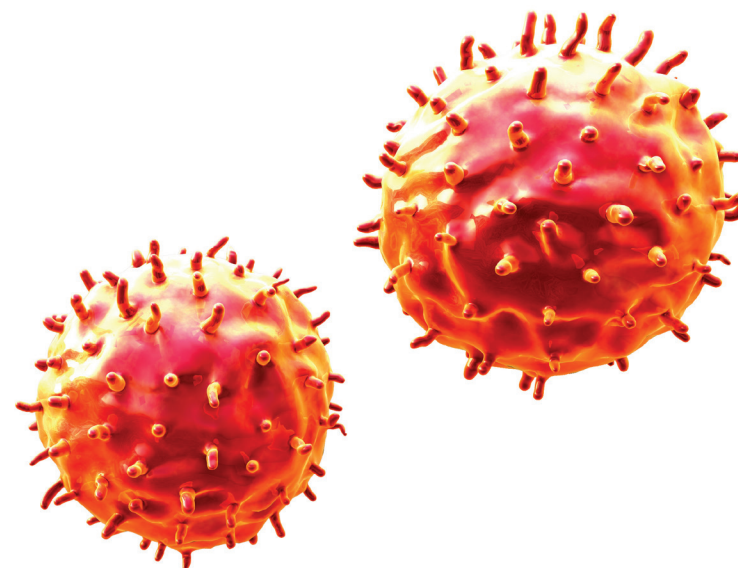


Interactive Example Candidate Responses

Paper 3 (May / June 2016), Question 1

Cambridge IGCSE™
Biology 0610



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1 Fig. 1.1 shows an animal cell.

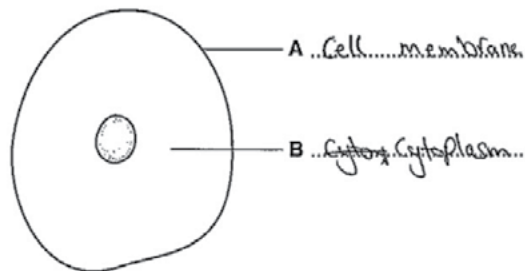


Fig. 1.1

(a) (i) Name the features labelled A and B.

Write your answers on Fig. 1.1.

[2]

(ii) The nucleus of living cells contains genetic material.

Name the **chemical** that this genetic material is made from.

.....Chromosomes.....[1]

(b) The cell in Fig. 1.1 carries out aerobic respiration.

Name **one** chemical that diffuses into an animal cell **and** one chemical that diffuses out of a cell during aerobic respiration.

chemical that diffuses inOxygen.....

chemical that diffuses outCarbon dioxide.....[2]

(c) The process of active transport occurs in some cells.

Outline **one** way in which diffusion is different to active transport.

.....Diffusion is movement of molecules down concentration gradient while active transport is movement of molecules against concentration gradient.....[1]

Select page

HIGH

MIDDLE

LOW

Your Mark

1(a)(i)

1(a)(ii)

1(b)

1(c)

1(d)(i)

1(d)(ii)

Q1	Mark scheme
(a)(i)	A – membrane/cell membrane/plasma membrane ; B – cytoplasm ; 2 marks
(a)(ii)	DNA; 1 mark
(b)	<i>diffuses in:</i> oxygen/glucose ; <i>diffuses out:</i> carbon dioxide/water ; 2 marks
(c)	(diffusion) does not need oxygen/respiration/energy (but active transport does); A diffusion is passive (diffusion) involves movement (of particles) from high to low concentration/down a concentration gradient (but opposite for active transport); 1 mark

EXAMINER COMMENTS

MARK SCHEME

Fig. 1.2 shows a cell from the palisade mesophyll layer of a leaf.

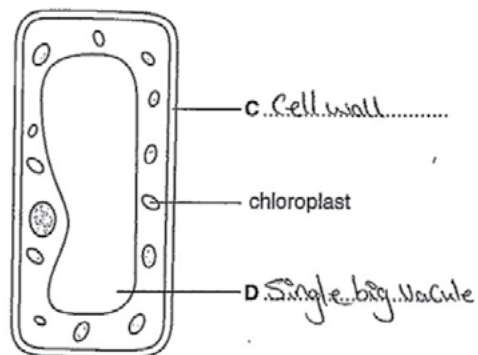


Fig. 1.2

(d) (i) Name the features labelled C and D.

Write your answers on Fig. 1.2.

[2]

(ii) Name the process carried out by the chloroplasts **and** explain why all animal life depends on this process.

name of process photosynthesis

explanation Chloroplasts contain green pigments which absorb sunlight and change it into light energy into chemical energy and make photosynthesis to produce (take Carbon dioxide, water and light) to produce glucose for their food and oxygen. all animals depend on plants for nutrition. plants are the producers of all food chains for any food chain so they are essential. also plants give out oxygen during photosynthesis, oxygen is responsible for respiration of all animals and removal of Carbon dioxide

[Total: 13]

Your Mark

1(a)(i)

1(a)(ii)

1(b)

1(c)

1(d)(i)

1(d)(ii)

Q1	Mark scheme	
(d)(i)	C – cell wall; R cell membrane	
	D – vacuole;	2 marks
(d)(ii)	process: <u>photosynthesis</u> ; AW throughout. Mark independently. I other named process	1 mark
	animal dependence: 1 (chloroplasts contain chlorophyll) absorb/use/trap, light/energy ; If respiration/another process is named, mark the explanation and award points relating to photosynthesis I sun (alone)	
	2 (to) produce glucose/carbohydrate/food, or plants are producers ;	
	3 (photosynthesis) removes carbon dioxide (from atmosphere) or adds oxygen (to the atmosphere) ;	
	4 primary consumers/herbivores/animals, gain energy or food/as they eat plants/producers ; I reference to food chain/web unqualified	
	5 secondary consumers/carnivores eat herbivores/primary consumers/other animals ; mp 2 and 3 (only) can be obtained from an equation.	
	6 (animals) need/use oxygen for respiration ; chemical equation must be correct and balanced	4 marks

1 Fig. 1.1 shows an animal cell.

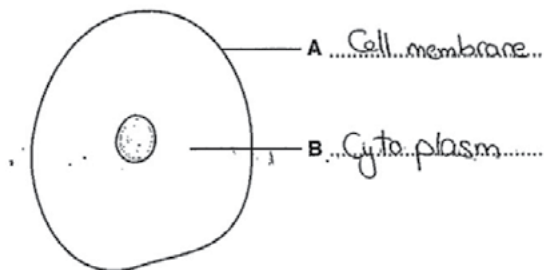


Fig. 1.1

(a) (i) Name the features labelled A and B.

Write your answers on Fig. 1.1.

[2]

(ii) The nucleus of living cells contains genetic material.

Name the **chemical** that this genetic material is made from.

~~Cell sap~~ DNA [1]

(b) The cell in Fig. 1.1 carries out aerobic respiration.

Name **one** chemical that diffuses into an animal cell **and** one chemical that diffuses out of a cell during aerobic respiration.

chemical that diffuses in water

chemical that diffuses out glycogen [2]

(c) The process of active transport occurs in some cells.

Outline **one** way in which diffusion is different to active transport.

diffusion is movement of gas particles from high concentration gradient to low concentration gradient [1]

Select page

HIGH

MIDDLE

LOW

Your Mark

1(a)(i)

1(a)(ii)

1(b)

1(c)

1(d)(i)

1(d)(ii)

Q1 Mark scheme

(a)(i)	A – membrane/cell membrane/plasma membrane ; B – cytoplasm ;	2 marks
(a)(ii)	DNA;	1 mark
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(c)	(diffusion) does not need oxygen/respiration/energy (but active transport does); A diffusion is passive (diffusion) involves movement (of particles) from high to low concentration/down a concentration gradient (but opposite for active transport);	1 mark

EXAMINER COMMENTS

MARK SCHEME

Fig. 1.2 shows a cell from the palisade mesophyll layer of a leaf.

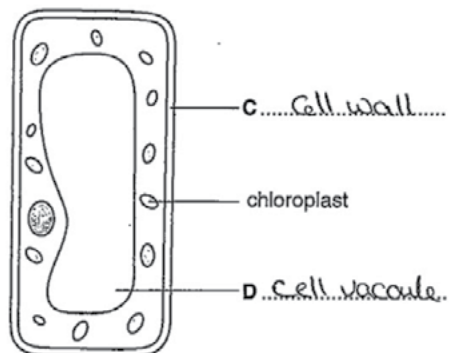


Fig. 1.2

- (d) (i) Name the features labelled C and D.

Write your answers on Fig. 1.2.

[2]

- (ii) Name the process carried out by the chloroplasts **and** explain why all animal life depends on this process.

name of process Photosynthesis

explanation when Photosynthesis is produced in plant

herbivours eat it and then Carnivours eat

the herbivours so it is the main food supply

because if it wasn't present herbivours and

omnivours would decrease in number too

leading to decrease in number of Carnivours

and Photosynthesis is

the main food supply

for all animals

because they need it for energy

[5]

[Total: 13]

Your Mark

1(a)(i)

1(a)(ii)

1(b)

1(c)

1(d)(i)

1(d)(ii)

Q1	Mark scheme	
(d)(i)	C – cell wall; R cell membrane	
	D – vacuole;	2 marks
(d)(ii)	process: photosynthesis ; AW throughout. Mark independently. I other named process	1 mark
	animal dependence: 1 (chloroplasts contain chlorophyll) absorb/use/trap, light/energy ; If respiration/another process is named, mark the explanation and award points relating to photosynthesis I sun (alone)	
	2 (to) produce glucose/carbohydrate/food, or plants are producers ;	
	3 (photosynthesis) removes carbon dioxide (from atmosphere) or adds oxygen (to the atmosphere) ;	
	4 primary consumers/herbivores/animals, gain energy or food/as they eat plants/producers ; I reference to food chain/web unqualified	
	5 secondary consumers/carnivores eat herbivores/primary consumers/other animals ; mp 2 and 3 (only) can be obtained from an equation.	
	6 (animals) need/use oxygen for respiration ; chemical equation must be correct and balanced	4 marks

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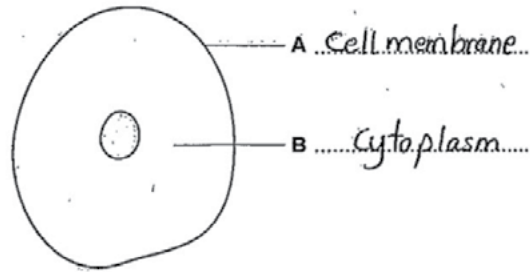


Fig. 1.1

(a) (i) Name the features labelled A and B.

Write your answers on Fig. 1.1.

[2]

(ii) The nucleus of living cells contains genetic material.

Name the **chemical** that this genetic material is made from.

.....protein.....[1]

(b) The cell in Fig. 1.1 carries out aerobic respiration.

Name **one** chemical that diffuses into an animal cell **and** one chemical that diffuses out of a cell during aerobic respiration.

chemical that diffuses inglucose + oxygen.....

chemical that diffuses outwater / Carbon dioxide.....[2]

(c) The process of active transport occurs in some cells.

Outline **one** way in which diffusion is different to active transport.

.....Diffusion is movement from high concentration to low concentration that different to active transport.....[1]

Select page

HIGH

MIDDLE

LOW

Your Mark

1(a)(i)

1(a)(ii)

1(b)

1(c)

1(d)(i)

1(d)(ii)

Q1	Mark scheme
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(a)(ii)	DNA; 1 mark
(b)	<i>diffuses in:</i> oxygen/glucose ; <i>diffuses out:</i> carbon dioxide/water ; 2 marks
(c)	(diffusion) does not need oxygen/respiration/energy (but active transport does); A diffusion is passive (diffusion) involves movement (of particles) from high to low concentration/down a concentration gradient (but opposite for active transport); 1 mark

EXAMINER COMMENTS

MARK SCHEME

Fig. 1.2 shows a cell from the palisade mesophyll layer of a leaf.

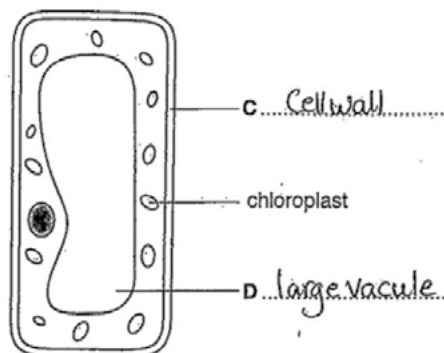


Fig. 1.2

- (d) (i) Name the features labelled C and D.

Write your answers on Fig. 1.2.

[2]

- (ii) Name the process carried out by the chloroplasts and explain why all animal life depends on this process.

name of process Energy / protein / glucose

explanation Animal life take more energy from the chloroplasts and more protein which help in growth and development, take high percentage of glucose.

[5]

[Total: 13]

Your Mark

1(a)(i)

1(a)(ii)

1(b)

1(c)

1(d)(i)

1(d)(ii)

Q1	Mark scheme	
(d)(i)	C – cell wall; R cell membrane	
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	5 secondary consumers/carnivores eat herbivores/primary consumers/other animals ; mp 2 and 3 (only) can be obtained from an equation.	
	6 (animals) need/use oxygen for respiration ; chemical equation must be correct and balanced	4 marks

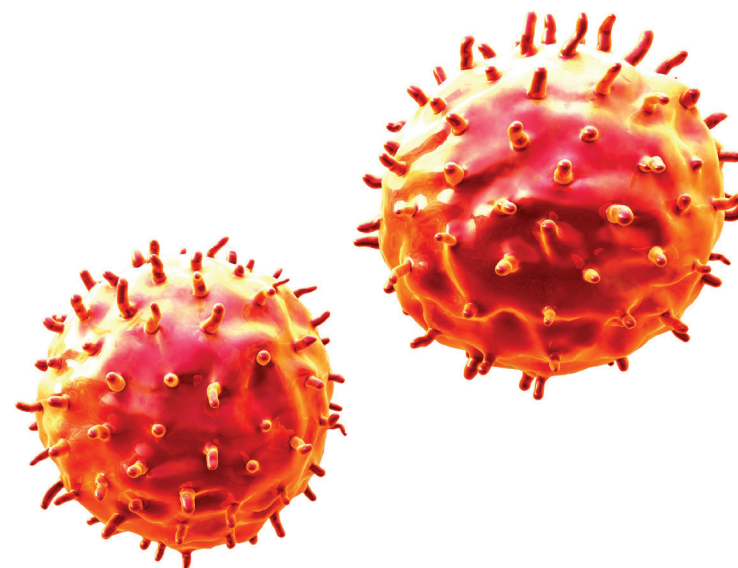
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Interactive Example Candidate Responses

Paper 3 (May / June 2016), Question 2

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Biology 0610



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2 Fig. 2.1 shows a gorilla with her baby.



Fig. 2.1

(a) Gorillas are mammals and have characteristics that are **only** found in mammals, and not in any other vertebrate group.

State:

(i) **one** mammalian characteristic visible in Fig. 2.1

Fur[1]

(ii) **two** mammalian characteristics **not** visible in Fig. 2.1

1 Suckle the babies

2 External ears

[2]

Select page

HIGH

MIDDLE

LOW

Your Mark

2(a)(i)

2(a)(ii)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(b)(iv)

2(c)

Q2 Mark scheme

(a)(i)	fur/hair; (external) ears; mammary glands;	1 mark
(a)(ii)	give birth (to live young) ; suckle young/feed young on milk ; 3 inner ear ossicles ; differentiated teeth ; 2 sets of teeth (deciduous and permanent) / AW ; diaphragm ; sweat glands ; sebaceous glands ;	2 marks

EXAMINER
COMMENTS

MARK
SCHEME

(b) Fig. 2.2 shows the average body mass and Table 2.1 shows the average lifespan of males in six species of mammal.

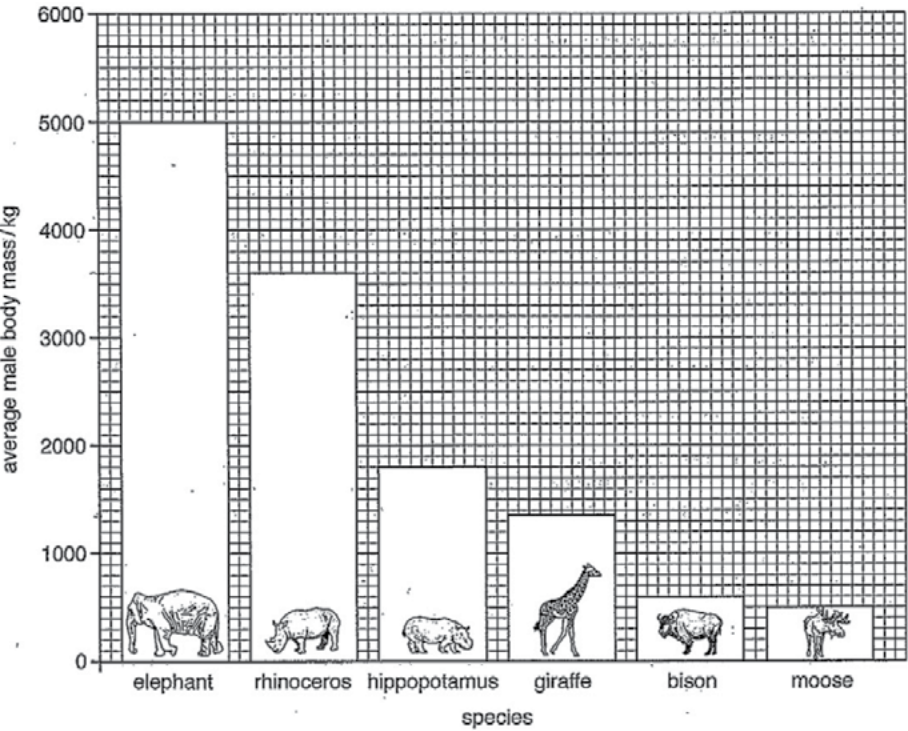


Fig. 2.2

Table 2.1

spécies	average male lifespan/years
elephant	70
rhinoceros	48
hippopotamus	42
giraffe	25
bison	23
moose	21

Your Mark

2(a)(i)

2(a)(ii)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(b)(iv)

2(c)

Q2	Mark scheme
(b)(i)	bison ; 1 mark
(b)(ii)	3600 (kg) ; 1 mark
(b)(iii)	number between 1300–1400 (kg) ; 1 mark
(b)(iv)	the larg(er) the body mass, the long(er) the life span/AW ora ; A positive correlation I proportional unqualified R directly proportional 1 mark
(c)	A AW throughout A examples of the categories I healthy life-style I good/stressful/hostile environment unqualified 1 water/potable/clean/drinkable ; 2 adequate food supply/balanced diet/eating healthily/ access to food/no famine ; 3 medical facilities/doctors/hospitals/treatments ; 4 personal hygiene ; 5 sanitation/sewage treatment/removal of rubbish ; 6 exercise facilities/taking regular exercise ; 7 shelter from elements/housing ; 8 absence of pollution/safe or clean environment ; 9 use of modern technology ; 10 improved education/schools ; 11 avoidance of smoking/alcohol/drugs ; 12 avoidance of hazardous behaviour/promiscuity/risky activities/crime/no war ; I avoid natural disasters/diseases 13 reduction in poverty ; 3 marks

- (i) Name the mammal that has an average lifespan of 23 years.

Bison.....[1]
- (ii) State the average body mass of a male rhinoceros.

.....3600..... kg [1]
- (iii) State the average body mass of the mammal that has an average lifespan of 25 years.

.....1350..... kg [1]
- (iv) Describe the relationship between average body mass and average lifespan shown in Fig. 2.2 and Table 2.1.

As the average body mass increases, the average lifespan increases.....[1]
- (c) The average lifespan of a human male can vary from 40 years to 85 years. The lifespan partly depends on the things available in the country where the man lives. Suggest **three** things that would increase the chance of a man having a longer lifespan.

1 Increased food supply.....

2 Less diseases.....

3 Increased health care.....

[3]

[Total: 10]

Your Mark

2(a)(i)

2(a)(ii)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(b)(iv)

2(c)

Q2	Mark scheme	
(b)(i)	bison ;	1 mark
(b)(ii)	3600 (kg) ;	1 mark
(b)(iii)	number between 1300–1400 (kg) ;	1 mark
(b)(iv)	the larg(er) the body mass, the long(er) the life span/AW ora ; A positive correlation I proportional unqualified R directly proportional	1 mark
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2 Fig. 2.1 shows a gorilla with her baby.



Fig. 2.1

(a) Gorillas are mammals and have characteristics that are **only** found in mammals, and not in any other vertebrate group.

State:

(i) **one** mammalian characteristic visible in Fig. 2.1

..... Fur [1]

(ii) **two** mammalian characteristics **not** visible in Fig. 2.1

1 1 pair of legs

2 [2]

Select page

HIGH

MIDDLE

LOW

Your Mark

2(a)(i)

2(a)(ii)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(b)(iv)

2(c)

Q2 Mark scheme

(a)(i)	fur/hair; (external) ears; mammary glands;	1 mark
(a)(ii)	give birth (to live young) ; suckle young/feed young on milk ; 3 inner ear ossicles ; differentiated teeth ; 2 sets of teeth (deciduous and permanent) / AW ; diaphragm ; sweat glands ; sebaceous glands ;	2 marks

EXAMINER
COMMENTS

MARK
SCHEME

(b) Fig. 2.2 shows the average body mass and Table 2.1 shows the average lifespan of males in six species of mammal.

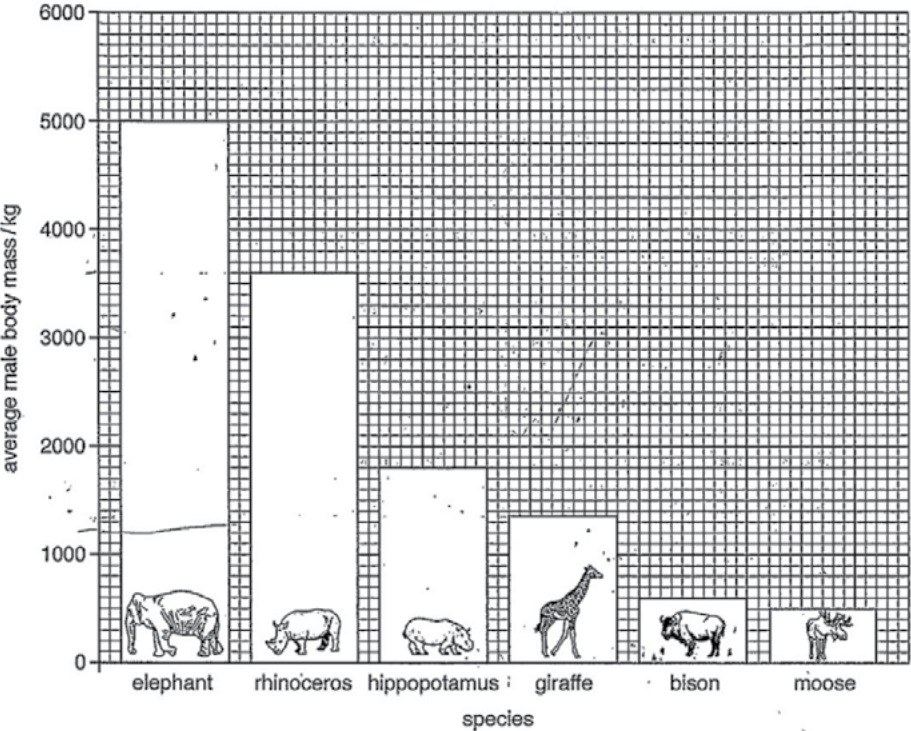


Fig. 2.2

Table 2.1

species	average male lifespan/years
elephant	70
rhinoceros	48
hippopotamus	42
giraffe	25
bison	23
moose	21

Your Mark

2(a)(i)

2(a)(ii)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(b)(iv)

2(c)

Q2	Mark scheme
(b)(i)	bison ; 1 mark
(b)(ii)	3600 (kg) ; 1 mark
(b)(iii)	number between 1300–1400 (kg) ; 1 mark
(b)(iv)	the larg(er) the body mass, the long(er) the life span/AW ora ; A positive correlation I proportional unqualified R directly proportional 1 mark
(c)	A AW throughout A examples of the categories I healthy life-style I good/stressful/hostile environment unqualified 1 water/potable/clean/drinkable ; 2 adequate food supply/balanced diet/eating healthily/ access to food/no famine ; 3 medical facilities/doctors/hospitals/treatments ; 4 personal hygiene ; 5 sanitation/sewage treatment/removal of rubbish ; 6 exercise facilities/taking regular exercise ; 7 shelter from elements/housing ; 8 absence of pollution/safe or clean environment ; 9 use of modern technology ; 10 improved education/schools ; 11 avoidance of smoking/alcohol/drugs ; 12 avoidance of hazardous behaviour/promiscuity/risky activities/crime/no war ; I avoid natural disasters/diseases 13 reduction in poverty ; 3 marks

LOW

bison [1]

.....3600..... kg [1]

.....1350..... kg [1]

as average body mass decreases
average lifespan decrease. They are
inversely proportional. [1]

1. No Pollution

2. balanced diet

3 [3]

Your Mark

2(a)(i)

2(a)(ii)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(b)(iv)

2(c)

Q2	Mark scheme
(b)(i)	bison ; 1 mark
(b)(ii)	<u>3600</u> (kg) ; 1 mark
(b)(iii)	number between 1300–1400 (kg) ; 1 mark
(b)(iv)	the larg(er) the body mass, the long(er) the life span/AW ora ; A positive correlation I proportional unqualified R directly proportional 1 mark
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MARK SCHEME

2 Fig. 2.1 shows a gorilla with her baby.



Fig. 2.1

- (a) Gorillas are mammals and have characteristics that are **only** found in mammals, and not in any other vertebrate group.

State:

- (i) **one** mammalian characteristic visible in Fig. 2.1

..... Have hair [1]

- (ii) **two** mammalian characteristics **not** visible in Fig. 2.1

1 Fingers toes

2 Flappy ears [2]

Your Mark

2(a)(i)

2(a)(ii)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(b)(iv)

2(c)

Q2	Mark scheme	
(a)(i)	fur/hair; (external) ears; mammary glands;	1 mark
(a)(ii)	give birth (to live young) ; suckle young/feed young on milk ; 3 inner ear ossicles ; differentiated teeth ; 2 sets of teeth (deciduous and permanent) / AW ; diaphragm ; sweat glands ; sebaceous glands ;	2 marks

(b) Fig. 2.2 shows the average body mass and Table 2.1 shows the average lifespan of males in six species of mammal.

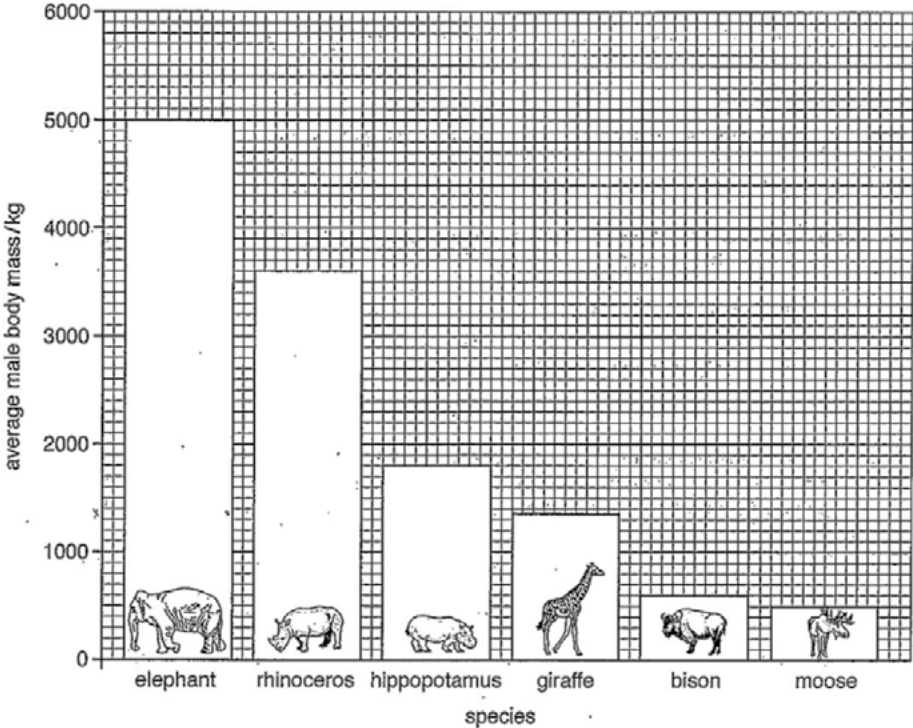


Fig. 2.2

Table 2.1

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rhinoceros	48
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bison	23
moose	21

Your Mark

2(a)(i)

2(a)(ii)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(b)(iv)

2(c)

Q2	Mark scheme
(b)(i)	bison ; 1 mark
(b)(ii)	3600 (kg) ; 1 mark
(b)(iii)	number between 1300–1400 (kg) ; 1 mark
(b)(iv)	the larg(er) the body mass, the long(er) the life span/AW ora ; A positive correlation I proportional unqualified R directly proportional 1 mark
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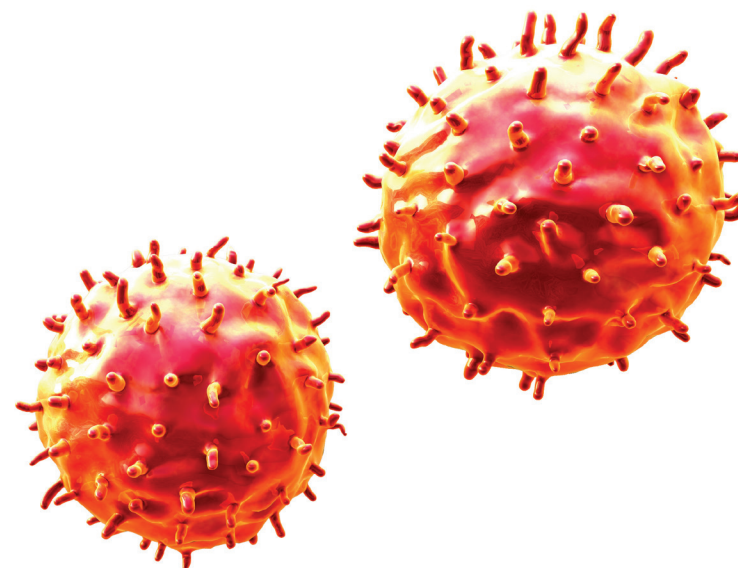
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Interactive Example Candidate Responses

Paper 3 (May / June 2016), Question 3

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3 Fig. 3.1 shows a section through the skin.

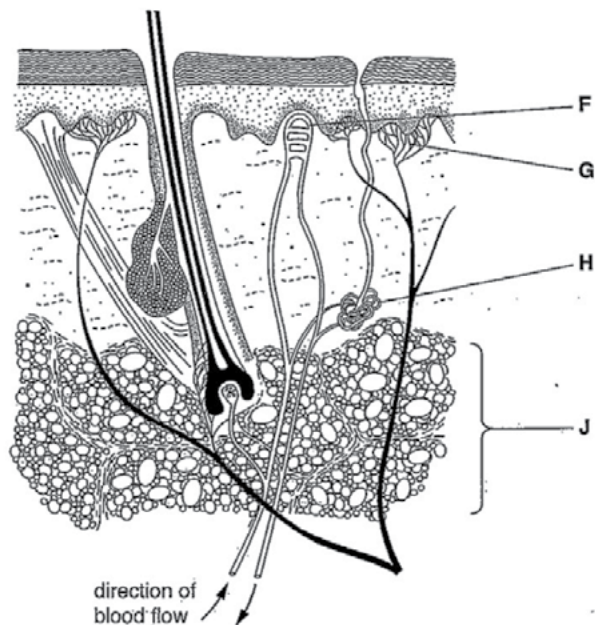


Fig. 3.1

(a) Name the structures labelled in Fig. 3.1 and outline a function in the skin for each one.

Write your answers in Table 3.1.

An example has been done for you.

Table 3.1

structure	name of structure	function in the skin
F	Capillary loop	diabetes and constricts to control the blood flow
G	sensory neurones	detects stimulus
H	sweat gland	produces sweat for cooling the body
J	fatty tissue	insulation for the skin.

[6]

Select page

HIGH

MIDDLE

LOW

Your Mark

3(a)

3(b)(i)

3(b)(ii)

3(c)

Q3 Mark scheme

(a)	label	name	function
	F	capillary ;	transports blood/heat/ supplies oxygen glucose to cells/removes carbon dioxide; I vein/artery
	G	receptors/sensory neurone ;	detect changes in external environment/stimulus/ touch/pressure/ temperature; R detects temperature of the blood I responds to
	H		
	J	adipose tissue/fat/fatty tissue ;	insulation/prevention of heat loss/keeps body warm/shock absorber/ energy store; I fatty acids I dermis
6 marks			
(b)(i)	with no back-pack 6 (arbitrary units); with 9 kg back-pack 13 (arbitrary units); 117(%); I 116.6%		
3 marks			
(b)(ii)	more/increased volume of, sweat produced;		
1 mark			
(c)	1 ref. to evaporation ; I ref. to heat loss by conduction/convection/radiation 2 (of) water/sweat ; 3 (idea of) need for heat/latent heat/energy ; I sweat absorbs heat unqualified 4 (heat/latent heat/energy for evaporation) taken from/ body/skin/blood ; 5 blood carries heat ;		
3 marks			

EXAMINER
COMMENTS

MARK
SCHEME

- (b) In an investigation the volume of sweat produced by a student was measured when running while carrying different masses in a back-pack.



The results are shown in Fig. 3.2.

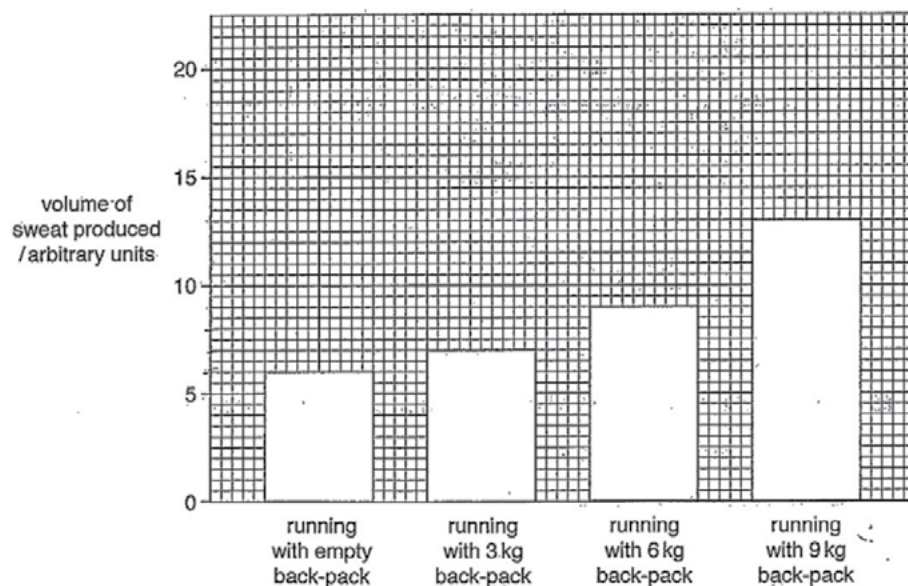


Fig. 3.2

Your Mark

3(a)

3(b)(i)

3(b)(ii)

3(c)

Q3 Mark scheme			
(a)	label	name	function
	F	capillary ;	transports blood/heat/ supplies oxygen glucose to cells/removes carbon dioxide; I vein/artery
	G	receptors/sensory neurone ;	detect changes in external environment/stimulus/ touch/pressure/ temperature; R detects temperature of the blood I responds to
	H		
(b)(i)	J	adipose tissue/fat/fatty tissue ;	insulation/prevention of heat loss/keeps body warm/shock absorber/ energy store; I fatty acids I dermis
	6 marks		
(b)(i)		with no back-pack 6 (arbitrary units); with 9 kg back-pack 13 (arbitrary units); 117(%); I 116.6%	3 marks
(b)(ii)		more/increased volume of, sweat produced;	1 mark
(c)		1 ref. to evaporation ; I ref. to heat loss by conduction/convection/radiation 2 (of) water/sweat ; 3 (idea of) need for heat/latent heat/energy ; I sweat absorbs heat unqualified 4 (heat/latent heat/energy for evaporation) taken from/ body/skin/blood ; 5 blood carries heat ;	3 marks

3 Fig. 3.1 shows a section through the skin.

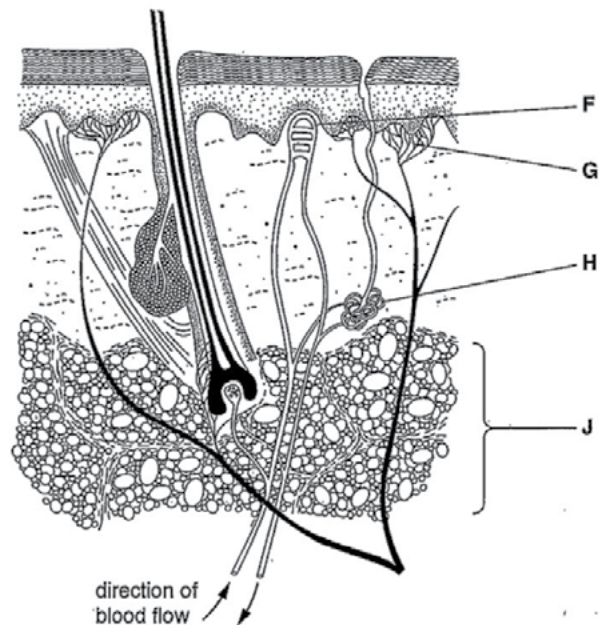


Fig. 3.1

(a) Name the structures labelled in Fig. 3.1 and outline a function in the skin for each one.

Write your answers in Table 3.1.

An example has been done for you.

Table 3.1

structure	name of structure	function in the skin
F	blood capillaries	take in and to out blood.
G	receptors	transport signals.
H	sweat gland	produces sweat for cooling the body
J	Spongy mesophyll	for gas exchange

[6]

Your Mark

3(a)

3(b)(i)

3(b)(ii)

3(c)

Q3	Mark scheme		
(a)	label	name	function
	F	capillary ;	transports blood/heat/ supplies oxygen glucose to cells/removes carbon dioxide; I vein/artery
	G	receptors/sensory neurone ;	detect changes in external environment/stimulus/ touch/pressure/ temperature; R detects temperature of the blood I responds to
	H		
	J	adipose tissue/fat/fatty tissue ;	insulation/prevention of heat loss/keeps body warm/shock absorber/ energy store; I fatty acids I dermis
6 marks			
(b)(i)	with no back-pack 6 (arbitrary units); with 9kg back-pack 13 (arbitrary units); 117(%); I 116.6%		
3 marks			
(b)(ii)	more/increased volume of, sweat produced;		
1 mark			
(c)	1 ref. to evaporation ; I ref. to heat loss by conduction/convection/radiation 2 (of) water/sweat ; 3 (idea of) need for heat/latent heat/energy ; I sweat absorbs heat unqualified 4 (heat/latent heat/energy for evaporation) taken from/ body/skin/blood ; 5 blood carries heat ;		
3 marks			

(b) In an investigation the volume of sweat produced by a student was measured when running while carrying different masses in a back-pack.



The results are shown in Fig. 3.2.

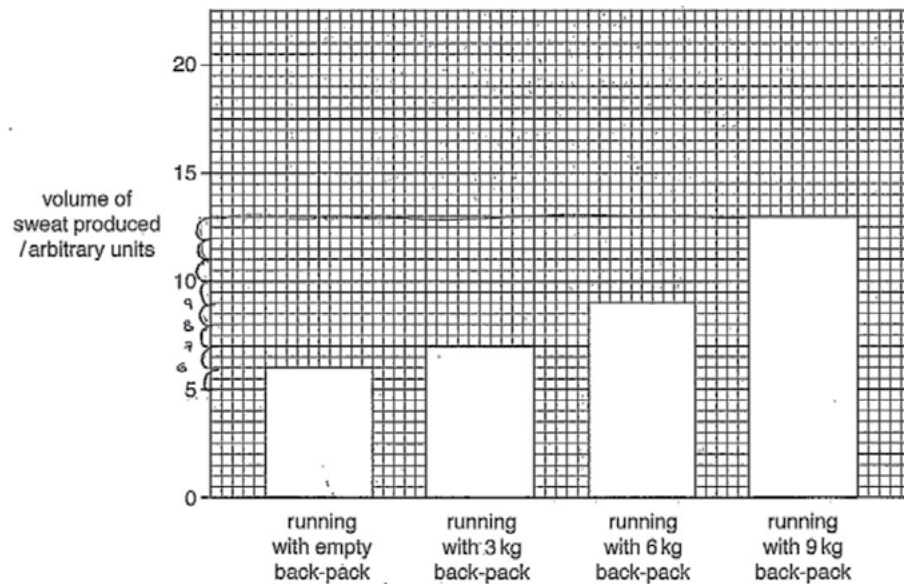


Fig. 3.2

Your Mark

3(a)

3(b)(i)

3(b)(ii)

3(c)

Q3 Mark scheme			
(a)	label	name	function
	F	capillary ;	transports blood/heat/ supplies oxygen glucose to cells/removes carbon dioxide; I vein/artery
	G	receptors/sensory neurone ;	detect changes in external environment/stimulus/ touch/pressure/ temperature; R detects temperature of the blood I responds to
	H		
(b)(i)	J	adipose tissue/fat/fatty tissue ;	insulation/prevention of heat loss/keeps body warm/shock absorber/ energy store; I fatty acids I dermis
	6 marks		
(b)(i)		with no back-pack 6 (arbitrary units); with 9 kg back-pack 13 (arbitrary units); 117(%); I 116.6%	3 marks
(b)(ii)		more/increased volume of, sweat produced;	1 mark
(c)		1 ref. to evaporation ; I ref. to heat loss by conduction/convection/radiation 2 (of) water/sweat ; 3 (idea of) need for heat/latent heat/energy ; I sweat absorbs heat unqualified 4 (heat/latent heat/energy for evaporation) taken from/ body/skin/blood ; 5 blood carries heat ;	3 marks

(i) Use Fig. 3.2 to state:

the volume of sweat produced when running with an empty back-pack

6 arbitrary units

the volume of sweat produced when running with a 9 kg back-pack

.....13..... arbitrary units

Use these two volumes to calculate the percentage increase in sweat production when running with a 9kg back-pack.

Give your answer to the nearest whole number.

Show your working.

$$\frac{6}{9} \times 100$$

..... %
[3]

(ii) This investigation was carried out when the air temperature was 10 °C.

Predict the effect of carrying out the same investigation if the air temperature was 15 °C.

Different volumes of sweat produced.

(c) When the student was at rest the volume of sweat produced was 2 arbitrary units.

The volume increases during exercise as the body needs to keep cool.

Explain how this cooling takes place.

Cooling takes space by evaporating of water muscles need more energy to contract, more loss of sweat and sweat goes out to keep the body temperature cool and ~~and~~ constant

[Total: 13]

Your Mark

3(a)

3(b)(i)

3(b)(ii)

3(c)

Q3 Mark scheme

(a)	label	name	function
	F	capillary ;	transports blood/heat/ supplies oxygen glucose to cells/removes carbon dioxide; I vein/artery
	G	receptors/sensory neurone ;	detect changes in external environment/stimulus/ touch/pressure/ temperature; R detects temperature of the blood I responds to
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	J	adipose tissue/fat/fatty tissue ;	insulation/prevention of heat loss/keeps body warm/shock absorber/ energy store; I fatty acids I dermis
6 marks			
(b)(i)	with no back-pack 6 (arbitrary units); with 9 kg back-pack 13 (arbitrary units); 117%; I 116.6%		
3 marks			
(b)(ii)	more/increased volume of, sweat produced;		
1 mark			
(c)	1 ref. to evaporation ; I ref. to heat loss by conduction/convection/radiation 2 (of) water/sweat ; 3 (idea of) need for heat/latent heat/energy ; I sweat absorbs heat unqualified 4 (heat/latent heat/energy for evaporation) taken from/ body/skin/blood ; 5 blood carries heat ;		
3 marks			

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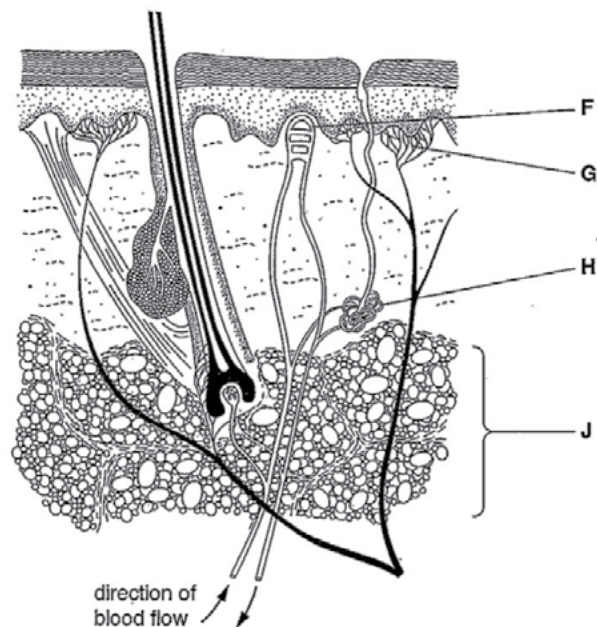


Fig. 3.1

(a) Name the structures labelled in Fig. 3.1 and outline a function in the skin for each one.

Write your answers in Table 3.1.

An example has been done for you.

Table 3.1

structure	name of structure	function in the skin
F	Vein	Support skin with blood Blood supply
G	Nerve	Control movement
H	sweat gland	produces sweat for cooling the body
J	Tissue (group of cells)	Respiration in skin

[6]

Select page

HIGH

MIDDLE

LOW

Your Mark

3(a)

3(b)(i)

3(b)(ii)

3(c)

Q3 Mark scheme

(a)	label	name	function
	F	capillary ;	transports blood/heat/ supplies oxygen glucose to cells/removes carbon dioxide; I vein/artery
	G	receptors/sensory neurone ;	detect changes in external environment/stimulus/ touch/pressure/ temperature; R detects temperature of the blood I responds to
	H		
	J	adipose tissue/fat/fatty tissue ;	insulation/prevention of heat loss/keeps body warm/shock absorber/ energy store; I fatty acids I dermis
6 marks			
(b)(i)	with no back-pack 6 (arbitrary units); with 9 kg back-pack 13 (arbitrary units); 117(%) I 116.6%		
			3 marks
(b)(ii)	more/increased volume of, sweat produced;		
			1 mark
(c)	1 ref. to evaporation ; I ref. to heat loss by conduction/convection/radiation 2 (of) water/sweat ; 3 (idea of) need for heat/latent heat/energy ; I sweat absorbs heat unqualified 4 (heat/latent heat/energy for evaporation) taken from/ body/skin/blood ; 5 blood carries heat ;		
			3 marks

EXAMINER
COMMENTS

MARK
SCHEME

- (b) In an investigation the volume of sweat produced by a student was measured when running while carrying different masses in a back-pack.



The results are shown in Fig. 3.2.

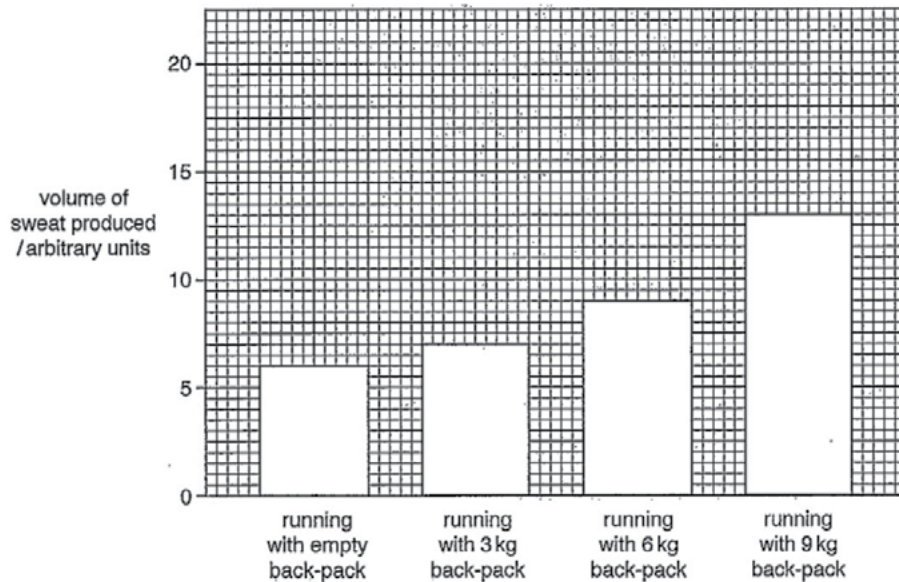


Fig. 3.2

Your Mark

3(a)

3(b)(i)

3(b)(ii)

3(c)

Q3 Mark scheme

(a)	label	name	function
	F	capillary ;	transports blood/heat/ supplies oxygen glucose to cells/removes carbon dioxide; I vein/artery
	G	receptors/sensory neurone ;	detect changes in external environment/stimulus/ touch/pressure/ temperature; R detects temperature of the blood I responds to
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(b)(i)	J	adipose tissue/fat/fatty tissue ;	insulation/prevention of heat loss/keeps body warm/shock absorber/ energy store; I fatty acids I dermis
	6 marks		
(b)(i)		with no back-pack 6 (arbitrary units); with 9 kg back-pack 13 (arbitrary units); 117(%); I 116.6%	3 marks
(b)(ii)		more/increased volume of, sweat produced;	1 mark
(c)		1 ref. to evaporation ; I ref. to heat loss by conduction/convection/radiation 2 (of) water/sweat ; 3 (idea of) need for heat/latent heat/energy ; I sweat absorbs heat unqualified 4 (heat/latent heat/energy for evaporation) taken from/ body/skin/blood ; 5 blood carries heat ;	3 marks

MARK SCHEME

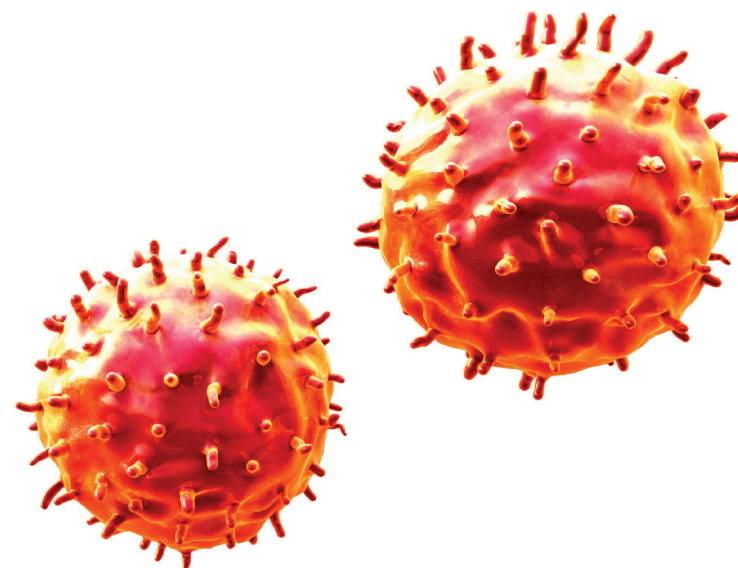
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Interactive Example Candidate Responses

Paper 3 (May / June 2016), Question 4

Cambridge IGCSE™
Biology 0610



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4 Choose words from the list to complete the sentences about hormones.

Each word may be used once, more than once, or not at all.

adrenaline	blood	decrease	glands
increase	insulin	nerves	main
saliva	system	target	urine

Hormones are chemicals produced by adrenaline glands.

Hormones are carried round the body by the blood.

A hormone affects the activity of one part of the body called the target organ.

After a person has eaten a meal the pancreas releases the hormone insulin.

One of the effects of this hormone is to lower the glucose level in the blood. [5]

[Total: 5]

Your Mark

4

Q4 Mark scheme

glands ;
blood ;
target ;
insulin ;
blood ;

5 marks

4 Choose words from the list to complete the sentences about hormones.

Each word may be used once, more than once, or not at all.

adrenaline	blood	decrease	glands
increase	insulin	nerves	main
saliva	system	target	urine

Hormones are chemicals produced byglands.....

Hormones are carried round the body by theblood.....

A hormone affects the activity of one part of the body called themain..... organ.

After a person has eaten a meal the pancreas releases the hormoneinsulin.....

One of the effects of this hormone is to lower the glucose level in theurine..... [5]

[Total: 5]

Select page

HIGH

MIDDLE

LOW

Your Mark

4

Q4	Mark scheme
	glands ; blood ; target ; insulin ; blood ; 5 marks

EXAMINER
COMMENTS

MARK
SCHEME

4 Choose words from the list to complete the sentences about hormones.

Each word may be used once, more than once, or not at all.

adrenaline	blood	decrease	glands
increase	insulin	nerves	main
saliva	system	target	urine

Hormones are chemicals produced by blood

Hormones are carried round the body by the blood glands

A hormone affects the activity of one part of the body called the main organ.

After a person has eaten a meal the pancreas releases the hormone insulin

One of the effects of this hormone is to lower the glucose level in the urine [5]

[Total: 5]

Select page

HIGH

MIDDLE

LOW

Your Mark

4

Q4 Mark scheme

glands ;
blood ;
target ;
insulin ;
blood ;

5 marks

EXAMINER
COMMENTS

MARK
SCHEME

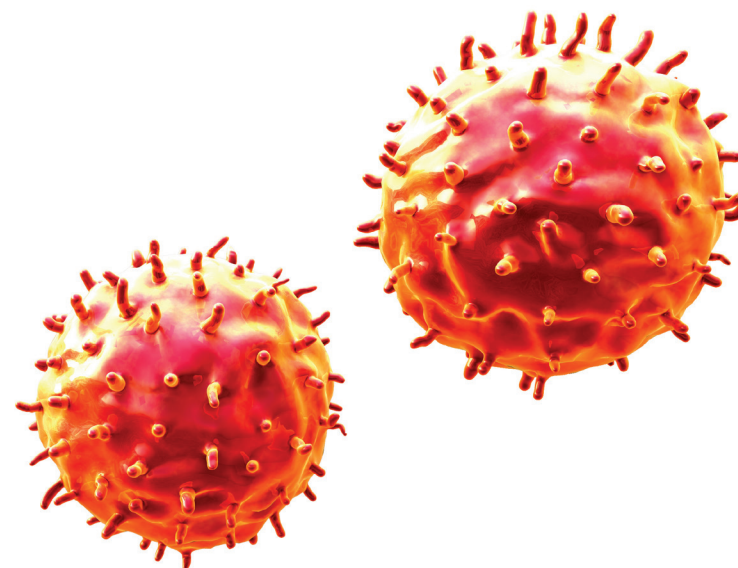
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e: info@cambridgeinternational.org www.cambridgeinternational.org

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Interactive Example Candidate Responses

Paper 3 (May / June 2016), Question 5

Cambridge IGCSE™
Biology 0610



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5 Fig. 5.1 shows some apparatus used to investigate transpiration:

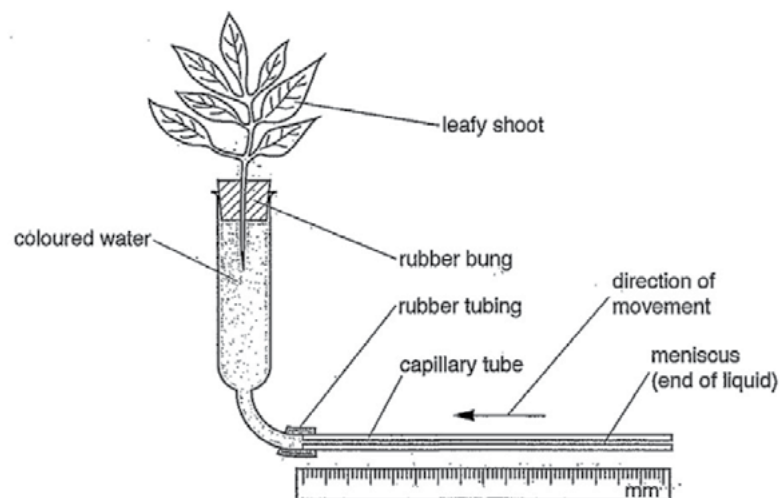


Fig. 5.1

The rate of transpiration can be calculated by measuring how far the meniscus moves in five minutes.

(a) Name the tissue that transports water from the roots to the leaves in a plant.

.....xylem.....[1]

Select page

HIGH

MIDDLE

LOW

Your Mark

5(a)

5(b)(i)

5(b)(ii)

5(c)(i)

5(c)(ii)

5(d)

Q5	Mark scheme	
(a)	xylem ;	1 mark
(b)(i)	rate of transpiration increases as temperature rises/ ora ; A positive correlation rate of increase becomes faster as temperature rises/ ora ; I efficiency the higher the temperature the greater the distance moved by the meniscus ora ; R incorrect causal relationship in an ora	1 mark
(b)(ii)	1 enzymes will be destroyed/cease to function ; A enzymes denatured 2 shoot/plant/leaf/cells die/no transpiration ; 3 water loss greater than water intake ; A wilting 4 difficulty in achieving temperature (in lab) ;	2 marks
(c)(i)	less transpiration/(meniscus) will not move as fast or as far/slower rate of movement/less water loss/less water uptake ; I smaller/lower results	1 mark
(c)(ii)	1 smaller leaves ; 2 fewer leaves ; 3 less surface area (for transpiration) ; 4 fewer stomata (through which transpiration can occur) ;	2 marks
(d)	humidity ; A air movement/light (intensity)/carbon dioxide concentration	1 mark

EXAMINER COMMENTS

MARK SCHEME

- (b) The investigation was carried out at five different temperatures. All other conditions were kept constant.

Table 5.1 shows the results recorded using the apparatus shown in Fig. 5.1.

Table 5.1

temperature/°C	distance moved by meniscus in five minutes/mm
10	28
20	32
30	37
40	44
50	53

- (i) State **one** conclusion that can be drawn from the results in Table 5.1 about the effect of temperature on the rate of transpiration.

when the temperature increase, the rate of transpiration increases. [1]

- (ii) Suggest why the investigation was not continued at temperatures above 50°C.

because the enzymes in the plant will be denatured from high temperature. [2]

Your Mark

5(a)

5(b)(i)

5(b)(ii)

5(c)(i)

5(c)(ii)

5(d)

Q5	Mark scheme	
(a)	xylem ;	1 mark
(b)(i)	rate of transpiration increases as temperature rises/ ora ; A positive correlation rate of increase becomes faster as temperature rises/ ora ; I efficiency the higher the temperature the greater the distance moved by the meniscus ora ; R incorrect causal relationship in an ora	1 mark
(b)(ii)	1 enzymes will be destroyed/cease to function ; A enzymes denatured 2 shoot/plant/leaf/cells die/no transpiration ; 3 water loss greater than water intake ; A wilting 4 difficulty in achieving temperature (in lab) ;	2 marks
(c)(i)	less transpiration/(meniscus) will not move as fast or as far/slower rate of movement/less water loss/less water uptake ; I smaller/lower results	1 mark
(c)(ii)	1 smaller leaves ; 2 fewer leaves ; 3 less surface area (for transpiration) ; 4 fewer stomata (through which transpiration can occur) ;	2 marks
(d)	humidity ; A air movement/light (intensity)/carbon dioxide concentration	1 mark

(c) The investigation was repeated using the leafy shoot shown in Fig. 5.2.



Fig. 5.2

(i) Predict how these results would be different to the results shown in Table 5.1.

The results will be less than the results in Table 5.1 [1]

(ii) Give two reasons why the results would be different.

because this leafy shoot is smaller than the other and has less leaves than the other, so the amount of water moved will be less. [2]

(d) State one factor, other than temperature, that can affect the rate of transpiration.

humidity [1]

[Total: 8]

Your Mark

5(a)

5(b)(i)

5(b)(ii)

5(c)(i)

5(c)(ii)

5(d)

Q5	Mark scheme	
(a)	xylem ;	1 mark
(b)(i)	rate of transpiration increases as temperature rises/ ora ; A positive correlation rate of increase becomes faster as temperature rises/ ora ; I efficiency the higher the temperature the greater the distance moved by the meniscus ora ; R incorrect causal relationship in an ora	1 mark
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(c)(i)	less transpiration/(meniscus) will not move as fast or as far/slower rate of movement/less water loss/less water uptake ; I smaller/lower results	1 mark
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(d)	humidity ; A air movement/light (intensity)/carbon dioxide concentration	1 mark

5 Fig. 5.1 shows some apparatus used to investigate transpiration.

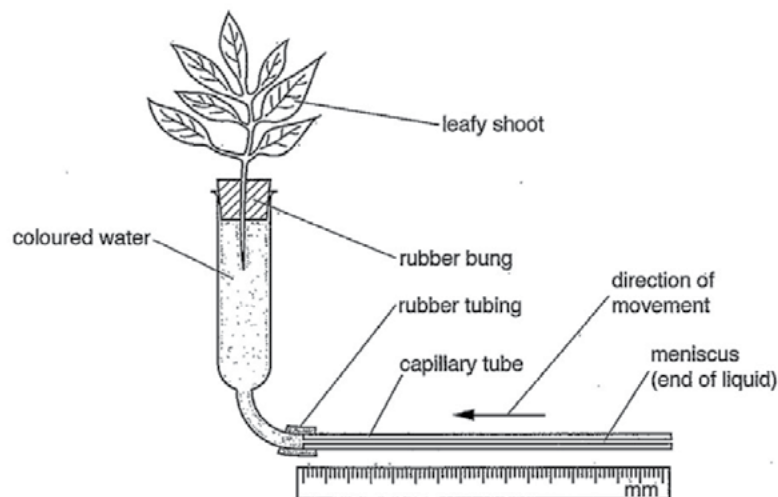


Fig. 5.1

The rate of transpiration can be calculated by measuring how far the meniscus moves in five minutes.

(a) Name the tissue that transports water from the roots to the leaves in a plant.

xylem tissue [1]

Select page

HIGH

MIDDLE

LOW

Your Mark

5(a)

5(b)(i)

5(b)(ii)

5(c)(i)

5(c)(ii)

5(d)

Q5	Mark scheme	
(a)	xylem ;	1 mark
(b)(i)	rate of transpiration increases as temperature rises/ ora ; A positive correlation rate of increase becomes faster as temperature rises/ ora ; I efficiency the higher the temperature the greater the distance moved by the meniscus ora ; R incorrect causal relationship in an ora	1 mark
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(d)	humidity ; A air movement/light (intensity)/carbon dioxide concentration	1 mark

EXAMINER COMMENTS

MARK SCHEME

- (b) The investigation was carried out at five different temperatures. All other conditions were kept constant.

Table 5.1 shows the results recorded using the apparatus shown in Fig. 5.1.

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10	28
20	32
30	37
40	44
50	53

- (i) State **one** conclusion that can be drawn from the results in Table 5.1 about the effect of temperature on the rate of transpiration.

As temperature increase, the rate of transpiration increase. [1]

- (ii) Suggest why the investigation was not continued at temperatures above 50°C.

Because above 50°C causes the air to be saturated with water vapour (humidity) the rate of transpiration will decrease. [2]

Your Mark

5(a)

5(b)(i)

5(b)(ii)

5(c)(i)

5(c)(ii)

5(d)

Q5	Mark scheme
(a)	xylem ; 1 mark
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(c)(i)	less transpiration/(meniscus) will not move as fast or as far/slower rate of movement/less water loss/less water uptake ; I smaller/lower results 1 mark
(c)(ii)	1 smaller leaves ; 2 fewer leaves ; 3 less surface area (for transpiration) ; 4 fewer stomata (through which transpiration can occur) ; 2 marks
(d)	humidity ; A air movement/light (intensity)/carbon dioxide concentration 1 mark

(c) The investigation was repeated using the leafy shoot shown in Fig. 5.2.



Fig. 5.2

(i) Predict how these results would be different to the results shown in Table 5.1.

The distance moved by the meniscus in 5 minute will decrease. [1]

(ii) Give two reasons why the results would be different.

① Because few leaves are used
② Because the rate of transpiration will decrease. [2]

(d) State one factor, other than temperature, that can affect the rate of transpiration.

humidity [1]

[Total: 8]

Your Mark

5(a)

5(b)(i)

5(b)(ii)

5(c)(i)

5(c)(ii)

5(d)

Q5	Mark scheme	
(a)	xylem ;	1 mark
(b)(i)	rate of transpiration increases as temperature rises/ ora ; A positive correlation rate of increase becomes faster as temperature rises/ ora ; I efficiency the higher the temperature the greater the distance moved by the meniscus ora ; R incorrect causal relationship in an ora	1 mark
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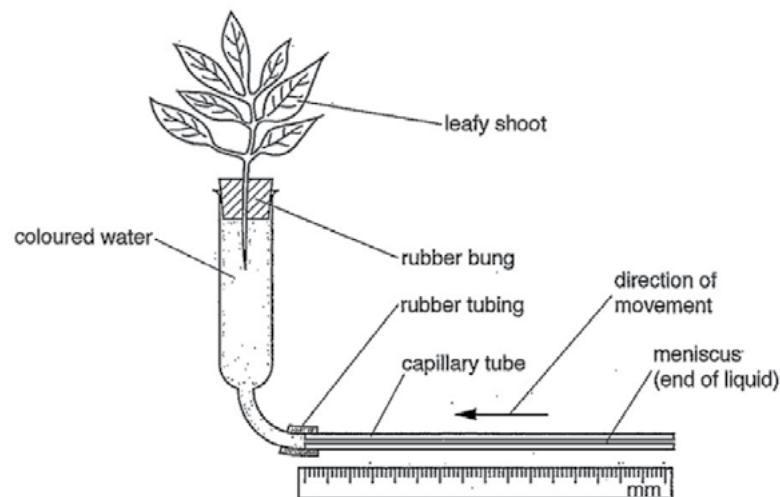


Fig. 5.1

The rate of transpiration can be calculated by measuring how far the meniscus moves in five minutes.

(a) Name the tissue that transports water from the roots to the leaves in a plant.

.....xylem.....[1]

Select page

HIGH

MIDDLE

LOW

Your Mark

5(a)

5(b)(i)

5(b)(ii)

5(c)(i)

5(c)(ii)

5(d)

Q5	Mark scheme	
(a)	xylem ;	1 mark
(b)(i)	rate of transpiration increases as temperature rises/ ora ; A positive correlation rate of increase becomes faster as temperature rises/ ora ; I efficiency the higher the temperature the greater the distance moved by the meniscus ora ; R incorrect causal relationship in an ora	1 mark
(b)(ii)	1 enzymes will be destroyed/cease to function ; A enzymes denatured 2 shoot/plant/leaf/cells die/no transpiration ; 3 water loss greater than water intake ; A wilting 4 difficulty in achieving temperature (in lab) ;	2 marks
(c)(i)	less transpiration/(meniscus) will not move as fast or as far/slower rate of movement/less water loss/less water uptake ; I smaller/lower results	1 mark
(c)(ii)	1 smaller leaves ; 2 fewer leaves ; 3 less surface area (for transpiration) ; 4 fewer stomata (through which transpiration can occur) ;	2 marks
(d)	humidity ; A air movement/light (intensity)/carbon dioxide concentration	1 mark

EXAMINER
COMMENTS

MARK
SCHEME

- (b) The investigation was carried out at five different temperatures. All other conditions were kept constant.

Table 5.1 shows the results recorded using the apparatus shown in Fig. 5.1.

Table 5.1

temperature/°C	distance moved by meniscus in five minutes/mm
10	28
20	32
30	37
40	44
50	53

- (i). State **one** conclusion that can be drawn from the results in Table 5.1 about the effect of temperature on the rate of transpiration.

As ~~temp~~ temperature increases the distance moved by meniscus ~~is~~ increases [1]

- (ii) Suggest why the investigation was not continued at temperatures above 50°C.

because it would have been too hot for the meniscus to move and the thermometer wouldn't record because it has reached the end of its scale [2]

Your Mark

5(a)

5(b)(i)

5(b)(ii)

5(c)(i)

5(c)(ii)

5(d)

Q5	Mark scheme	
(a)	xylem ;	1 mark
(b)(i)	rate of transpiration increases as temperature rises/ ora ; A positive correlation rate of increase becomes faster as temperature rises/ ora ; I efficiency the higher the temperature the greater the distance moved by the meniscus ora ; R incorrect causal relationship in an ora	1 mark
(b)(ii)	1 enzymes will be destroyed/cease to function ; A enzymes denatured 2 shoot/plant/leaf/cells die/no transpiration ; 3 water loss greater than water intake ; A wilting 4 difficulty in achieving temperature (in lab) ;	2 marks
(c)(i)	less transpiration/(meniscus) will not move as fast or as far/slower rate of movement/less water loss/less water uptake ; I smaller/lower results	1 mark
(c)(ii)	1 smaller leaves ; 2 fewer leaves ; 3 less surface area (for transpiration) ; 4 fewer stomata (through which transpiration can occur) ;	2 marks
(d)	humidity ; A air movement/light (intensity)/carbon dioxide concentration	1 mark

(c) The investigation was repeated using the leafy shoot shown in Fig. 5.2.



Fig. 5.2

(i) Predict how these results would be different to the results shown in Table 5.1.

~~The distance~~ it would be less accurate. [1]

(ii) Give two reasons why the results would be different.

different conditions. different apparatus used. [2]

(d) State one factor, other than temperature, that can affect the rate of transpiration.

humidity and amount of rain fall. [1]

[Total: 8]

Your Mark

5(a)

5(b)(i)

5(b)(ii)

5(c)(i)

5(c)(ii)

5(d)

Q5	Mark scheme	
(a)	xylem ;	1 mark
(b)(i)	rate of transpiration increases as temperature rises/ ora ; A positive correlation rate of increase becomes faster as temperature rises/ ora ; I efficiency the higher the temperature the greater the distance moved by the meniscus ora ; R incorrect causal relationship in an ora	1 mark
(b)(ii)	1 enzymes will be destroyed/cease to function ; A enzymes denatured 2 shoot/plant/leaf/cells die/no transpiration ; 3 water loss greater than water intake ; A wilting 4 difficulty in achieving temperature (in lab) ;	2 marks
(c)(i)	less transpiration/(meniscus) will not move as fast or as far/slower rate of movement/less water loss/less water uptake ; I smaller/lower results	1 mark
(c)(ii)	1 smaller leaves ; 2 fewer leaves ; 3 less surface area (for transpiration) ; 4 fewer stomata (through which transpiration can occur) ;	2 marks
(d)	humidity ; A air movement/light (intensity)/carbon dioxide concentration	1 mark

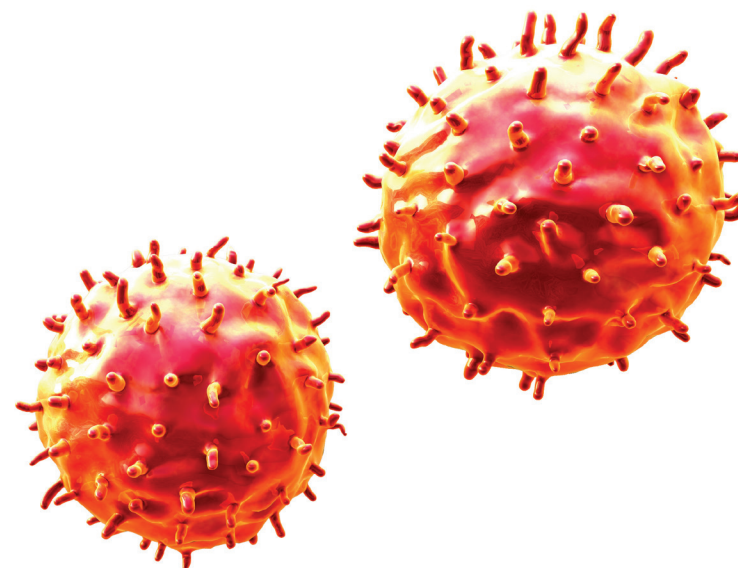
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Interactive Example Candidate Responses

Paper 3 (May / June 2016), Question 6

Cambridge IGCSE™
Biology 0610



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6 (a) Define the term genetic engineering.

removal of ~~insert~~ of a certain ~~gene~~ from chromosomes of a species and ~~inserting~~ inserting it into another different species to obtain desirable characteristic

[2]

(b) State two examples of genetic engineering.

For each example, outline how it benefits humans.

Write your answers in Table 6.1.

Table 6.1

example	benefit to humans
taking genes of production of insulin from humans and adding inserting it to bacteria	insulin produced by bacteria will be taken and prescribed to people who have problems with secretion of insulin in body
taking genes from a micro-organism that is not affected by insecticides and adding it to plants	plant crops will not be harmed by insecticides to have healthier crops if insecticide affect soil

[4]

[Total: 6]

Select page

HIGH

MIDDLE

LOW

Your Mark

6(a)

6(b)

Q6 Mark scheme

(a) change the genetic material (of an organism); by removing/changing/inserting (individual) genes; from one organism/species to another; **2 marks**

(b) 1 references to artificial selection mark as a pair, but benefit must match example

example	benefit
to make (bacteria) produce insulin ;	treat diabetes/cheaper method of production ;
crop plants resistant to herbicides/pesticides ;	kill weeds/other pests without killing plant so more food produced ;
crop plants resistant to insects ;	less of plant eaten by insect – more food produced ;
crop plants produce more vitamins ;	fewer cases of vitamin deficiency ;
any valid example ;	any valid benefit ;

4 marks

EXAMINER COMMENTS

MARK SCHEME

6 (a) Define the term *genetic engineering*.

take a gene from a species and put it in another species by bacteria as it produce rapidly to develop its characteristics.

[2]

(b) State **two** examples of genetic engineering.

For each example, outline how it benefits humans.

Write your answers in Table 6.1.

Table 6.1

example	benefit to humans
Selective breeding	having Cattles with more meat and milk
insulin	taking insulin and put with bacteria where bacteria divide and insulin increase.

[4]

[Total: 6]

Your Mark

6(a)

6(b)

Q6 Mark scheme

(a)	change the genetic material (of an organism); by removing/changing/inserting (individual) genes; from one organism/species to another; 2 marks												
(b)	1 references to artificial selection mark as a pair, but benefit must match example <table> <tr> <th>example</th><th>benefit</th></tr> <tr> <td>to make (bacteria) produce insulin ;</td><td>treat diabetes/cheaper method of production ;</td></tr> <tr> <td>crop plants resistant to herbicides/pesticides ;</td><td>kill weeds/other pests without killing plant so more food produced ;</td></tr> <tr> <td>crop plants resistant to insects ;</td><td>less of plant eaten by insect – more food produced ;</td></tr> <tr> <td>crop plants produce more vitamins ;</td><td>fewer cases of vitamin deficiency ;</td></tr> <tr> <td>any valid example ;</td><td>any valid benefit ;</td></tr> </table> 4 marks	example	benefit	to make (bacteria) produce insulin ;	treat diabetes/cheaper method of production ;	crop plants resistant to herbicides/pesticides ;	kill weeds/other pests without killing plant so more food produced ;	crop plants resistant to insects ;	less of plant eaten by insect – more food produced ;	crop plants produce more vitamins ;	fewer cases of vitamin deficiency ;	any valid example ;	any valid benefit ;
example	benefit												
to make (bacteria) produce insulin ;	treat diabetes/cheaper method of production ;												
crop plants resistant to herbicides/pesticides ;	kill weeds/other pests without killing plant so more food produced ;												
crop plants resistant to insects ;	less of plant eaten by insect – more food produced ;												
crop plants produce more vitamins ;	fewer cases of vitamin deficiency ;												
any valid example ;	any valid benefit ;												

6 (a) Define the term *genetic engineering*.

its genes which show the DNA of the person if he is boy or girl and show if it's homozygous or heterozygous [2]

(b) State **two** examples of genetic engineering.

For each example, outline how it benefits humans.

Write your answers in Table 6.1.

Table 6.1

example	benefit to humans
DNA	help to know the person's sex type
heterozygous	it's the gene that 2 or more different gene

[4]

[Total: 6]

Select page

HIGH

MIDDLE

LOW

Your Mark

6(a)

6(b)

Q6 Mark scheme

(a)	change the genetic material (of an organism); by removing/changing/inserting (individual) genes; from one organism/species to another; 2 marks												
(b)	1 references to artificial selection mark as a pair, but benefit must match example <table> <tr> <th>example</th><th>benefit</th></tr> <tr> <td>to make (bacteria) produce insulin ;</td><td>treat diabetes/cheaper method of production ;</td></tr> <tr> <td>crop plants resistant to herbicides/pesticides ;</td><td>kill weeds/other pests without killing plant so more food produced ;</td></tr> <tr> <td>crop plants resistant to insects ;</td><td>less of plant eaten by insect – more food produced ;</td></tr> <tr> <td>crop plants produce more vitamins ;</td><td>fewer cases of vitamin deficiency ;</td></tr> <tr> <td>any valid example ;</td><td>any valid benefit ;</td></tr> </table> 4 marks	example	benefit	to make (bacteria) produce insulin ;	treat diabetes/cheaper method of production ;	crop plants resistant to herbicides/pesticides ;	kill weeds/other pests without killing plant so more food produced ;	crop plants resistant to insects ;	less of plant eaten by insect – more food produced ;	crop plants produce more vitamins ;	fewer cases of vitamin deficiency ;	any valid example ;	any valid benefit ;
example	benefit												
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crop plants resistant to insects ;	less of plant eaten by insect – more food produced ;												
crop plants produce more vitamins ;	fewer cases of vitamin deficiency ;												
any valid example ;	any valid benefit ;												

EXAMINER COMMENTS

MARK SCHEME

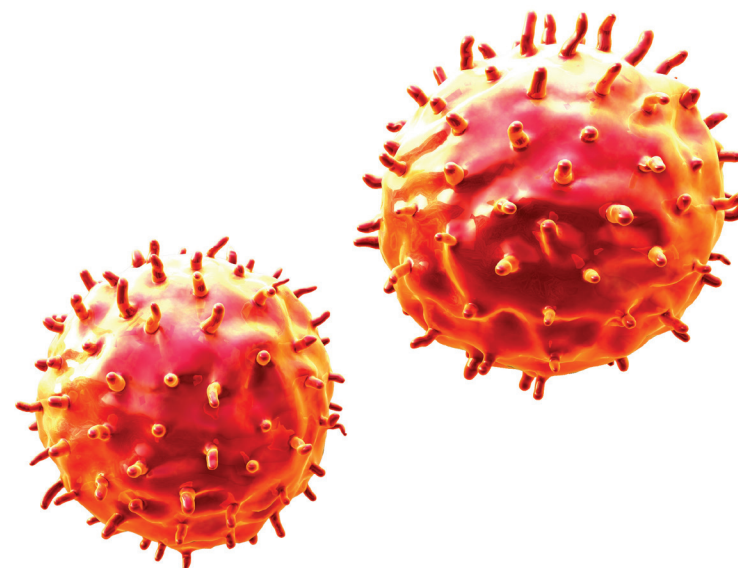
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Paper 3 (May / June 2016), Question 7

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Biology 0610



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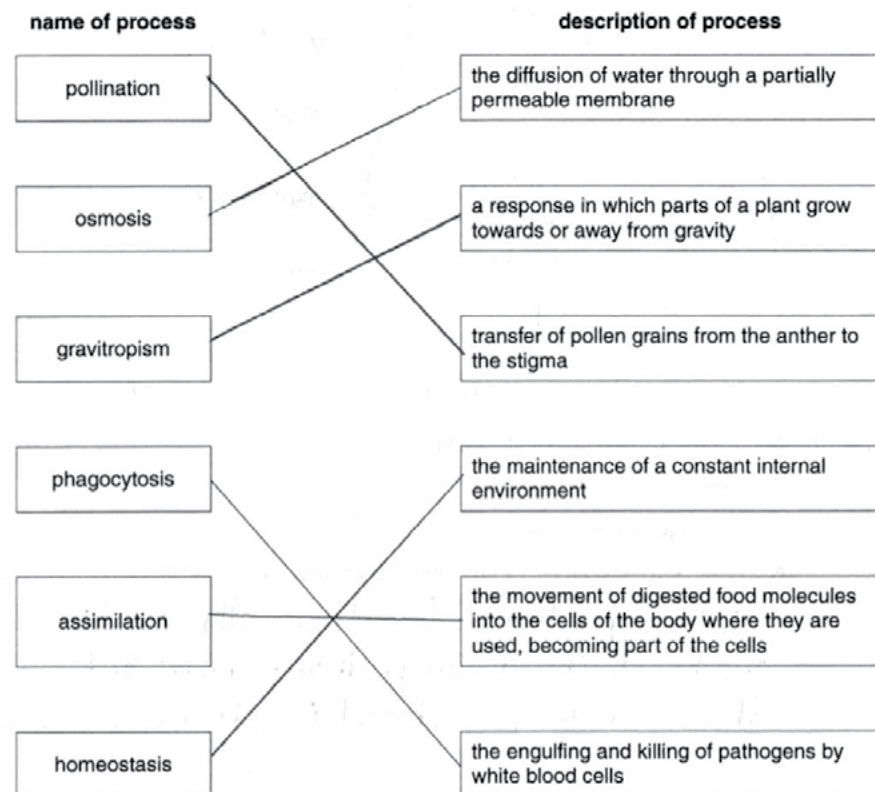
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7 The boxes on the left contain the names of some processes taking place in living organisms.

The boxes on the right contain descriptions of these processes.

Draw **one** straight line from each box on the left to a box on the right to link the name of the process with its description.

An example has been done for you.



[4]

[Total: 4]

Your Mark

7

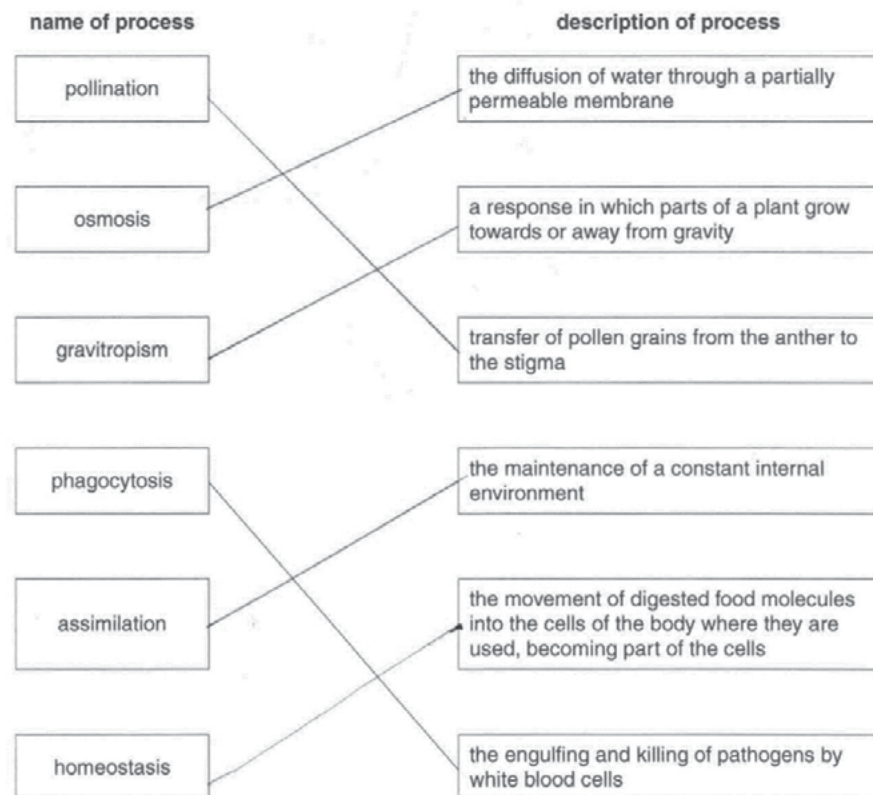
Q7 Mark scheme	
	5 or 4 correct = 4 3 correct = 3 2 correct = 2 1 correct = 1
4 marks	

7 The boxes on the left contain the names of some processes taking place in living organisms.

The boxes on the right contain descriptions of these processes.

Draw **one** straight line from each box on the left to a box on the right to link the name of the process with its description.

An example has been done for you.



[4]

[Total: 4]

Your Mark

7

Q7 Mark scheme	
	5 or 4 correct = 4 3 correct = 3 2 correct = 2 1 correct = 1

4 marks

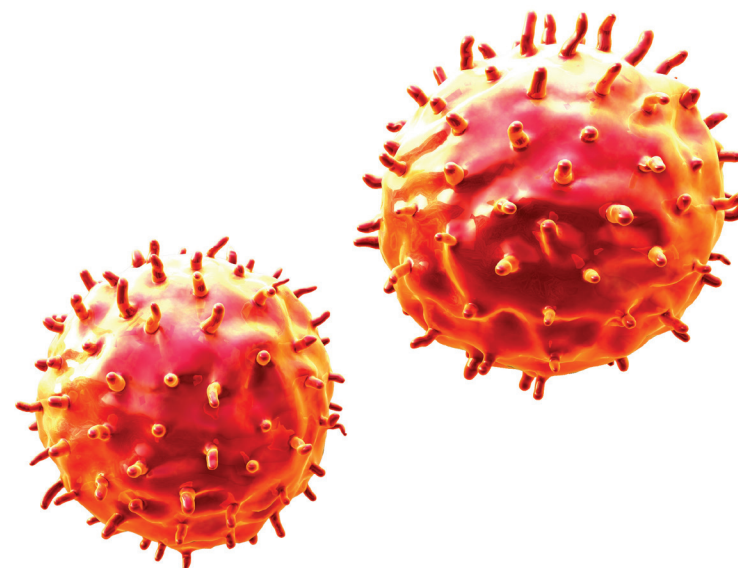
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Paper 3 (May / June 2016), Question 8

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8 Fig. 8.1 shows the structures that produce urine and excrete it from the body.

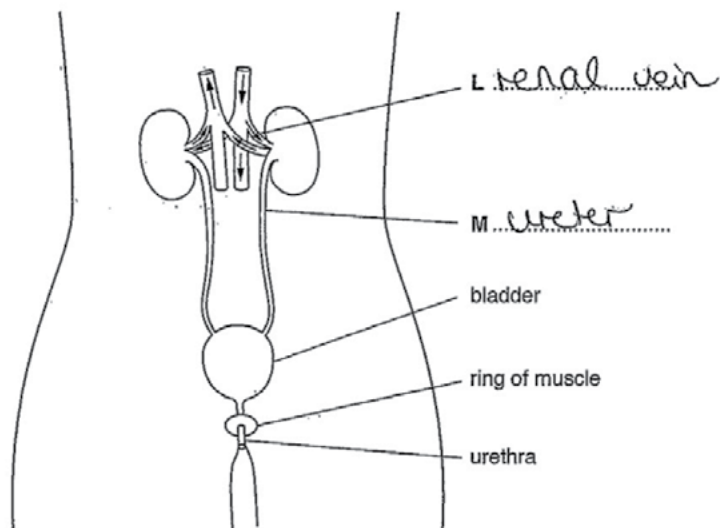


Fig. 8.1

(a) (i) Name the structures labelled L and M.

Write your answers on Fig. 8.1.

[2]

(ii) Urea is excreted in the urine.

Name the organ that produces urea and suggest how urea is transferred to the kidneys.

Urea is made in the liver.
Urea is ~~transferred~~ transferred to the kidneys by ~~it~~ in the blood.

[2]

Select page

HIGH

MIDDLE

LOW

Your Mark

8(a)(i)

8(a)(ii)

8(b)

8(c)

Q8	Mark scheme	
(a)(i)	L – renal artery ; M – ureter ;	2 marks
(a)(ii)	produced by: liver ; transferred in: blood/plasma/blood vessels/circulation ;	2 marks
(b)	1 student drank less water/ate fewer foods, containing water ; ignore numbered lines 2 student sweated more/AW ; A student had diarrhoea ; student vomited ; student lost a lot of blood ; 3 (as) it was a hotter day ; 4 (as) student exercised/student had a fever ; I renal failure on that day/student cried 5 student ate a lot of salty food ; 6 lower humidity so water (vapour) lost in exhalation ;	3 marks
(c)	1 screening/removal of large solids/twigs/plastic/etc. ; 2 settling out/grit settles to bottom of tank ; 3 microbes/bacteria decompose (digest) organic material ; 4 digestion of materials in liquid by (aerobic) microorganisms ; 5 aeration ; 6 materials in sludge digested by (anaerobic) bacteria ; 7 filtration ; A filtration once only unless qualified 8 chlorination or sterilisation/use of disinfectants/ bactericides/bacteria killed ;	3 marks

EXAMINER
COMMENTS

MARK
SCHEME

(b) In an investigation, the volume of urine produced by a student each day is measured.
The results are shown in Table 8.1.

Table 8.1

day	volume of urine /cm ³ per day
1	1440
2	1510
3	1410
4	1445
5	910
6	1445
7	1500

Suggest **three** possible reasons for the lower volume of urine produced by the student on day 5.

- 1 Low water intake
 - 2 High temperature
 - 3 Large amount of sweat produced
- [3]

(c) Outline **three** processes used in the treatment of sewage to make the water it contains safe for human use.

- 1 Filtering for removal of insoluble particles
 - 2 Adding chlorine to kill bacteria and pathogens (chlorination)
 - 3 Distillation
- [3]
[Total: 10]

Your Mark

8(a)(i)

8(a)(ii)

8(b)

8(c)

Q8	Mark scheme
(a)(i)	L – renal artery ; M – ureter ; 2 marks
(a)(ii)	<i>produced by:</i> liver ; <i>transferred in:</i> blood/plasma/blood vessels/circulation ; 2 marks
(b)	1 student drank less water/ate fewer foods, containing water ; ignore numbered lines 2 student sweated more/AW ; A student had diarrhoea; student vomited; student lost a lot of blood; 3 (as) it was a hotter day ; 4 (as) student exercised/student had a fever ; I renal failure on that day/student cried 5 student ate a lot of salty food ; 6 lower humidity so water (vapour) lost in exhalation ; 3 marks
(c)	1 screening/removal of large solids/twigs/plastic/etc. ; 2 settling out/grit settles to bottom of tank ; 3 microbes/bacteria decompose (digest) organic material ; 4 digestion of materials in liquid by (aerobic) microorganisms ; 5 aeration ; 6 materials in sludge digested by (anaerobic) bacteria ; 7 filtration ; A filtration once only unless qualified 8 chlorination or sterilisation/use of disinfectants/ bactericides/bacteria killed ; 3 marks

8 Fig. 8.1 shows the structures that produce urine and excrete it from the body.

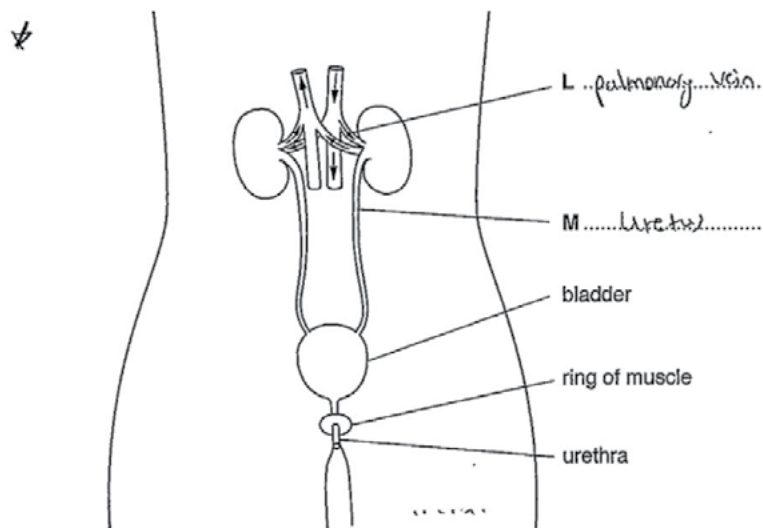


Fig. 8.1

(a) (i) Name the structures labelled L and M.

Write your answers on Fig. 8.1.

[2]

(ii) Urea is excreted in the urine.

Name the organ that produces urea and suggest how urea is transferred to the kidneys.

Urea is produced in the liver and the urea is transferred to the kidney by the blood.

[2]

Select page

HIGH

MIDDLE

LOW

Your Mark

8(a)(i)

8(a)(ii)

8(b)

8(c)

Q8	Mark scheme	
(a)(i)	L – renal artery ; M – ureter ;	2 marks
(a)(ii)	produced by: liver ; transferred in: blood/plasma/blood vessels/circulation ;	2 marks
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(c)	1 screening/removal of large solids/twigs/plastic/etc. ; 2 settling out/grit settles to bottom of tank ; 3 microbes/bacteria decompose (digest) organic material ; 4 digestion of materials in liquid by (aerobic) microorganisms ; 5 aeration ; 6 materials in sludge digested by (anaerobic) bacteria ; 7 filtration ; A filtration once only unless qualified 8 chlorination or sterilisation/use of disinfectants/ bactericides/bacteria killed ;	3 marks

EXAMINER
COMMENTS

MARK
SCHEME

- (b) In an investigation, the volume of urine produced by a student each day is measured.

The results are shown in Table 8.1.

Table 8.1

day	volume of urine /cm ³ per day
1	1440
2	1510
3	1410
4	1445
5	910
6	1445
7	1500

Suggest **three** possible reasons for the lower volume of urine produced by the student on day 5.

- The student ~~exercised~~ ~~exercised~~ exercised very hard on that day.
- The student got a problem in his kidney on that day.
- The day was very hot.
temperature in that

[3]

- (c) Outline **three** processes used in the treatment of sewage to make the water it contains safe for human use.

- bactericides are used to remove any bacteria found in water.
- Chlorine is used for the chlorination of water which removes impurities and microbes to produce pure water.

[3]

[Total: 10]

Your Mark

8(a)(i)

8(a)(ii)

8(b)

8(c)

Q8	Mark scheme	
(a)(i)	L – renal artery ; M – ureter ;	2 marks
(a)(ii)	produced by: liver ; transferred in: blood/plasma/blood vessels/circulation ;	2 marks
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(c)	1 screening/removal of large solids/twigs/plastic/etc. ; 2 settling out/grit settles to bottom of tank ; 3 microbes/bacteria decompose (digest) organic material ; 4 digestion of materials in liquid by (aerobic) microorganisms ; 5 aeration ; 6 materials in sludge digested by (anaerobic) bacteria ; 7 filtration ; A filtration once only unless qualified 8 chlorination or sterilisation/use of disinfectants/ bactericides/bacteria killed ;	3 marks

8 Fig. 8.1 shows the structures that produce urine and excrete it from the body.

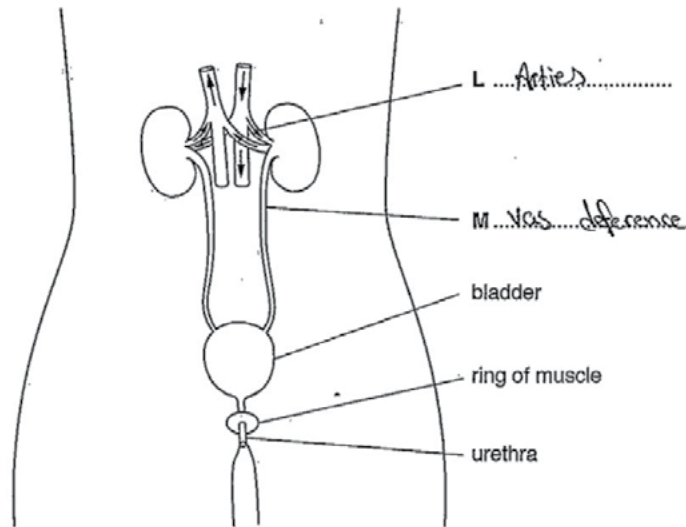


Fig. 8.1

(a) (i) Name the structures labelled L and M.

Write your answers on Fig. 8.1.

[2]

(ii) Urea is excreted in the urine.

Name the organ that produces urea and suggest how urea is transferred to the kidneys.

Liver, the bile (with urea) from liver will
deliver the urea to the pancreas and the
pancreatic juice deliver it to the kidney. [2]

Select page

HIGH

MIDDLE

LOW

Your Mark

8(a)(i)

8(a)(ii)

8(b)

8(c)

Q8	Mark scheme	
(a)(i)	L – renal artery ; M – ureter ;	2 marks
(a)(ii)	produced by: liver ; transferred in: blood/plasma/blood vessels/circulation ;	2 marks
(b)	1 student drank less water/ate fewer foods, containing water ; ignore numbered lines 2 student sweated more/AW ; A student had diarrhoea; student vomited; student lost a lot of blood; 3 (as) it was a hotter day ; 4 (as) student exercised/student had a fever ; I renal failure on that day/student cried 5 student ate a lot of salty food ; 6 lower humidity so water (vapour) lost in exhalation ;	3 marks
(c)	1 screening/removal of large solids/twigs/plastic/etc. ; 2 settling out/grit settles to bottom of tank ; 3 microbes/bacteria decompose (digest) organic material ; 4 digestion of materials in liquid by (aerobic) microorganisms ; 5 aeration ; 6 materials in sludge digested by (anaerobic) bacteria ; 7 filtration ; A filtration once only unless qualified 8 chlorination or sterilisation/use of disinfectants/ bactericides/bacteria killed ;	3 marks

EXAMINER
COMMENTS

MARK
SCHEME

(b) In an investigation, the volume of urine produced by a student each day is measured.

The results are shown in Table 8.1.

Table 8.1

day	volume of urine /cm ³ per day
1	1440
2	1510
3	1410
4	1445
5	910
6	1445
7	1500

Suggest **three** possible reasons for the lower volume of urine produced by the student on day 5.

- 1 Due to the low amount of water in the body
- 2 Slight
- 3
- [3]

(c) Outline **three** processes used in the treatment of sewage to make the water it contains safe for human use.

- 1 put chlorine in water
- 2 pass it through pipes to filter it
- 3
- [3]

[Total: 10]

Your Mark

8(a)(i)

8(a)(ii)

8(b)

8(c)

Q8	Mark scheme	
(a)(i)	L – renal artery ; M – ureter ;	2 marks
(a)(ii)	produced by: liver ; transferred in: blood/plasma/blood vessels/circulation ;	2 marks
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(c)	1 screening/removal of large solids/twigs/plastic/etc. ; 2 settling out/grit settles to bottom of tank ; 3 microbes/bacteria decompose (digest) organic material ; 4 digestion of materials in liquid by (aerobic) microorganisms ; 5 aeration ; 6 materials in sludge digested by (anaerobic) bacteria ; 7 filtration ; A filtration once only unless qualified 8 chlorination or sterilisation/use of disinfectants/ bactericides/bacteria killed ;	3 marks

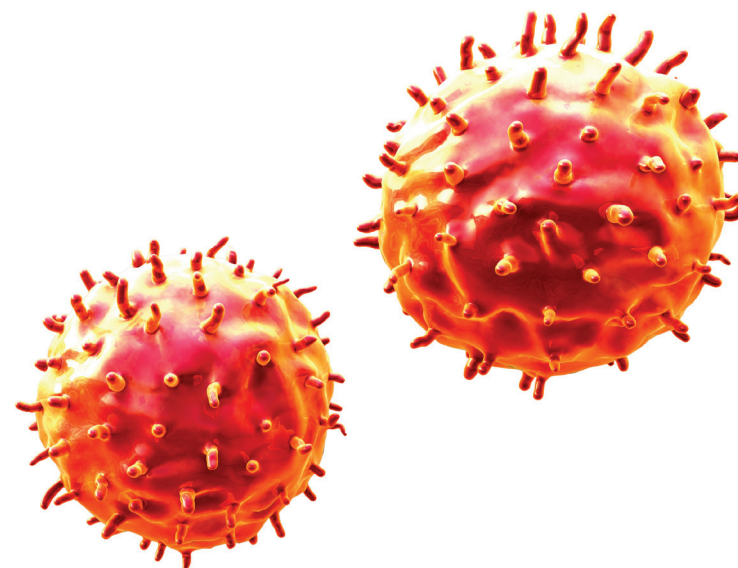
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Biology 0610



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- 9 (a) (i) Table 9.1 contains examples of components of a balanced diet and foods that contain a high proportion of the component.

Complete Table 9.1 by filling in the blank spaces.

Table 9.1

component of balanced diet	food containing a high proportion of the component
fat	olive oil
protein	meat
carbohydrate	pasta
fibre (roughage)	unpolished rice

[3]

- (ii) Name **two** other components of a balanced diet that are not listed in Table 9.1.

..... vitamin C

..... calcium

..... iron

[2]

Your Mark

9(a)(i)

9(a)(ii)

9(b)

9(c)

Q9 Mark scheme

(a)(i)	component	food
	Protein ;	
	Carbohydrate ;	
		any example of plant cell wall material / any fruit or vegetable ;
3 marks		
(a)(ii)	A ecf from table if group not given there minerals/ions/named mineral ; vitamins/named vitamin ; water ;	
2 marks		

(b) Fig. 9.1 shows a picture of food production on a modern farm.



Fig. 9.1

The use of modern technology has increased the amount of food produced.

State **two** examples of modern technology **and** explain how each has contributed to the amount of **plants** grown for food.

example	explanation of technology
watering by dropping droplets of water	small pipes in the a pipe over the crops that, water plants ^{so produce} without a lot of water and this the saves water and money
chemical fertiliser	substances containing potassium, nitrogen, phosphorus that increase crop yield and size. Make soil more fertile

[4]

(c) On modern farms crop plants can be grown as large-scale monocultures.

Suggest **two** negative impacts on an ecosystem for this method of food production.

- 1 animals/habitats which was living there will not find place. Food chains and webs will be ^{animals} ~~destroyed~~ ^{distructed}
- 2 they could die as lack of food and for the effect of pesticides on them

[2]

[Total: 11]

Your Mark

9(a)(i)

9(a)(ii)

9(b)

9(c)

Q9 Mark scheme

(b)	example and improvement must match A increased yields for any of the explanations A explanations in terms of increased speed or efficiency and I references to an example being easier 1 use of agricultural machinery/tractors/trucks ; improved efficiency/greater land area cultivated/plant more seeds/harvest more of the crop/harvest faster/spray pesticides/irrigate the crop ; 2 use of (artificial) fertilisers ; improved yields/grow faster ; 3 use of herbicides/pesticides/insecticides; no competition from weeds/pests or increases yields ; 4 selective breeding; improve quality/quantity of produce ; 5 use of glass houses/poly-tunnels ; protect crops from adverse environment/provide optimum growing environment/grow out of season/increased yields ; 6 any valid example ; with improvement ; 4 marks
(c)	1 death of organisms ; 2 disrupts food chains/webs/eutrophication ; 3 habitat destruction/soil erosion ; A deforestation 4 changes in precipitation ; A reduced biodiversity 2 marks

- 9 (a) (i) Table 9.1 contains examples of components of a balanced diet and foods that contain a high proportion of the component.

Complete Table 9.1 by filling in the blank spaces.

Table 9.1

component of balanced diet	food containing a high proportion of the component
fat	olive oil
Protein	meat
Carbohydrates Sugar	pasta
fibre (roughage)	Carrot

[3]

- (ii) Name **two** other components of a balanced diet that are not listed in Table 9.1.

..... ~~sugar~~ water

..... minerals [2]

Your Mark

9(a)(i)

9(a)(ii)

9(b)

9(c)

Q9 Mark scheme

(a)(i)	component	food
	Protein ;	
	Carbohydrate ;	
		any example of plant cell wall material / any fruit or vegetable ;
3 marks		
(a)(ii)	A ecf from table if group not given there minerals/ions/named mineral ; vitamins/named vitamin ; water ;	
2 marks		

(b) Fig. 9.1 shows a picture of food production on a modern farm.



Fig. 9.1

The use of modern technology has increased the amount of food produced.

State **two** examples of modern technology **and** explain how each has contributed to the amount of **plants** grown for food.

example	explanation of technology
Fertilisers	It increased the amount of food food production.
herbicides	It is possible the Herbicides are poured over the farm which increase the food production and kill insect.

[4]

(c) On modern farms crop plants can be grown as large-scale monocultures.

Suggest **two** negative impacts on an ecosystem for this method of food production.

1. ~~It is very hard to control a large scale~~
~~farm.~~ crop plants on large areas don't grow well.
2. ~~the~~ the ~~farm~~ may get harmed by insects and other animals.

[2]

[Total: 11]

Your Mark

9(a)(i)

9(a)(ii)

9(b)

9(c)

Q9	Mark scheme
(b)	example and improvement must match A increased yields for any of the explanations A explanations in terms of increased speed or efficiency and I references to an example being easier 1 use of agricultural machinery/tractors/trucks ; improved efficiency/greater land area cultivated/plant more seeds/harvest more of the crop/harvest faster/ spray pesticides/irrigate the crop ; 2 use of (artificial) fertilisers ; improved yields/grow faster ; 3 use of herbicides/pesticides/insecticides; no competition from weeds/pests or increases yields ; 4 selective breeding; improve quality/quantity of produce ; 5 use of glass houses/poly-tunnels ; protect crops from adverse environment/provide optimum growing environment/grow out of season/increased yields ; 6 any valid example ; with improvement ; 4 marks
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Complete Table 9.1 by filling in the blank spaces.

Table 9.1

component of balanced diet	food containing a high proportion of the component
fat	olive oil
protein	meat
carbohydrate	pasta
fibre (roughage)	fruits

[3]

- (ii) Name **two** other components of a balanced diet that are not listed in Table 9.1.

*calcium and vitamins

[2]

Your Mark

9(a)(i)

9(a)(ii)

9(b)

9(c)

Q9 Mark scheme

(a)(i)	component	food
	Protein ;	
	Carbohydrate ;	
		any example of plant cell wall material / any fruit or vegetable ;
3 marks		
(a)(ii)	A ecf from table if group not given there minerals/ions/named mineral ; vitamins/named vitamin ; water ;	
2 marks		

(b) Fig. 9.1 shows a picture of food production on a modern farm.



Fig. 9.1

The use of modern technology has increased the amount of food produced.

State **two** examples of modern technology **and** explain how each has contributed to the amount of **plants** grown for food.

example	explanation of technology
Truck machine	It throws seeds and fertilizers in the whole farm

[4]

(c) On modern farms crop plants can be grown as large-scale monocultures.

Suggest **two** negative impacts on an ecosystem for this method of food production.

- 1 Many grasshoppers will feed on it
- 2 some poisons/fertilizers are thrown to kill insects which also makes the food produced containing poisonous substance.

[Total: 11]

Your Mark

9(a)(i)

9(a)(ii)

9(b)

9(c)

Q9 Mark scheme

(b)	example and improvement must match A increased yields for any of the explanations A explanations in terms of increased speed or efficiency and 1 references to an example being easier 1 use of agricultural machinery/tractors/trucks ; improved efficiency/greater land area cultivated/plant more seeds/harvest more of the crop/harvest faster/spray pesticides/irrigate the crop ; 2 use of (artificial) fertilisers ; improved yields/grow faster ; 3 use of herbicides/pesticides/insecticides; no competition from weeds/pests or increases yields ; 4 selective breeding; improve quality/quantity of produce ; 5 use of glass houses/poly-tunnels ; protect crops from adverse environment/provide optimum growing environment/grow out of season/increased yields ; 6 any valid example ; with improvement ; 4 marks
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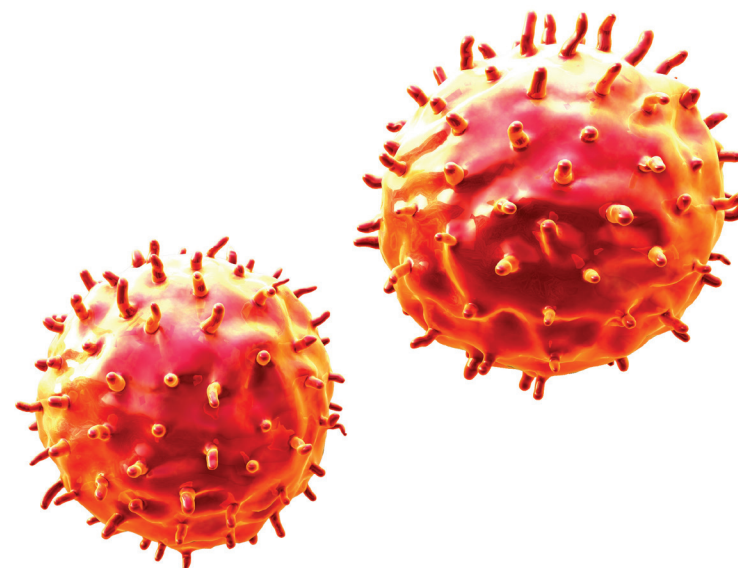
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Interactive Example Candidate Responses

Paper 4 (May / June 2016), Question 1

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Biology 0610



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1 (a) Fig. 1.1 shows the human heart and the main blood vessels. The functions of the parts of the heart and some of the blood vessels are given in Table 1.1.

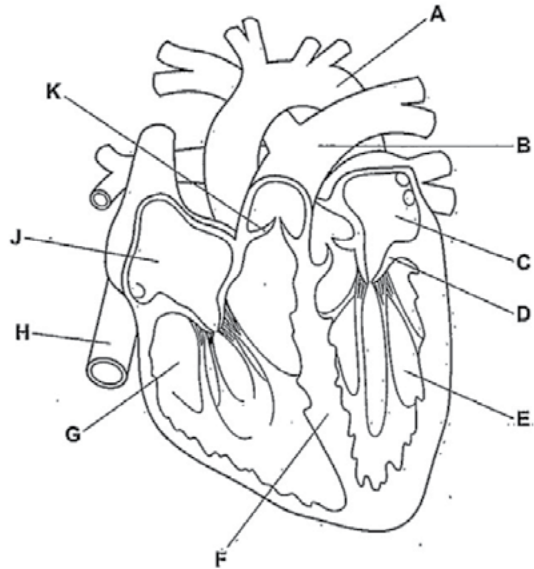


Fig. 1.1

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1 Mark scheme			
(a)	Function	Letter on Fig 1.1	Name
	structure that separates oxygenated and deoxygenated blood	F	septum ;
	structure that prevents backflow of blood from ventricle to atrium	D	bicuspid / mitral / atrioventricular, valve ; A 'AV valve' R right atrioventricular valve
	blood vessel that carries oxygenated blood	A	aorta
	blood vessel that carries deoxygenated blood	B H	pulmonary artery vena cava ;
	structure that prevents backflow of blood from pulmonary artery to right ventricle	K	semilunar valve ;
	chamber of the heart that contains oxygenated blood	C E	left atrium left ventricle ;
	chamber of the heart that pumps deoxygenated blood	J G	right atrium right ventricle ;
6 marks			

Complete Table 1.1.

One row has been done for you.

Table 1.1

function	letter on Fig. 1.1	name
structure that separates oxygenated and deoxygenated blood	F	septum
structure that prevents backflow of blood from ventricle to atrium	D	atrioventri atrioventricular valve
blood vessel that carries oxygenated blood	A	aorta
blood vessel that carries deoxygenated blood	H, B	vena cava, pulmonary artery
structure that prevents backflow of blood from pulmonary artery to right ventricle	K	semilunar valve
chamber of the heart that contains oxygenated blood	C, E	left atrium, left ventricle
chamber of the heart that contains deoxygenated blood	J, G	right atrium, right ventricle

[6]

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1 Mark scheme

(a)	Function	Letter on Fig 1.1	Name
	structure that separates oxygenated and deoxygenated blood	F	septum ;
	structure that prevents backflow of blood from ventricle to atrium	D	bicuspid / mitral / atrioventricular, valve ; A 'AV valve' R right atrioventricular valve
	blood vessel that carries oxygenated blood	A	aorta
	blood vessel that carries deoxygenated blood	B H	pulmonary artery vena cava ;
	structure that prevents backflow of blood from pulmonary artery to right ventricle	K	semilunar valve ;
	chamber of the heart that contains oxygenated blood	C E	left atrium left ventricle ;
	chamber of the heart that pumps deoxygenated blood	J G	right atrium right ventricle ;

6 marks

(b) A group of students used a heart monitor to record the pulse rate of an athlete during a 5000 metre race. The recordings started just before the race began and ended just after it had finished, as shown in Fig. 1.2.

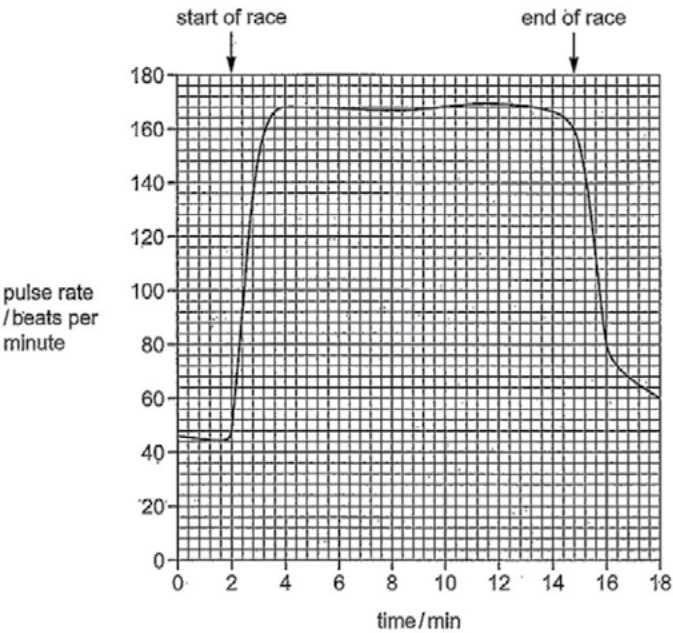


Fig. 1.2

- (i) Use data from Fig. 1.2 to describe the effect of exercise on the pulse rate of the athlete.
- Pulse rate ^{steeply} increases from 44 to 168 beats per minute in the first 2 minutes of the race. It remains constant at 168 beats per minute for the next 10 minutes before ~~gradually~~ falling to the end of the race. After race is over, it begins to decrease.

[3]

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1	Mark scheme
(b)(i)	units must be used pulse rate increases and remains constant ; immediate / sudden / steep / rapid / AW, increase in pulse rate ; R exponential increases from 44–48 bpm to 164–170 bpm ; increases by 120–126 bpm / by 3.5 to 4 times or approx. 4 maximum / 164–170 bpm, at, 4 min(utes) / 2 min(utes) after race starts ; 3 marks
(b)(ii)	adrenaline stimulates increase in, heart / pulse, rate ; increase in blood, carbon dioxide (concentration) / acidity, detected ; A decrease in pH nerves stimulate heart to beat faster ; ref to muscle contraction / AW ; 'more' / 'increases', is only needed once muscles require more energy / muscles are doing more work ; (rate of aerobic) respiration increases ; R 'produce energy' once only increase demand for, oxygen / glucose ; ref to removal of, carbon dioxide / lactic acid / heat ; more, blood / carbon dioxide, to lungs (per unit time) ; more, blood / oxygen / glucose, to muscles ; AVP ; e.g. ref to ATP / vasodilation in muscles 4 marks

- (ii) Explain the change in pulse rate between 2 minutes and 3 minutes after the recordings started.

During exercise, muscles need more energy for contraction so aerobic respiration increases. Pulse rate increases to increase blood flow to the muscles to supply them with oxygen fast enough for increased respiration, remove carbon dioxide that is being produced as a result of respiration and prevent anaerobic respiration and the build up of lactic acid. CO₂ lowers blood pH which is detected by receptors in the brain and it increases frequency of impulses to the heart [4].

[Total: 13]

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1	Mark scheme
(b)(i)	units must be used pulse rate increases and remains constant ; immediate / sudden / steep / rapid / AW, increase in pulse rate ; R exponential increases from 44–48 bpm to 164–170 bpm ; increases by 120–126 bpm / by 3.5 to 4 times or approx. 4 maximum / 164–170 bpm, at, 4 min(utes) / 2 min(utes) after race starts ; 3 marks
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1 (a) Fig. 1.1 shows the human heart and the main blood vessels. The functions of the parts of the heart and some of the blood vessels are given in Table 1.1.

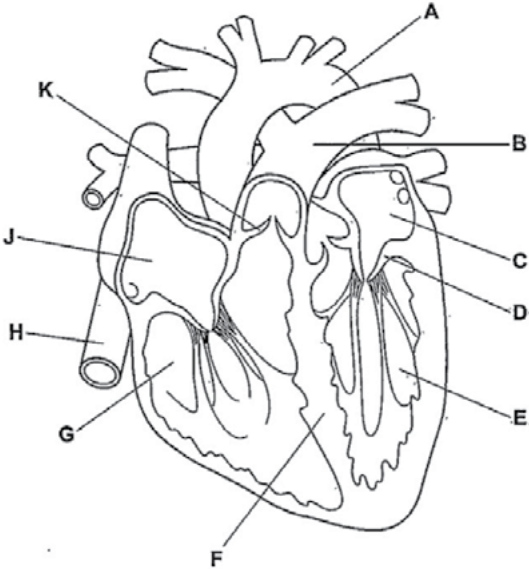


Fig. 1.1

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1 Mark scheme			
(a)	Function	Letter on Fig 1.1	Name
	structure that separates oxygenated and deoxygenated blood	F	septum ;
	structure that prevents backflow of blood from ventricle to atrium	D	bicuspid / mitral / atrioventricular, valve ; A 'AV valve' R right atrioventricular valve
	blood vessel that carries oxygenated blood	A	aorta
	blood vessel that carries deoxygenated blood	B H	pulmonary artery vena cava ;
	structure that prevents backflow of blood from pulmonary artery to right ventricle	K	semilunar valve ;
	chamber of the heart that contains oxygenated blood	C E	left atrium left ventricle ;
	chamber of the heart that pumps deoxygenated blood	J G	right atrium right ventricle ;
6 marks			

Complete Table 1.1.

One row has been done for you.

Table 1.1

function	letter on Fig. 1.1	name
structure that separates oxygenated and deoxygenated blood	F	Septum
structure that prevents backflow of blood from ventricle to atrium	K D	Atrioventricular valve
blood vessel that carries oxygenated blood	A	aorta
blood vessel that carries deoxygenated blood	J H	Vena cava
structure that prevents backflow of blood from pulmonary artery to right ventricle	K G	Semi-lunar valves
chamber of the heart that contains oxygenated blood	E & E	Left chamber
chamber of the heart that contains deoxygenated blood	G	Right chamber

[6]

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1 Mark scheme

(a)	Function	Letter on Fig 1.1	Name
	structure that separates oxygenated and deoxygenated blood	F	septum ;
	structure that prevents backflow of blood from ventricle to atrium	D	bicuspid / mitral / atrioventricular, valve ; A 'AV valve' R right atrioventricular valve
	blood vessel that carries oxygenated blood	A	aorta
	blood vessel that carries deoxygenated blood	B H	pulmonary artery vena cava ;
	structure that prevents backflow of blood from pulmonary artery to right ventricle	K	semilunar valve ;
	chamber of the heart that contains oxygenated blood	C E	left atrium left ventricle ;
	chamber of the heart that pumps deoxygenated blood	J G	right atrium right ventricle ;

6 marks

(b) A group of students used a heart monitor to record the pulse rate of an athlete during a 5000 metre race. The recordings started just before the race began and ended just after it had finished, as shown in Fig. 1.2.

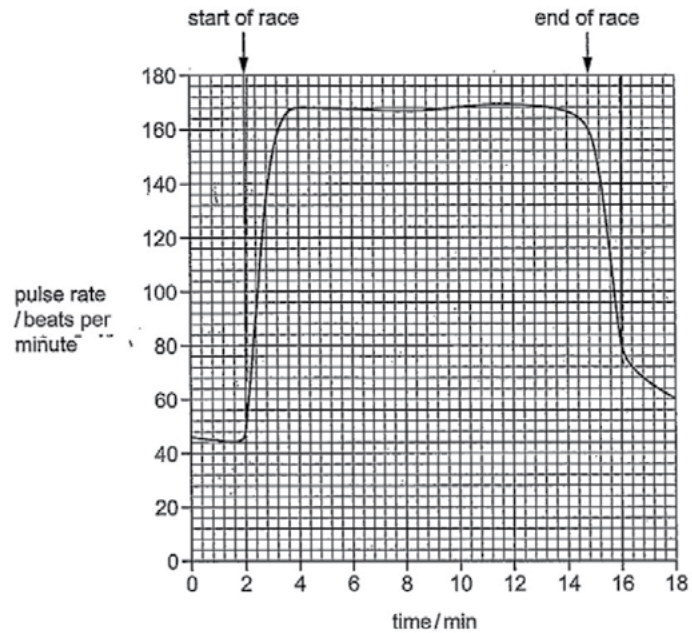


Fig. 1.2

(i) Use data from Fig. 1.2 to describe the effect of exercise on the pulse rate of the athlete.

When the athlete was at rest his pulse rate was about "44.5 pulse/minute". When the race started the pulse rate started ^{increasing} peaking at regular at an average of 20 pulse s. until it peaked at about "168 pulse per minute."

[3]

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1	Mark scheme
(b)(i)	units must be used pulse rate increases and remains constant ; immediate / sudden / steep / rapid / AW, increase in pulse rate ; R exponential increases from 44–48 bpm to 164–170 bpm ; increases by 120–126 bpm / by 3.5 to 4 times or approx. 4 maximum / 164–170 bpm, at, 4 min(utes) / 2 min(utes) after race starts ; 3 marks
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(ii) Explain the change in pulse rate between 2 minutes and 3 minutes after the recordings started.

The athlete's breathing rate was increasing as he was applying effort and so needed more blood to be ~~to~~ supplied to his body so that more oxygen could be used for for respiration to provide him with sufficient energy to ~~to~~ run during the race. The heart rate jumped at which the oxygen was used up was increasing and so to compensate the heart was beating faster.

[4]

[Total: 13]

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1	Mark scheme
(b)(i)	units must be used pulse rate increases and remains constant ; immediate / sudden / steep / rapid / AW, increase in pulse rate ; R exponential increases from 44–48 bpm to 164–170 bpm ; increases by 120–126 bpm / by 3.5 to 4 times or approx. 4 maximum / 164–170 bpm, at, 4 min(utes) / 2 min(utes) after race starts ; 3 marks
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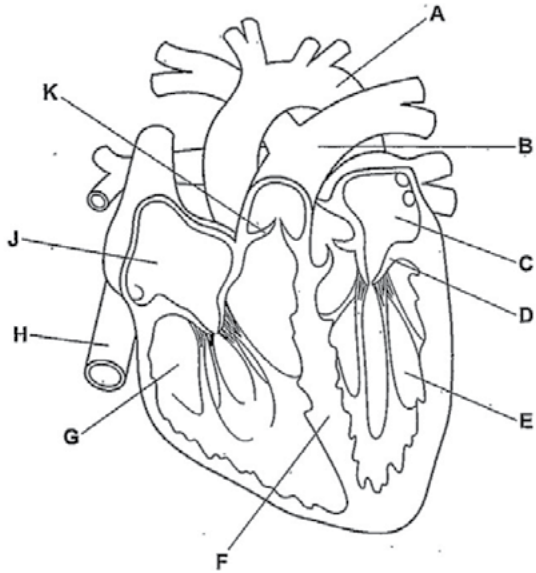


Fig. 1.1

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1 Mark scheme			
(a)	Function	Letter on Fig 1.1	Name
	structure that separates oxygenated and deoxygenated blood	F	septum ;
	structure that prevents backflow of blood from ventricle to atrium	D	bicuspid / mitral / atrioventricular, valve ; A 'AV valve' R right atrioventricular valve
	blood vessel that carries oxygenated blood	A	aorta
	blood vessel that carries deoxygenated blood	B H	pulmonary artery vena cava ;
	structure that prevents backflow of blood from pulmonary artery to right ventricle	K	semilunar valve ;
	chamber of the heart that contains oxygenated blood	C E	left atrium left ventricle ;
	chamber of the heart that pumps deoxygenated blood	J G	right atrium right ventricle ;
6 marks			

Complete Table 1.1.

One row has been done for you.

Table 1.1

function	letter on Fig. 1.1	name
structure that separates oxygenated and deoxygenated blood	F	Septum
structure that prevents backflow of blood from ventricle to atrium	C	Tricuspid valve
blood vessel that carries oxygenated blood	A	aorta
blood vessel that carries deoxygenated blood	H	vena cava
structure that prevents backflow of blood from pulmonary artery to right ventricle	K	Bicuspid valve
chamber of the heart that contains oxygenated blood	B	left atrium
chamber of the heart that contains deoxygenated blood	J	Right atrium

[6]

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1 Mark scheme

(a)	Function	Letter on Fig 1.1	Name
	structure that separates oxygenated and deoxygenated blood	F	septum ;
	structure that prevents backflow of blood from ventricle to atrium	D	bicuspid / mitral / atrioventricular, valve ; A 'AV valve' R right atrioventricular valve
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(b) A group of students used a heart monitor to record the pulse rate of an athlete during a 5000 metre race. The recordings started just before the race began and ended just after it had finished, as shown in Fig. 1.2.

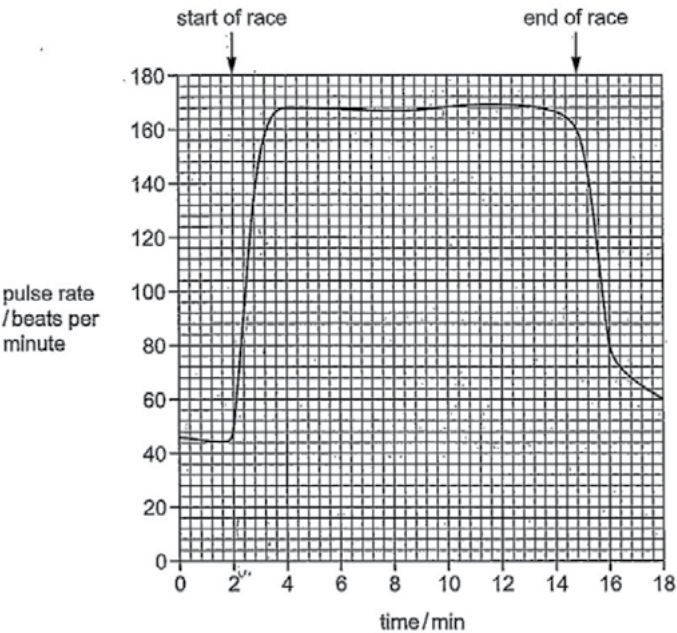


Fig. 1.2

(i) Use data from Fig. 1.2 to describe the effect of exercise on the pulse rate of the athlete.

As you can see on the graph the student kept on running had a fast speed for about 50 seconds and then he got slow at 2 st slow and as he went on he kept on reducing his speed.

[3]

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1	Mark scheme
(b)(i)	units must be used pulse rate increases and remains constant ; immediate / sudden / steep / rapid / AW, increase in pulse rate ; R exponential increases from 44–48 bpm to 164–170 bpm ; increases by 120–126 bpm / by 3.5 to 4 times or approx. 4 maximum / 164–170 bpm, at, 4 min(utes) / 2 min(utes) after race starts ; 3 marks
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(ii) Explain the change in pulse rate between 2 minutes and 3 minutes after the recordings started.

The pulse rate on 3 minutes was high that than it was at 2 minutes this is because he ran and as he ran he took deep breaths and that's the reason to why his pulse rate got high.

[4]

[Total: 13]

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1	Mark scheme
(b)(i)	units must be used pulse rate increases and remains constant ; immediate / sudden / steep / rapid / AW, increase in pulse rate ; R exponential increases from 44–48 bpm to 164–170 bpm ; increases by 120–126 bpm / by 3.5 to 4 times or approx. 4 maximum / 164–170 bpm, at, 4 min(utes) / 2 min(utes) after race starts ; 3 marks
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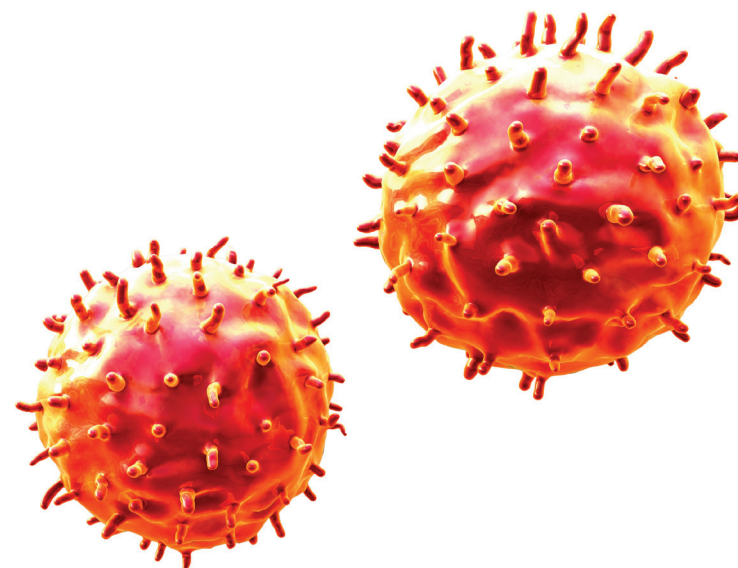
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Interactive Example Candidate Responses

Paper 4 (May / June 2016), Question 2

Cambridge IGCSE™
Biology 0610



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2 The nervous system coordinates the responses of animals to changes in their environment.

(a) Fig. 2.1 shows the arrangement of the nervous system in a mammal.

Complete Fig. 2.1 by writing the names of the missing parts of the mammalian nervous system in the boxes.

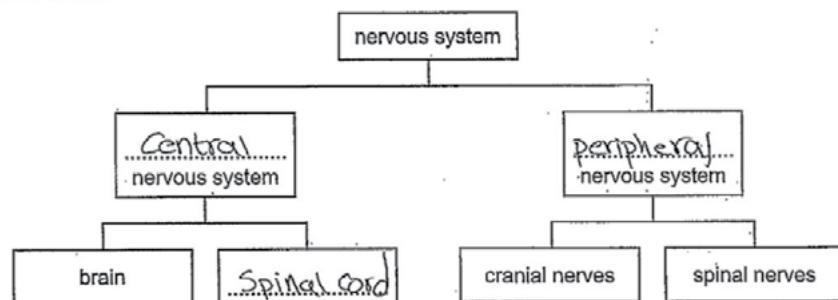


Fig. 2.1

[3]

(b) Fig. 2.2 is a flow chart that shows how an involuntary action is controlled.

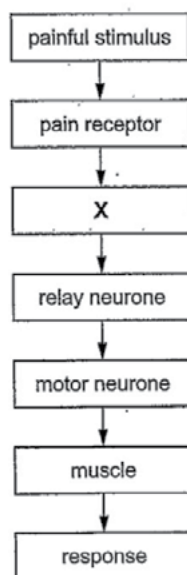


Fig. 2.2

Select page

HIGH

MIDDLE

LOW

Your Mark

2(a)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(c)(i)

2(c)(ii)

2(c)(iii)

2(c)(iv)

Q2	Mark scheme	
(a)	central (nervous system) ; peripheral (nervous system) ; spinal cord ; R spine	3 marks
(b)(i)	sensory neurone ; A afferent neurone R sensory nerve	1 mark
(b)(ii)	simple reflex / reflex ; A reflex arc	1 mark
(b)(iii)	slower / takes more time ; needs thought / uses (higher centres of) the brain / conscious control ; learnt / not inherited / not innate / needs training / AW ; not automatic ; response is not always the same to the stimulus ;	2 marks

EXAMINER
COMMENTS

MARK
SCHEME

(i) State the structure found at X.

Sensory neurone

[1]

(ii) State the type of involuntary action shown by the flow chart.

reflex action

[1]

(iii) State two ways in which a voluntary action differs from an involuntary action.

1 Voluntary action happens under conscious control involving the brain in its initiation.

2 Involuntary actions are faster than voluntary actions.

[2]

Your Mark

2(a)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(c)(i)

2(c)(ii)

2(c)(iii)

2(c)(iv)

Q2	Mark scheme	
(a)	central (nervous system) ; peripheral (nervous system) ; spinal cord ; R spine	3 marks
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(b)(iii)	slower / takes more time ; needs thought / uses (higher centres of) the brain / conscious control ; learnt / not inherited / not innate / needs training / AW ; not automatic ; response is not always the same to the stimulus ;	2 marks

(c) Fig. 2.3 shows three pots of seedlings that have been kept in different conditions.

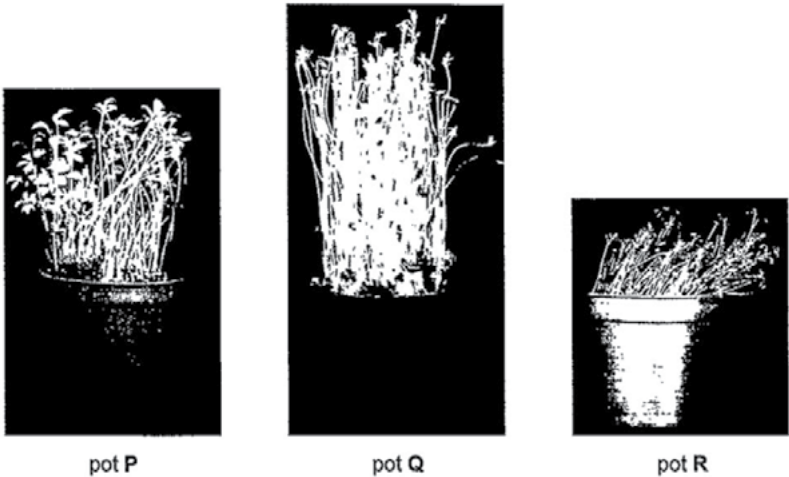


Fig. 2.3

- (i) State the conditions in which pots P and Q were kept.

P plenty of light upwards

Q dark conditions

[1]
- (ii) State the name of the growth response shown by the seedlings in pot R.

positive phototropism

[2]

Your Mark

2(a)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(c)(i)

2(c)(ii)

2(c)(iii)

2(c)(iv)

Q2	Mark scheme
(c)(i)	either pot P – (uniform) light AND pot Q – no light / dark / covered (up) ; or pot P – (uniform) with / plus, magnesium AND pot Q – no magnesium ; A pot P has all nutrients 1 mark
(c)(ii)	positive ; (photo)tropism / (photo)tropic ; R (photo)trophic / geotropic / gravitropic 2 marks
(c)(iii)	idea that leaves / seedlings / plants / chloroplasts, get more light ; more (light) <u>energy</u> , absorbed / trapped / AW ; more photosynthesis ; more, growth / biomass / glucose / starch / AW ; 'more' is only required once 2 marks
(c)(iv)	(auxins) made / produced, in (shoot), tip / apex ; I 'found, in / on' pass / move / diffuse / spread (down the stem) ; auxins collect in the side, in the dark / away from light ; A 'dark / shaded, side' greater (cell) elongation on side in the dark ; AVP ; e.g. absorption of water (by osmosis) / stretching of cell walls / phototropin(s) / plants detect or sense light / ref to turgor pressure I comments about roots 4 marks

(iii) Explain the advantage to the seedlings of this growth response.

~~the~~ Positive phototropism helps the shoots to move and grow to the direction of light. This helps the cells to be ~~more~~ exposed to more ~~light~~ light which is trapped by chlorophyll in chloroplast, which is essential for photosynthesis. This leads to higher rate of photosynthesis ~~and~~ and thus more growth. (iv) Auxins control the growth responses of seedlings. due to the formation of more glucose.

Explain how auxins control the growth response of the seedlings in pot R.

~~* As light falls on one side~~
 * One side of the shoot is exposed to light.
 * Auxin from the tip diffuse more ~~to~~ to the shaded side than the one exposed to light.
 * They accumulate on the shaded side causing the cells to absorb more water than the other side and become more ~~and~~ elongated.
 * The uneven growth causes the shoot to bend towards the direction of the light. [4]

[Total: 16]

Select page

HIGH

MIDDLE

LOW

Your Mark

2(a)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(c)(i)

2(c)(ii)

2(c)(iii)

2(c)(iv)

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EXAMINER
COMMENTS

MARK
SCHEME

2 The nervous system coordinates the responses of animals to changes in their environment.

(a) Fig. 2.1 shows the arrangement of the nervous system in a mammal.

Complete Fig. 2.1 by writing the names of the missing parts of the mammalian nervous system in the boxes.

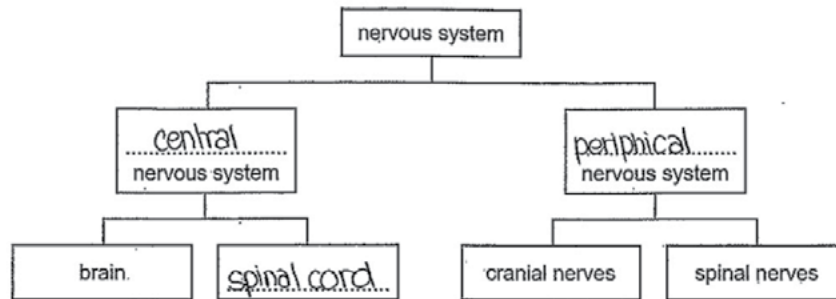


Fig. 2.1

[3]

(b) Fig. 2.2 is a flow chart that shows how an involuntary action is controlled.

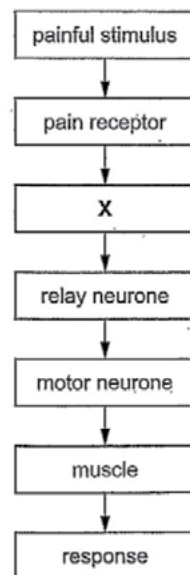


Fig. 2.2

Your Mark

2(a)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(c)(i)

2(c)(ii)

2(c)(iii)

2(c)(iv)

Q2	Mark scheme	
(a)	central (nervous system) ; peripheral (nervous system) ; spinal cord ; R spine	3 marks
(b)(i)	sensory neurone ; A afferent neurone R sensory nerve	1 mark
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(i) State the structure found at X.

coordinator [1]

(ii) State the type of involuntary action shown by the flow chart.

reflex arc [1]

(iii) State **two** ways in which a voluntary action differs from an involuntary action.

1 It can be controlled - you can choose to do it which you can't in involuntary action
2 You think about voluntary actions but you don't think about involuntary action, it just happens [2]

Your Mark

2(a)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(c)(i)

2(c)(ii)

2(c)(iii)

2(c)(iv)

Q2	Mark scheme
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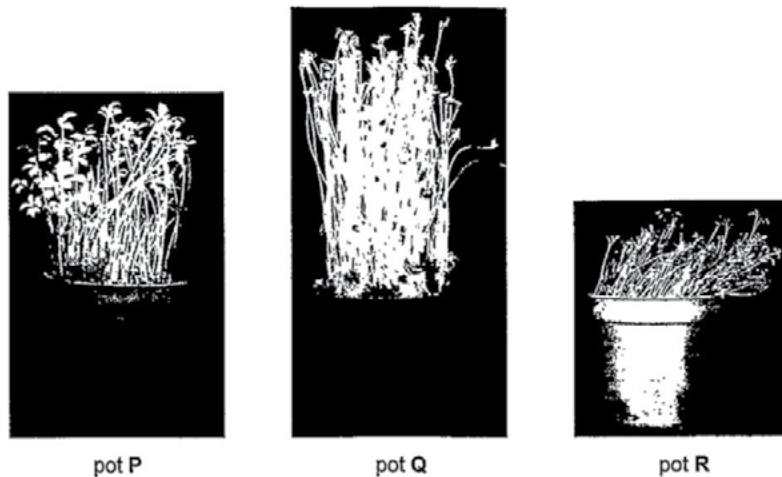


Fig. 2.3

(i) State the conditions in which pots P and Q were kept.

P ... Dark
Q ... Light

[1]

(ii) State the name of the growth response shown by the seedlings in pot R.

... phototropism [2]

Your Mark

2(a)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(c)(i)

2(c)(ii)

2(c)(iii)

2(c)(iv)

Q2	Mark scheme
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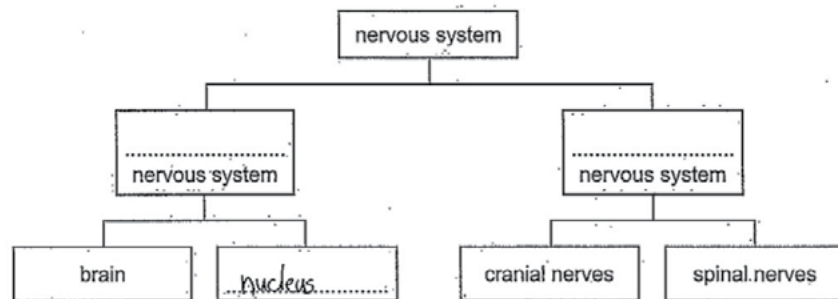


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[3]

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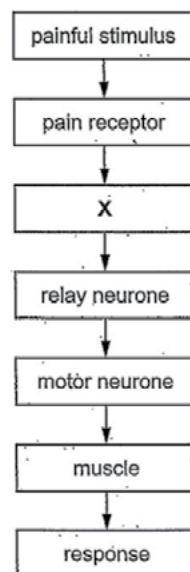


Fig. 2.2

Your Mark

2(a)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(c)(i)

2(c)(ii)

2(c)(iii)

2(c)(iv)

Q2	Mark scheme	
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(b)(iii)	slower / takes more time ; needs thought / uses (higher centres of) the brain / conscious control ; learnt / not inherited / not innate / needs training / AW ; not automatic ; response is not always the same to the stimulus ;	2 marks

(i) State the structure found at X.

~~Spinal cord~~ Spinal cord

[1]

(ii) State the type of involuntary action shown by the flow chart.

~~Uncontrolled reaction~~ Uncontrolled reaction

[1]

(iii) State two ways in which a voluntary action differs from an involuntary action.

1 It comes from the spinal cord not for the brain for faster reaction.

2 You do not control the reaction.

[2]

Your Mark

2(a)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(c)(i)

2(c)(ii)

2(c)(iii)

2(c)(iv)

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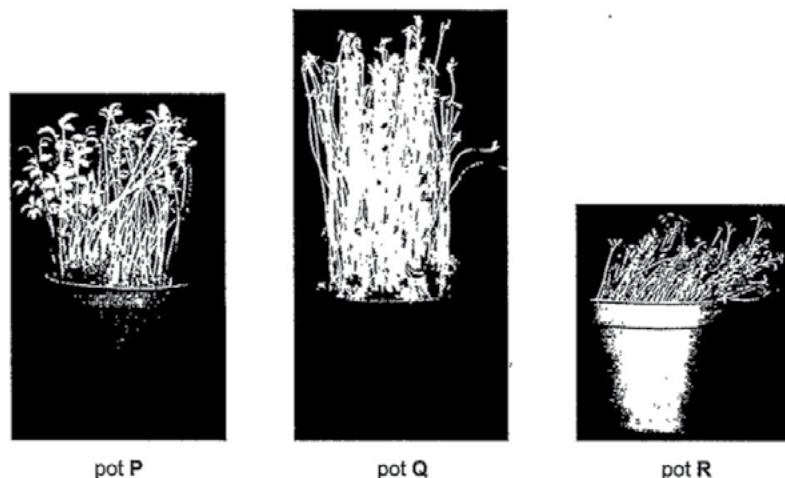


Fig. 2.3

(i) State the conditions in which pots P and Q were kept.

P.....Sunlight.....
Q.....Dimlight and too much water.....

[1]

(ii) State the name of the growth response shown by the seedlings in pot R.

It's cells were not exposed to light from same place.....

[2]

Your Mark

2(a)

2(b)(i)

2(b)(ii)

2(b)(iii)

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2(c)(ii)

2(c)(iii)

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◀ Select page ▶

HIGH

MIDDLE

LOW

(iii). Explain the advantage to the seedlings of this growth response.

Explain the advantage to the seedlings of this growth response.

1. The ^{Plant} ~~sun~~ was exposed to the sun from only one side so it grew ~~toward~~ towards the sun. And it grew longer roots and it is easier for spreading pollen grains for reproduction of ~~animals~~ of other plants and even other plant species. [2]

(iv) Auxins control the growth responses of seedlings.

Explain how auxins control the growth response of the seedlings in pot R.

Pot are was partially exposed to the Sun and barely watered so the ~~ex~~ auxin hormone ~~hypothetically~~ ~~formed~~ ~~in the~~ ~~pot~~ ~~without~~ supported the plant in growing leaves and helped it maintain its root.

[4]

[Total: 16]

Your Mark

2(a)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(c)(i)

2(c)(ii)

2(c)(iii)

2(c)(iv)

Q2	Mark scheme
(c)(i)	<i>either</i> pot P – (uniform) light AND pot Q – no light / dark / covered (up) ; <i>or</i> pot P – (uniform) with / plus, magnesium AND pot Q – no magnesium ; A pot P has all nutrients 1 mark
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EXAMINER COMMENTS

**MARK
SCHEME**

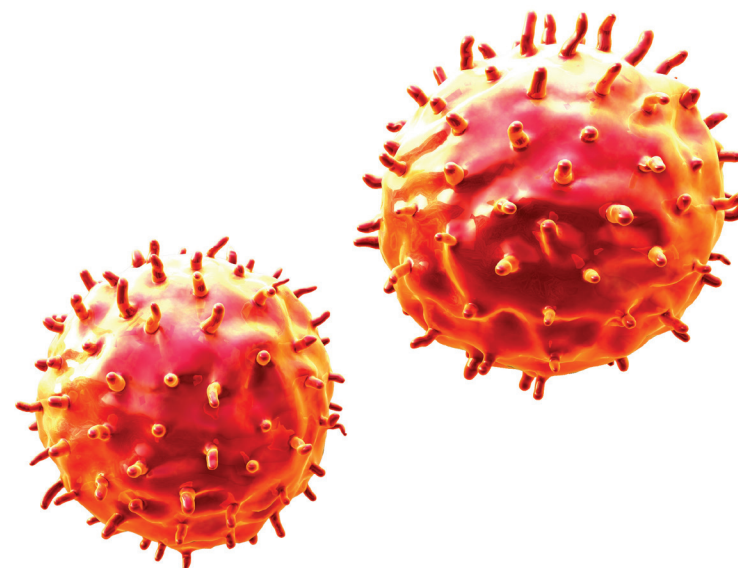
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Interactive Example Candidate Responses

Paper 4 (May / June 2016), Question 3

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Biology 0610



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3 Catalase is an enzyme that breaks down hydrogen peroxide inside cells. Red blood cells contain catalase.

Some dogs have an inherited condition in which catalase is not produced. This condition is known as acatalasia and it is caused by a mutation in the gene for catalase.

(a) Define the terms *gene* and *gene mutation*.

gene a length of DNA that codes for a protein.

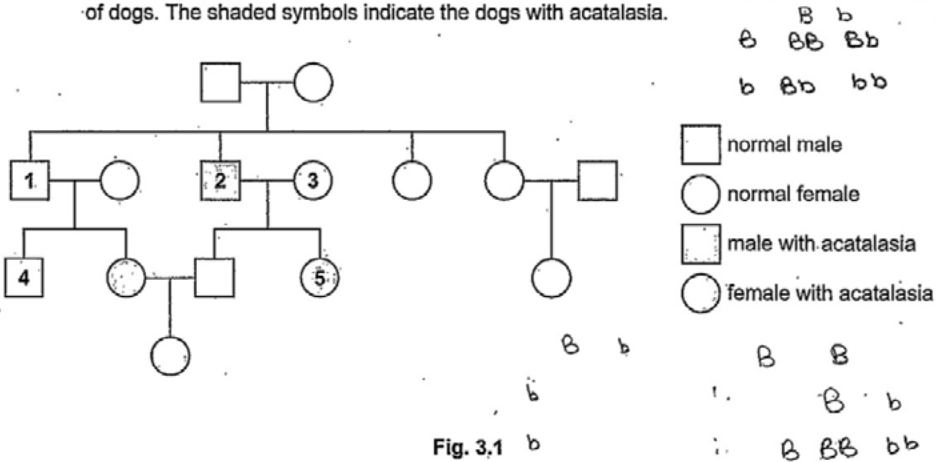
gene mutation... a change in base sequence of DNA.

[2]

(b) A geneticist was asked to investigate the inheritance of acatalasia in dogs:

The normal allele is represented by **B** and the mutant allele is represented by **b**.

The geneticist made the diagram in Fig. 3.1 to show the inheritance of acatalasia in a family of dogs. The shaded symbols indicate the dogs with acatalasia.



(i) State the genotypes of the dogs identified as 1, 2 and 3 in Fig. 3.1. b Bb bb

1 ~~bb~~ Bb
2 bb
3 Bb

2 bb

3. Bb

[3]

Your Mark

3(a)

3(b)(i)

3(b)(ii)

3(b)(iii)

Q3 Mark scheme

(a)	<i>gene</i> a length of DNA that codes for a protein ; R chromosome/molecule of/genome <i>gene mutation</i> a change in <u>base</u> sequence of DNA ; 2 marks
-----	--

(b)(i)	1 Bb ; 2 bb ; 3 Bb ;	3 marks
--------	--	----------------

(b)(ii)	$(Bb \times bb)$ B , b + b , (b) ; <table border="1" data-bbox="1655 593 1892 660"> <tr> <td colspan="2"></td><th colspan="2">male gametes</th></tr> <tr> <td colspan="2"></td><th>B</th><th>b</th></tr> <tr> <th rowspan="2">female gametes</th><th>b</th><td>Bb</td><td>bb</td></tr> <tr> <th>(b)</th><td>(Bb)</td><td>(bb)</td></tr> </table> <i>offspring genotypes</i> Bb and bb ; A heterozygous and homozygous recessive offspring phenotypes normal/carrier and acatalasia ; 3 marks						male gametes				B	b	female gametes	b	Bb	bb	(b)	(Bb)	(bb)
		male gametes																	
		B	b																
female gametes	b	Bb	bb																
	(b)	(Bb)	(bb)																
(b)(iii)	test (cross) ; 1 mark																		

(ii) The geneticist crossed dog 4 with dog 5. Approximately half of the offspring had acatalasia and half the offspring did not have acatalasia.

Complete the genetic diagram to show how this is possible.

dog 4 dog 5

parental phenotypes normal has acatalasia

parental genotypes Bb bb

gametes B b b

Punnett square

	B	b
b	Bb normal	bb acatalasia
b	Bb normal	bb acatalasia

offspring genotypes..... Bb, bb

offspring phenotypes..... normal, acatalasia. [3]

(iii) State the name given to the type of cross that you have completed in (b)(ii).

test cross. [1]

[Total: 9]

Your Mark

3(a)

3(b)(i)

3(b)(ii)

3(b)(iii)

Q3 Mark scheme																
(a)	<i>gene</i> a length of DNA that codes for a protein ; R chromosome/molecule of/genome <i>gene mutation</i> a change in <u>base</u> sequence of DNA ; 2 marks															
(b)(i)	1 Bb ; 2 bb ; 3 Bb ; 3 marks															
(b)(ii)	(Bb x bb) B , b + b , (b) ; <table><tr><td colspan="2"></td><td colspan="2">male gametes</td></tr><tr><td colspan="2"></td><td>B</td><td>b</td></tr><tr><td rowspan="2">female gametes</td><td>b</td><td>Bb</td><td>bb</td></tr><tr><td>(b)</td><td>(Bb)</td><td>(bb)</td></tr></table> <i>offspring genotypes</i> Bb and bb ; A heterozygous and homozygous recessive offspring phenotypes normal/carrier and acatalasia ; 3 marks			male gametes				B	b	female gametes	b	Bb	bb	(b)	(Bb)	(bb)
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		B	b													
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- 3 Catalase is an enzyme that breaks down hydrogen peroxide inside cells. Red blood cells contain catalase:

Some dogs have an inherited condition in which catalase is not produced. This condition is known as acatalasia and it is caused by a mutation in the gene for catalase.

- (a) Define the terms *gene* and *gene mutation*.

gene... a strand of DNA that codes for protein.

gene mutation... a copy of a gene that is different to the original

[2]

- (b) A geneticist was asked to investigate the inheritance of acatalasia in dogs.

The normal allele is represented by **B** and the mutant allele is represented by **b**.

The geneticist made the diagram in Fig. 3.1 to show the inheritance of acatalasia in a family of dogs. The shaded symbols indicate the dogs with acatalasia.

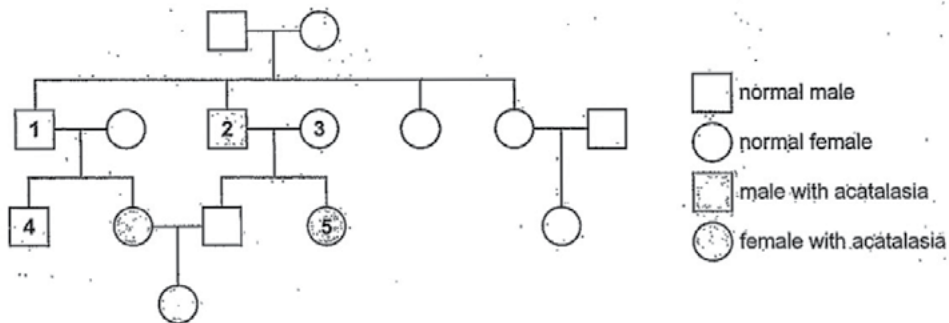


Fig. 3.1

- (i) State the genotypes of the dogs identified as 1, 2 and 3 in Fig. 3.1.

1 BB ; normal male
2 b ; male with acatalasia
3 BB ; normal female

[3]

Your Mark

3(a)

3(b)(i)

3(b)(ii)

3(b)(iii)

Q3 Mark scheme

(a)	<i>gene</i> a length of DNA that codes for a protein ; R chromosome/molecule of/genome <i>gene mutation</i> a change in <u>base</u> sequence of DNA ; 2 marks																	
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(b)(iii)	test (cross) ; 1 mark																	

(ii) The geneticist crossed dog 4 with dog 5. Approximately half of the offspring had acatalasia and half the offspring did not have acatalasia.

Complete the genetic diagram to show how this is possible.

dog 4

normal

BB

dog 5

has acatalasia

bb

parental phenotypes

parental genotypes

gametes

B

B

+

b

Punnett square

X	B	B
b	Bb	Bb

offspring genotypes.....

Bb

offspring phenotypes.....

[3]

(iii) State the name given to the type of cross that you have completed in (b)(ii).

..... selective breeding [1]

[Total: 9]

Your Mark

3(a)

3(b)(i)

3(b)(ii)

3(b)(iii)

Q3	Mark scheme															
(a)	<i>gene</i> a length of DNA that codes for a protein ; R chromosome/molecule of/genome <i>gene mutation</i> a change in <u>base</u> sequence of DNA ; 2 marks															
(b)(i)	1 Bb ; 2 bb ; 3 Bb ; 3 marks															
(b)(ii)	(Bb x bb) B , b + b , (b) ; <table><tr><td colspan="2"></td><td colspan="2">male gametes</td></tr><tr><td colspan="2"></td><td>B</td><td>b</td></tr><tr><td rowspan="2">female gametes</td><td>b</td><td>Bb</td><td>bb</td></tr><tr><td>(b)</td><td>(Bb)</td><td>(bb)</td></tr></table> <i>offspring genotypes</i> Bb and bb ; A heterozygous and homozygous recessive offspring phenotypes normal/carrier and acatalasia ; 3 marks			male gametes				B	b	female gametes	b	Bb	bb	(b)	(Bb)	(bb)
		male gametes														
		B	b													
female gametes	b	Bb	bb													
	(b)	(Bb)	(bb)													
(b)(iii)	test (cross) ; 1 mark															

- 3 Catalase is an enzyme that breaks down hydrogen peroxide inside cells. Red blood cells contain catalase.

Some dogs have an inherited condition in which catalase is not produced. This condition is known as acatalasia and it is caused by a mutation in the gene for catalase.

- (a) Define the terms *gene* and *gene mutation*.

gene... features transported from parents

gene mutation... features transported from parents the get changed

[2]

- (b) A geneticist was asked to investigate the inheritance of acatalasia in dogs.

The normal allele is represented by **B** and the mutant allele is represented by **b**.

The geneticist made the diagram in Fig. 3.1 to show the inheritance of acatalasia in a family of dogs. The shaded symbols indicate the dogs with acatalasia.

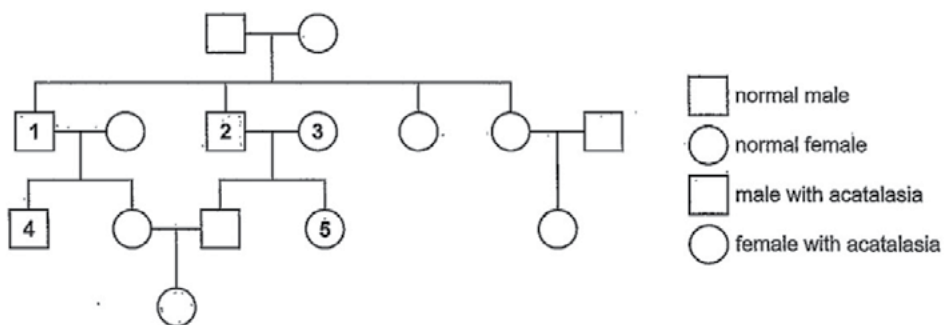


Fig. 3.1

- (i) State the genotypes of the dogs identified as 1, 2 and 3 in Fig. 3.1.

1 normal male
2 male with acatalasia
3 normal female

[3]

Your Mark

3(a)

3(b)(i)

3(b)(ii)

3(b)(iii)

Q3 Mark scheme

(a)	<i>gene</i> a length of DNA that codes for a protein ; R chromosome/molecule of/genome <i>gene mutation</i> a change in <u>base</u> sequence of DNA ; 2 marks																	
(b)(i)	1 Bb ; 2 bb ; 3 Bb ; 3 marks																	
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		male gametes																
		B	b															
female gametes	b	Bb	bb															
	(b)	(Bb)	(bb)															
(b)(iii)	test (cross) ; 1 mark																	

(ii) The geneticist crossed dog 4 with dog 5. Approximately half of the offspring had acatalasia and half the offspring did not have acatalasia.

Complete the genetic diagram to show how this is possible.

dog 4

normal

dog 5

has acatalasia

parental phenotypes

parental genotypes

4

5

+

5

gametes

Punnett square

4	5
45	55
54	44

offspring genotypes.....4⁵

offspring phenotypes.....5⁴

[3]

(iii) State the name given to the type of cross that you have completed in (b)(ii).

Punnett square

[1]

[Total: 9]

Your Mark

3(a)

3(b)(i)

3(b)(ii)

3(b)(iii)

Q3	Mark scheme															
(a)	<i>gene</i> a length of DNA that codes for a protein ; R chromosome/molecule of/genome <i>gene mutation</i> a change in <u>base</u> sequence of DNA ; 2 marks															
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		male gametes														
		B	b													
female gametes	b	Bb	bb													
	(b)	(Bb)	(bb)													
(b)(iii)	test (cross) ; 1 mark															

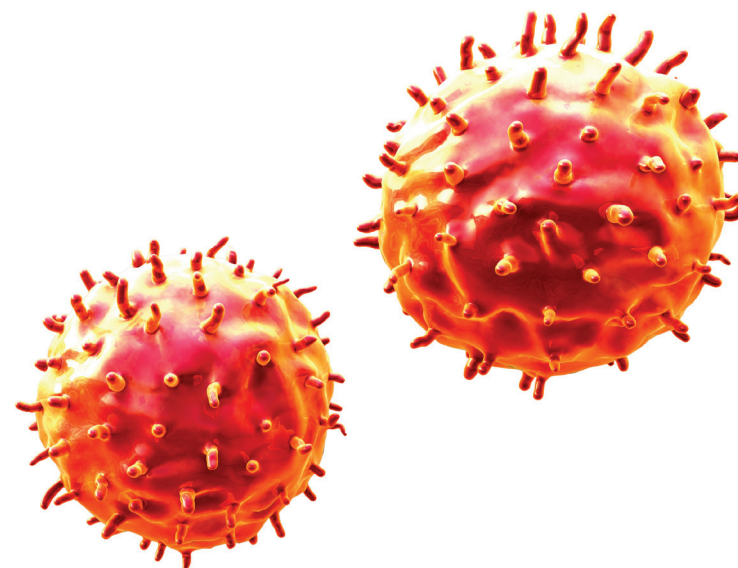
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Interactive Example Candidate Responses

Paper 4 (May / June 2016), Question 4

Cambridge IGCSE™
Biology 0610



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4 *Rhabdostyla* is a single-celled organism that has no cell wall and no chlorophyll.

(a) Gases are exchanged across the cell membrane of *Rhabdostyla*.

Name:

the gas produced by *Rhabdostyla* CO_2

the process that produces the gas respiration

the method of removal of the gas ~~respiration~~ diffusion

[3]

Rhabdostyla lives in freshwater habitats, such as ponds, lakes and rivers.

Freshwater has a very low concentration of solutes.

Rhabdostyla has a contractile vacuole that fills with water and empties at intervals as shown in Fig. 4.1. The contractile vacuole removes excess water.

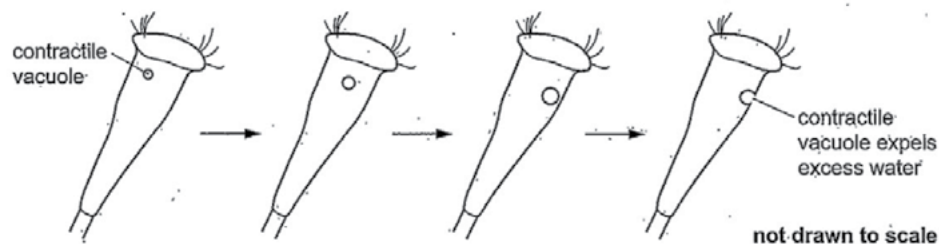


Fig. 4.1

(b) Explain, using the term **water potential**, why *Rhabdostyla* needs to remove excess water.

If *Rhabdostyla* did not remove excess it would get filled up with water until it burst as it has no cell wall to hold its shape. It would fill up as the ^{freshwater} ~~water~~ has a high water potential and *Rhabdostyla* has a low water potential so water moves down the ~~water~~ potential gradient through a partially permeable membrane into the cell by osmosis. [3]

Select page

HIGH

MIDDLE

LOW

Your Mark

4(a)

4(b)

4(c)

4(d)

Q4	Mark scheme
(a)	carbon dioxide/CO ₂ ; (aerobic) respiration ; (simple) diffusion ; A excretion I gas exchange 3 marks
(b)	water enters by <u>osmosis</u> ; down a <u>water potential</u> gradient/high(er) to low(er) <u>water potential</u> ; R water concentration A semi-/selectively/differentially through partially permeable membrane ; needs to remove water to prevent bursting ; 3 marks
(c)	as concentration of sea water increases the removal of water decreases ; as concentration of sea water increases the water potential gradient decreases ; A 0% to 12% therefore less water enters at higher concentrations of sea water ; less excess water ; 3 marks
(d)	cell walls, inelastic/do not stretch/rigid/inflexible/keep shape of cell ; I strong/tough/don't break cells, are turgid/have high turgor pressure ; resist any increase in, volume/pressure ; these cells do not absorb excess water ; A (very) little water enters the cells will not burst ; 3 marks

EXAMINER
COMMENTS

MARK
SCHEME

In an investigation, individual *Rhabdostyla* were placed into different concentrations of sea water. The rate of water excreted by the contractile vacuole of each organism was determined. The results are shown in Fig. 4.2.

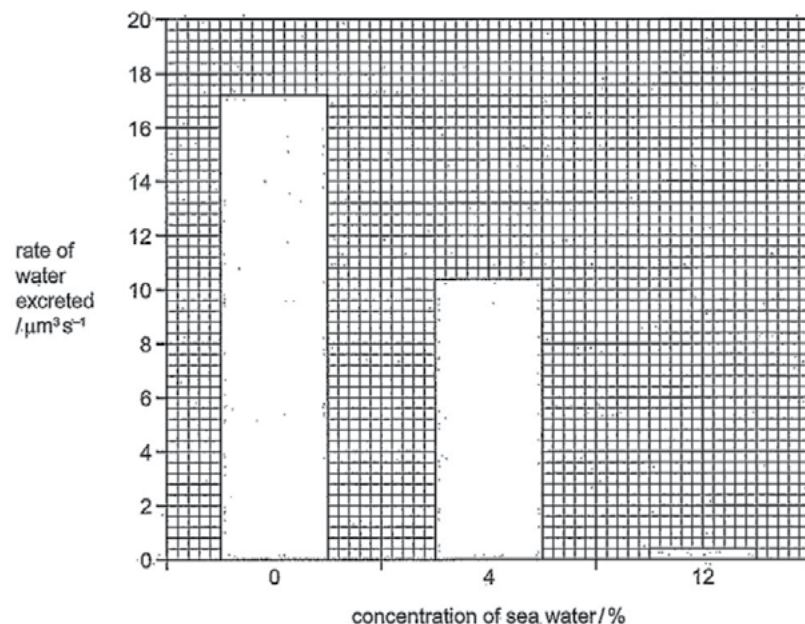


Fig. 4.2

(c) Explain the results shown in Fig. 4.2.

When there is just water a high amount of water is excreted due to the large differences in water potential between the cell and the water. When there is a higher concentration of sea water at 4% there are more salts in the water so the difference in water potential is less so less moves into the cell. At 12% concentration the water potentials are similar so there is little movement of water and so little water needs to be excreted by the cells as there are many salt ions in the water as well as sea water has a high salt content.

Your Mark

4(a)

4(b)

4(c)

4(d)

Q4	Mark scheme
(a)	carbon dioxide/CO ₂ ; (aerobic) respiration ; (simple) diffusion ; A excretion I gas exchange 3 marks
(b)	water enters by <u>osmosis</u> ; down a <u>water potential</u> gradient/high(er) to low(er) <u>water potential</u> ; R water concentration A semi-/selectively/differentially through partially permeable membrane ; needs to remove water to prevent bursting ; 3 marks
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(d) Single-celled organisms with cell walls do not have contractile vacuoles. Suggest why.

As a cell wall holds the shape of the organism even when filled with water so it will not burst like those without cell walls. Instead they become turgid when they are filled with water as the cell wall retains the cell's shape unlike the cell membrane so they do not need to be emptied of water by a contractile vacuole so it would be a waste of energy to have a contractile vacuole. [3]

[Total: 12]

Your Mark

4(a)

4(b)

4(c)

4(d)

Q4 Mark scheme	
(a)	carbon dioxide/CO ₂ ; (aerobic) respiration ; (simple) diffusion ; A excretion I gas exchange 3 marks
(b)	water enters by <u>osmosis</u> ; down a <u>water potential</u> gradient/high(er) to low(er) <u>water potential</u> ; R water concentration A semi-/selectively/differentially through partially permeable membrane ; needs to remove water to prevent bursting ; 3 marks
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- 4 *Rhabdostyla* is a single-celled organism that has no cell wall and no chlorophyll.

(a) Gases are exchanged across the cell membrane of *Rhabdostyla*.

Name:

the gas produced by *Rhabdostyla* O₂

the process that produces the gas respiration

the method of removal of the gas excretion

[3]

Rhabdostyla lives in freshwater habitats, such as ponds, lakes and rivers.

Freshwater has a very low concentration of solutes.

Rhabdostyla has a contractile vacuole that fills with water and empties at intervals as shown in Fig. 4.1. The contractile vacuole removes excess water.

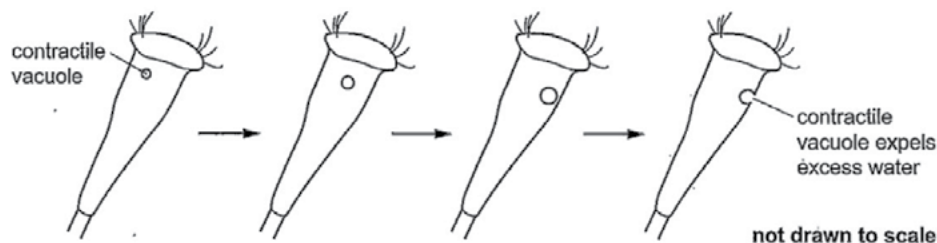


Fig. 4.1

(b) Explain, using the term **water potential**, why *Rhabdostyla* needs to remove excess water.

Rhabdostyla needs to remove excess water to avoid having too high water potential. If it would have too high water potential the cell would swell up and burst as there is no cell wall that would stop it from bursting.

[3]

Your Mark

4(a)

4(b)

4(c)

4(d)

Q4	Mark scheme
(a)	carbon dioxide/CO ₂ ; (aerobic) respiration ; (simple) diffusion ; A excretion I gas exchange 3 marks
(b)	water enters by <u>osmosis</u> ; down a <u>water potential</u> gradient/high(er) to low(er) <u>water potential</u> ; R water concentration A semi-/selectively/differentially through partially permeable membrane ; needs to remove water to prevent bursting ; 3 marks
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In an investigation, individual *Rhabdostyla* were placed into different concentrations of sea water. The rate of water excreted by the contractile vacuole of each organism was determined. The results are shown in Fig. 4.2.

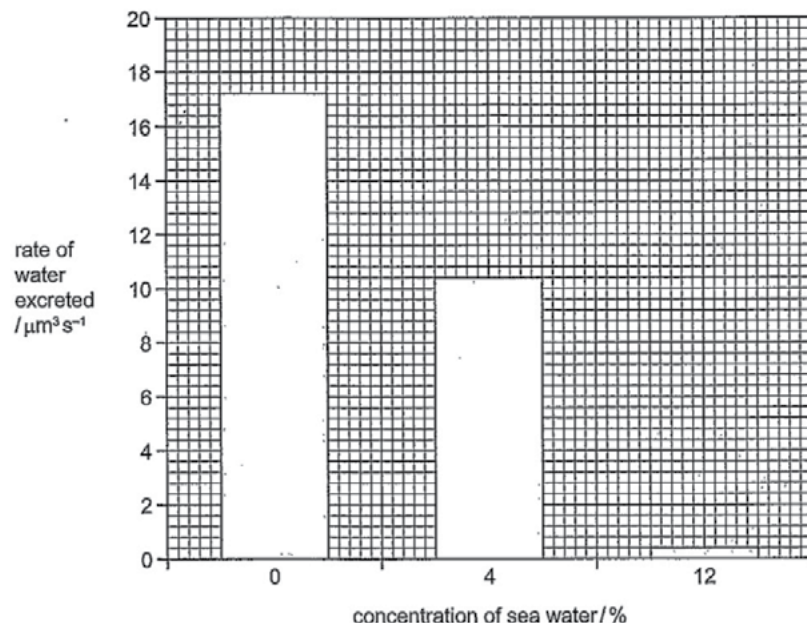


Fig. 4.2

(c) Explain the results shown in Fig. 4.2.

The lower the concentration of sea water, the higher the rate of water excreted. As you can see, at 0 concentration (%) the rate of water excreted was the highest ($17.2 \mu\text{m}^3 \text{s}^{-1}$). This might be because *Rhabdostylas* are used to fresh waters and not to salty water. Too much salty water could have made the vacuole ~~too~~ flaccid and dried out from the salt.

[3]

Your Mark

4(a)

4(b)

4(c)

4(d)

Q4	Mark scheme
(a)	carbon dioxide/CO ₂ ; (aerobic) respiration ; (simple) diffusion ; A excretion I gas exchange 3 marks
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(d) Single-celled organisms with cell walls do not have contractile vacuoles. Suggest why.

Single-celled organisms with cell walls do not need contractile vacuole to empty it's content because these cells cannot burst. The cell wall prevents them from bursting and so there is no need for contractile vacuole and to even out the water potential.

[3]

[Total: 12]

Select page

HIGH

MIDDLE

LOW

Your Mark

4(a)

4(b)

4(c)

4(d)

Q4	Mark scheme
(a)	carbon dioxide/CO ₂ ; (aerobic) respiration ; (simple) diffusion ; A excretion I gas exchange 3 marks
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EXAMINER
COMMENTS

MARK
SCHEME

4 *Rhabdostyla* is a single-celled organism that has no cell wall and no chlorophyll.

(a) Gases are exchanged across the cell membrane of *Rhabdostyla*.

Name: *Rhabdostyla*

the gas produced by *Rhabdostyla* ... *water vapor*

the process that produces the gas ... *contractile vacuole fills and empties with water*

the method of removal of the gas ... *contractile vacuole*

[3]

Rhabdostyla lives in freshwater habitats, such as ponds, lakes and rivers.

Freshwater has a very low concentration of solutes.

Rhabdostyla has a contractile vacuole that fills with water and empties at intervals as shown in Fig. 4.1. The contractile vacuole removes excess water.

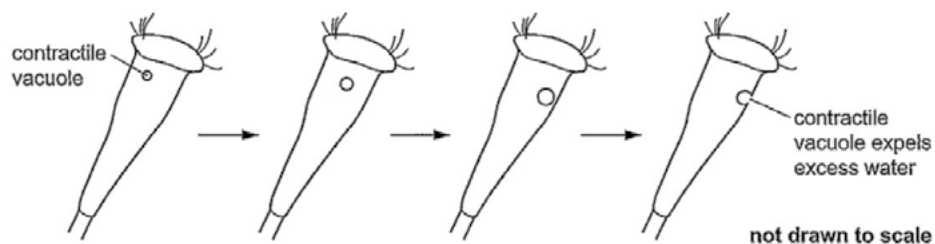


Fig. 4.1

(b) Explain, using the term **water potential**, why *Rhabdostyla* needs to remove excess water.

To make sure your water potential is correct, you need to get rid of all excess water. If you don't remove excess water then you won't be able to produce the gas you want.

[3]

Your Mark

4(a)

4(b)

4(c)

4(d)

Q4	Mark scheme
(a)	carbon dioxide/CO ₂ ; (aerobic) respiration ; (simple) diffusion ; A excretion I gas exchange 3 marks
(b)	water enters by <u>osmosis</u> ; down a <u>water potential</u> gradient/high(er) to low(er) <u>water potential</u> ; R water concentration A semi-/selectively/differentially through partially permeable membrane ; needs to remove water to prevent bursting ; 3 marks
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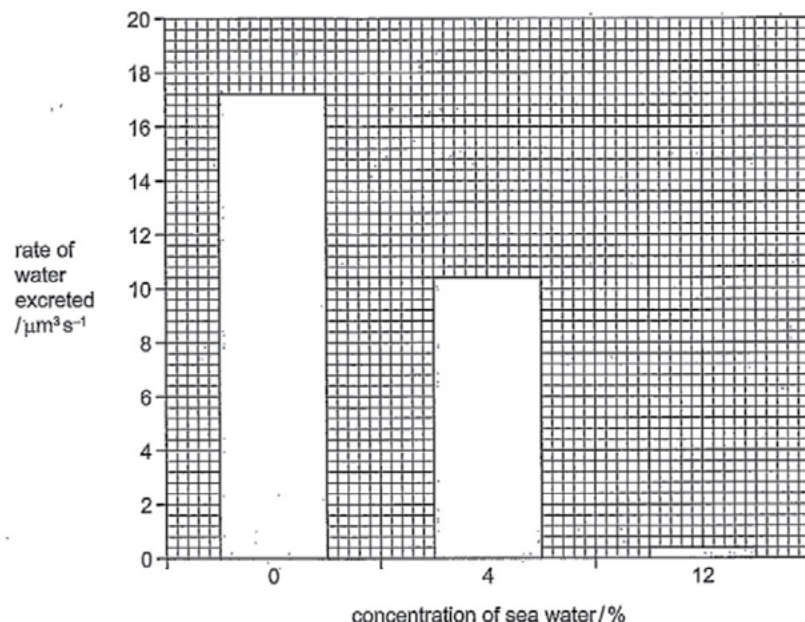


Fig. 4.2

(c) Explain the results shown in Fig. 4.2.

When there is 0% concentration of sea water, the rate of water excretion is about $17 \mu\text{m}^3 \text{s}^{-1}$. When there is 4% concentration of sea water, the rate of water excretion is lower at about $10.5 \mu\text{m}^3 \text{s}^{-1}$. Lastly, when there is 12% concentration of sea water, there is only about $1 \mu\text{m}^3 \text{s}^{-1}$ (rate of water excreted).

[3]

Your Mark

4(a)

4(b)

4(c)

4(d)

Q4	Mark scheme
(a)	carbon dioxide/CO ₂ ; (aerobic) respiration ; (simple) diffusion ; A excretion I gas exchange 3 marks
(b)	water enters by <u>osmosis</u> ; down a <u>water potential</u> gradient/high(er) to low(er) <u>water potential</u> ; R water concentration A semi-/selectively/differentially through partially permeable membrane ; needs to remove water to prevent bursting ; 3 marks
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(d) Single-celled organisms with cell walls do not have contractile vacuoles. Suggest why.

Single-celled organisms ~~ent~~ with cell walls
don't have contractile vacuoles because
they only have 1 cell to ~~to~~ live off of.
Organisms with multiple cells ~~to~~ need ~~a~~ contractile
vacuoles to help the organisms cells work
together to keep the organism alive.

[3]

[Total: 12]

Your Mark

4(a)

4(b)

4(c)

4(d)

Q4	Mark scheme
(a)	carbon dioxide/CO ₂ ; (aerobic) respiration ; (simple) diffusion ; A excretion I gas exchange 3 marks
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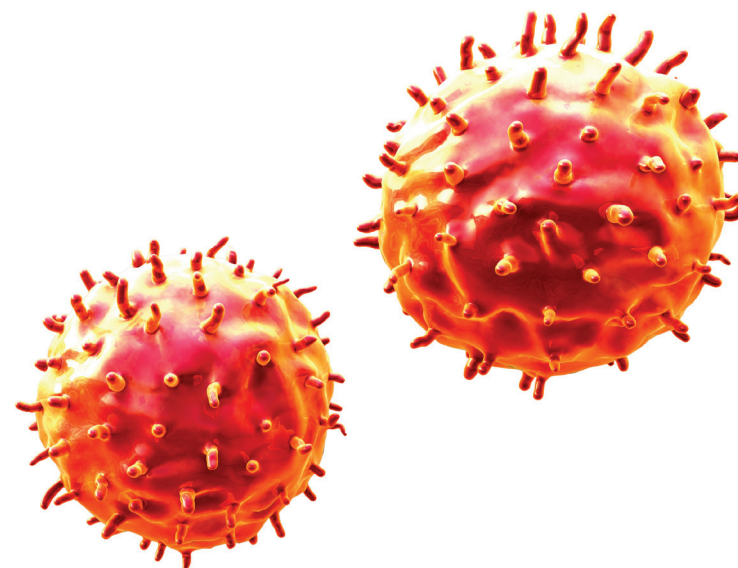
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Interactive Example Candidate Responses

Paper 4 (May / June 2016), Question 5

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Biology 0610



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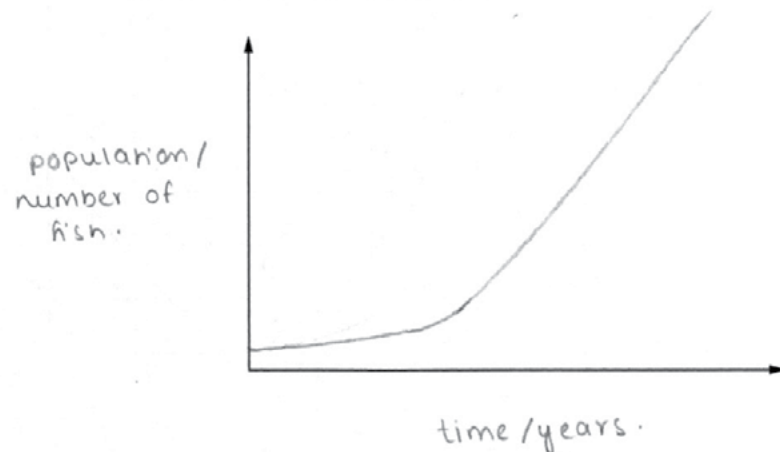
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- 5 A researcher investigated the population growth of fish for fish farming. The researcher stocked a farmer's lake with a small number of these fish and recorded the number of fish over the next five years. The researcher's results showed that the population of fish had increased exponentially.

(a) (i) Use the axes to show the **exponential growth** in the population of fish.

Label the axes and draw a suitable curve.



[3]

(ii) Explain why the population of fish increased exponentially.

There were few limiting factors.
Fish had plenty of food from foodstock.
So there was little competition. There
were no predators. Spread of disease
was controlled by antibiotics. Birth rate
was high since there were many
individuals to reproduce.

[4]

Your Mark

5(a)(i)

5(a)(ii)

5(b)

5(c)

5(d)

Q5 Mark scheme	
(a)(i)	vertical axis – numbers / population ; horizontal axis – time / years ; curve showing exponential increase / log phase ; I lag phase / curve starting at origin 3 marks
(a)(ii)	idea that 'birth' / reproduction / breeding, rate is greater than death rate ; I definitions of exponential growth no limiting factors ; no/little, competition ; plenty, of food/nutrients/space/mates/oxygen/ resources ; no/few, predators ; no/few, parasites/pathogens/disease ; AVP ; e.g. no/little, pollution/waste products/toxins 4 marks
(b)	between 1950 and 2012 units must be used at least once mass of fish caught increased and levels off ; 17 to 90 million tonnes/increase = 73 million tonnes ; A 16 to 18/increase of 72 to 74 fluctuations/increases and decreases/described ; e.g. around 1970/any time after 1990 ; mp4 cannot be awarded without mp3 maximum catch, 94 million tonnes/in 1996 ; steep increase between, 1950–1970/1973–1989 ; 3 marks

Fig. 5.1 shows the total mass of wild fish caught worldwide between 1950 and 2012 and the mass of farmed fish produced worldwide over the same period.

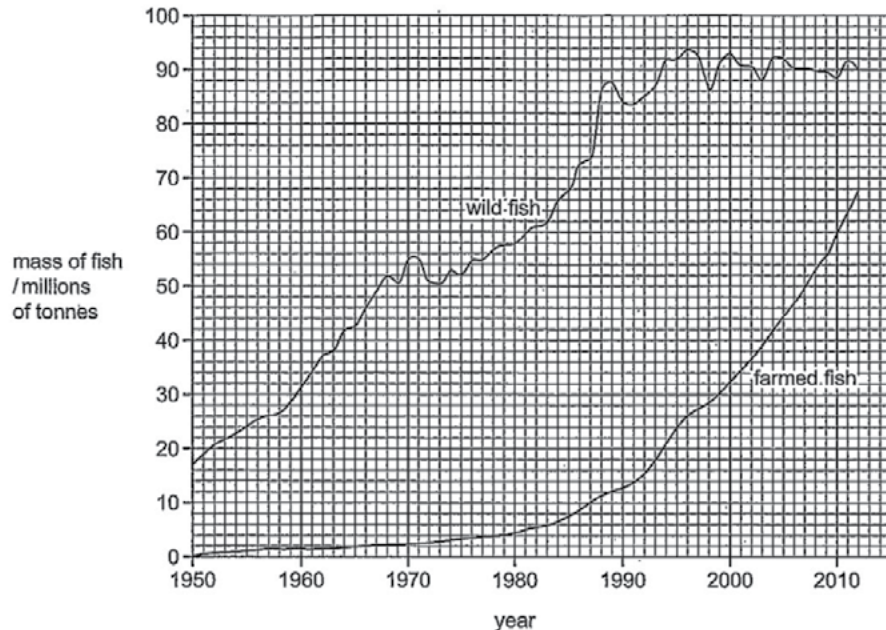


Fig. 5.1

(b) Describe the changes in the mass of **wild fish** caught between 1950 and 2012.

You will gain credit if you use data from Fig. 5.1.

There has been an overall increase in mass between 1950 and 2012 from 17 million tonnes to 90 million tonnes. It increased steeply between 1950 and 1995 and then remained fairly constant around 90 million tonnes. Greatest mass was in 1996. There were small fluctuations throughout 1950-2012. [3]

Your Mark

5(a)(i)

5(a)(ii)

5(b)

5(c)

5(d)

Q5	Mark scheme
(a)(i)	vertical axis – numbers / population ; horizontal axis – time / years ; curve showing exponential increase / log phase ; lag phase / curve starting at origin 3 marks
(a)(ii)	idea that 'birth' / reproduction / breeding, rate is greater than death rate ; definitions of exponential growth no limiting factors ; no/little, competition ; plenty, of food / nutrients / space / mates / oxygen / resources ; no/few, predators ; no/few, parasites / pathogens / disease ; AVP ; e.g. no/little, pollution / waste products / toxins 4 marks
(b)	between 1950 and 2012 units must be used at least once mass of fish caught increased and levels off ; 17 to 90 million tonnes / increase = 73 million tonnes ; A 16 to 18 / increase of 72 to 74 fluctuations / increases and decreases / described ; e.g. around 1970 / any time after 1990 ; mp4 cannot be awarded without mp3 maximum catch, 94 million tonnes / in 1996 ; steep increase between, 1950–1970 / 1973–1989 ; 3 marks

(c) It is predicted that wild fish stocks will decrease and become depleted because of overfishing.

Suggest ways in which governments can try to maintain the stocks of wild fish.

~~Governments should try to reduce the effect of limiting factors~~
 Governments should pass strict laws. Fishing should not be allowed during breeding season; special nets should be provided to fishermen that don't catch baby fish and overseas fishermen should not be allowed to fish in the part of the sea that belongs to the country. Water pollution due to chemical fertilizers and sewage should be reduced as this causes eutrophication and sewage should be treated before being dumped. Plastics should not be dumped in the sea or rivers. Oil spills should be prevented, Sewage should not contain contraceptives. [6]

(d) Like fish stocks, forests can be a sustainable resource.

Discuss what is meant by the term *sustainable resource*, using forests as an example.

Sustainable resource is a resource that can be removed from the environment without it running out. e.g. forests are cut down for agriculture, housing etc. but as long as they are replaced by planting trees elsewhere or some are left, they will not finish and will be available for future generations. and they will also grow back. [3]

[Total: 19]

Your Mark

5(a)(i)

5(a)(ii)

5(b)

5(c)

5(d)

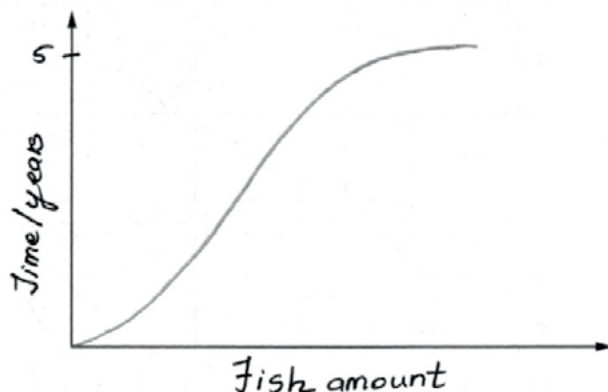
Q5 Mark scheme

(c)	answers can refer to seas, lakes and/or rivers international, agreements/treaties ; A set maximum mass/number/amount/quantity quotas/permits/licenses ; A 'ban unauthorised fishing' fines/sanctions, for, overfishing/illegal/unauthorised, fishing ; A consequences other than fines fishery protection vessels/wardens/patrols/AW ; restrictions on times when fishing can occur ; A not in breeding season exclusion zones/nursery zones/'no take' zones/reserves ; A descriptions or examples total ban for some species ; A named examples regulations on method of fishing ; e.g. mesh size of nets/ban nets/use of lines instead/size of fishing vessel/'fishing effort' I ban on all wild fish education/raise awareness/any example ; monitoring fish stocks ; captive breeding (of wild fish) ; re-stocking (of wild stocks) ; encourage farmed fish ; e.g. provide subsidies AVP ; e.g. tax on wild fish/increase the cost of wild fish 6 marks
(d)	definition of sustainable resource renewable/self-renewing/regenerates/described ; e.g. produced as rapidly as it is removed I reused/recycled resource, does not/will not, run out/become exhausted ; replanting/reseeding/regrowing ; AVP ; e.g. pollarding/coppicing/leaving mature trees 3 marks

- 5 A researcher investigated the population growth of fish for fish farming. The researcher stocked a farmer's lake with a small number of these fish and recorded the number of fish over the next five years. The researcher's results showed that the population of fish had increased exponentially.

(a) (i) Use the axes to show the **exponential growth** in the population of fish.

Label the axes and draw a suitable curve.



[3]

(ii) Explain why the population of fish increased exponentially.

The fish were provided with enough may
 for have not been within the reproductive
 age and then when they reached it however,
 there was an exponential growth as they
 provided with all the nutrients, the time
 and conditions for their population to
 increase.

[4]

Select page

HIGH

MIDDLE

LOW

Your Mark

5(a)(i)

5(a)(ii)

5(b)

5(c)

5(d)

Q5	Mark scheme
(a)(i)	vertical axis – numbers / population ; horizontal axis – time / years ; curve showing exponential increase / log phase ; I lag phase / curve starting at origin 3 marks
(a)(ii)	idea that 'birth' / reproduction / breeding, rate is greater than death rate ; I definitions of exponential growth no limiting factors ; no/little, competition ; plenty, of food / nutrients / space / mates / oxygen / resources ; no/few, predators ; no/few, parasites / pathogens / disease ; AVP ; e.g. no/little, pollution / waste products / toxins 4 marks
(b)	between 1950 and 2012 units must be used at least once mass of fish caught increased and levels off ; 17 to 90 million tonnes / increase = 73 million tonnes ; A 16 to 18 / increase of 72 to 74 fluctuations / increases and decreases / described ; e.g. around 1970 / any time after 1990 ; mp4 cannot be awarded without mp3 maximum catch, 94 million tonnes / in 1996 ; steep increase between, 1950–1970 / 1973–1989 ; 3 marks

EXAMINER COMMENTS

MARK SCHEME

Fig. 5.1 shows the total mass of wild fish caught worldwide between 1950 and 2012 and the mass of farmed fish produced worldwide over the same period.

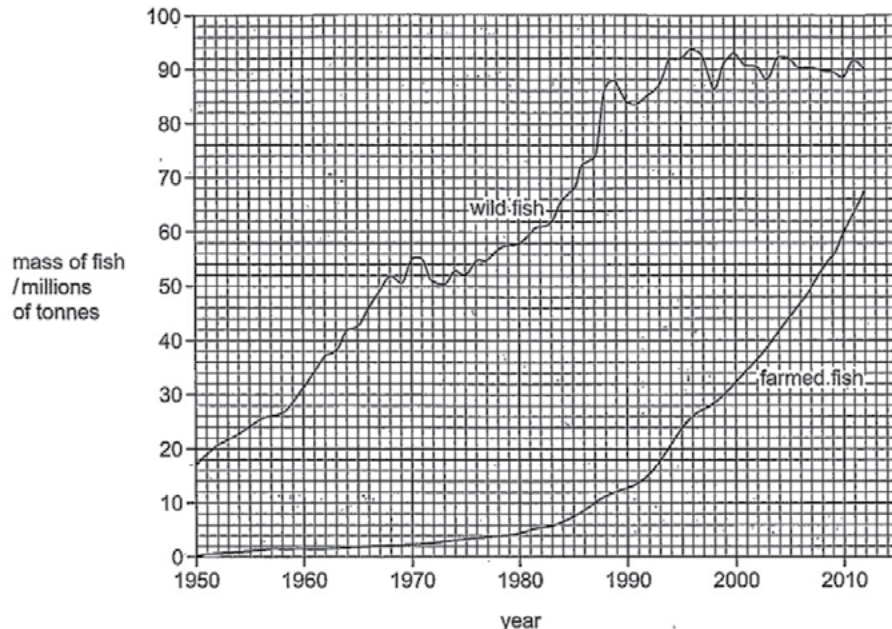


Fig. 5.1

(b) Describe the changes in the mass of **wild fish** caught between 1950 and 2012.

You will gain credit if you use data from Fig. 5.1.

The mass of fish at 1950 was around 19 million tonnes and as the years passed by there was growth but around the year 1985 there - 1990 was a growth spurt until it reached about 88 million tonnes and then the growth it increased and decreased normally until 201 was almost constant until 2010.

[3]

Your Mark

5(a)(i)

5(a)(ii)

5(b)

5(c)

5(d)

Q5	Mark scheme
(a)(i)	vertical axis – numbers / population ; horizontal axis – time / years ; curve showing exponential increase / log phase ; lag phase / curve starting at origin 3 marks
(a)(ii)	idea that 'birth' / reproduction / breeding, rate is greater than death rate ; definitions of exponential growth no limiting factors ; no/little, competition ; plenty, of food/nutrients/space/mates/oxygen/ resources ; no/few, predators ; no/few, parasites/pathogens/disease ; AVP ; e.g. no/little, pollution/waste products/toxins 4 marks
(b)	between 1950 and 2012 units must be used at least once mass of fish caught increased and levels off ; 17 to 90 million tonnes/increase = 73 million tonnes ; A 16 to 18/increase of 72 to 74 fluctuations/increases and decreases/described ; e.g. around 1970/any time after 1990 ; mp4 cannot be awarded without mp3 maximum catch, 94 million tonnes/in 1996 ; steep increase between, 1950–1970/1973–1989 ; 3 marks

(c) It is predicted that wild fish stocks will decrease and become depleted because of overfishing.

Suggest ways in which governments can try to maintain the stocks of wild fish.

The government can contribute in maintaining the stock of wild fish by:-

- Educating fishers about this issue.
- Enforcing laws that ban fishing at breeding seasons.
- Fishers should not be allowed to fish the young fishes that have not yet reached reproductive age.
- There should be a limit for fishing rate at time intervals.

[6]

(d) Like fish stocks, forests can be a sustainable resource.

Discuss what is meant by the term *sustainable resource*, using forests as an example.

A sustainable resource is a resource that is renewable or can be produced at the same rate as it is used. We can see this in forests as we cut down a reasonable amount of wood for example, heating purposes. We can ^{plant} grow the trees that we cut down again and so repeating this no ~~cycle~~ change in the ecosystem will at the same rate as we use them and at this rate the sustainable resource will remain in our ecosystem.

[Total: 19]

Your Mark

5(a)(i)

5(a)(ii)

5(b)

5(c)

5(d)

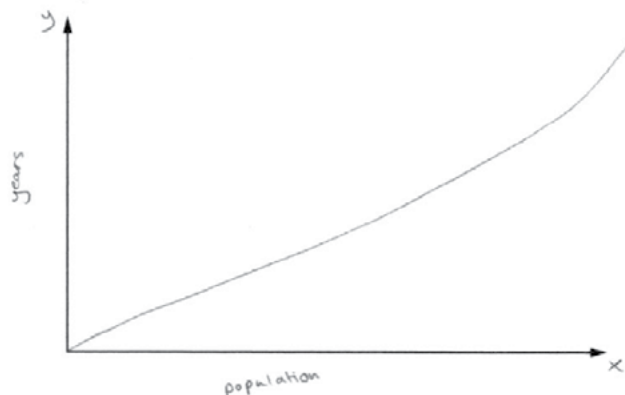
Q5 Mark scheme

(c)	answers can refer to seas, lakes and/or rivers international, agreements/treaties ; A set maximum mass/number/amount/quantity quotas/permits/licenses ; A 'ban unauthorised fishing' fines/sanctions, for, overfishing/illegal/unauthorised, fishing ; A consequences other than fines fishery protection vessels/wardens/patrols/AW ; restrictions on times when fishing can occur ; A not in breeding season exclusion zones/nursery zones/'no take' zones/reserves ; A descriptions or examples total ban for some species ; A named examples regulations on method of fishing ; e.g. mesh size of nets/ban nets/use of lines instead/size of fishing vessel/'fishing effort' I ban on all wild fish education/raise awareness/any example ; monitoring fish stocks ; captive breeding (of wild fish) ; re-stocking (of wild stocks) ; encourage farmed fish ; e.g. provide subsidies AVP ; e.g. tax on wild fish/increase the cost of wild fish 6 marks
(d)	definition of sustainable resource renewable/self-renewing/regenerates/described ; e.g. produced as rapidly as it is removed I reused/recycled resource, does not/will not, run out/become exhausted ; replanting/reseeding/regrowing ; AVP ; e.g. pollarding/coppicing/leaving mature trees 3 marks

- 5 A researcher investigated the population growth of fish for fish farming. The researcher stocked a farmer's lake with a small number of these fish and recorded the number of fish over the next five years. The researcher's results showed that the population of fish had increased exponentially.

(a) (i) Use the axes to show the **exponential growth** in the population of fish.

Label the axes and draw a suitable curve.



[3]

(ii) Explain why the population of fish increased exponentially.

Good environment, more offspring.
~~were made~~ The right amount of
 sunlight. ~~the~~ The lake is pure
 water no additional compounds.
 More oxygen.

[4]

Your Mark

5(a)(i)

5(a)(ii)

5(b)

5(c)

5(d)

Q5 Mark scheme	
(a)(i)	vertical axis – numbers / population ; horizontal axis – time / years ; curve showing exponential increase / log phase ; I lag phase / curve starting at origin 3 marks
(a)(ii)	idea that 'birth' / reproduction / breeding, rate is greater than death rate ; I definitions of exponential growth no limiting factors ; no/little, competition ; plenty, of food / nutrients / space / mates / oxygen / resources ; no/few, predators ; no/few, parasites / pathogens / disease ; AVP ; e.g. no/little, pollution / waste products / toxins 4 marks
(b)	between 1950 and 2012 units must be used at least once mass of fish caught increased and levels off ; 17 to 90 million tonnes / increase = 73 million tonnes ; A 16 to 18 / increase of 72 to 74 fluctuations / increases and decreases / described ; e.g. around 1970 / any time after 1990 ; mp4 cannot be awarded without mp3 maximum catch, 94 million tonnes / in 1996 ; steep increase between, 1950–1970 / 1973–1989 ; 3 marks

Fig. 5.1 shows the total mass of wild fish caught worldwide between 1950 and 2012 and the mass of farmed fish produced worldwide over the same period.

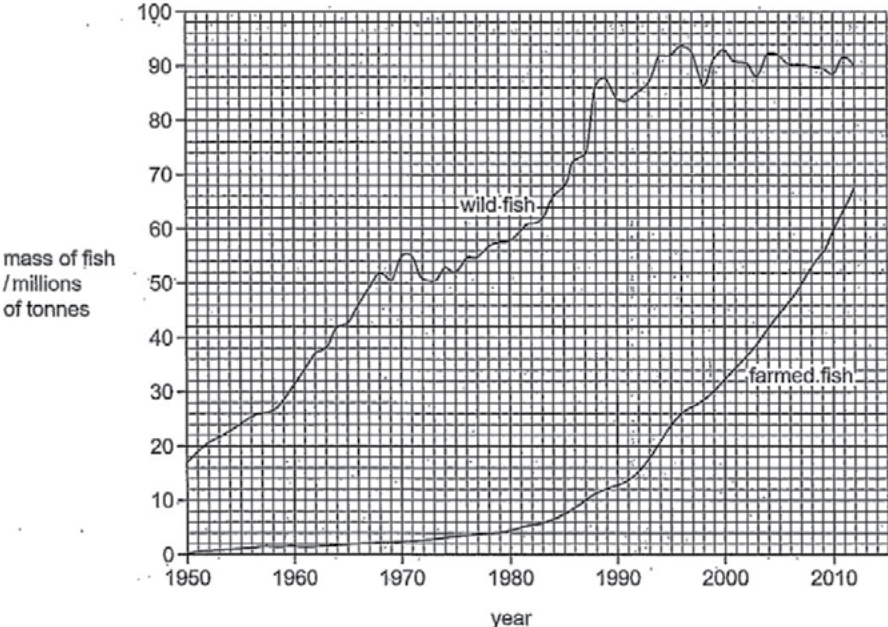


Fig. 5.1

(b) Describe the changes in the mass of **wild fish** caught between 1950 and 2012.

You will gain credit if you use data from Fig. 5.1.

The population of fish increased a lot, because farmed fish were used and so the wild fish weren't caught so more offsprings and less fishing.

Your Mark

5(a)(i)

5(a)(ii)

5(b)

5(c)

5(d)

Q5 Mark scheme	
(a)(i)	vertical axis – numbers / population ; horizontal axis – time / years ; curve showing exponential increase / log phase ; lag phase / curve starting at origin 3 marks
(a)(ii)	idea that 'birth' / reproduction / breeding, rate is greater than death rate ; definitions of exponential growth no limiting factors ; no/little, competition ; plenty, of food / nutrients / space / mates / oxygen / resources ; no/few, predators ; no/few, parasites / pathogens / disease ; AVP ; e.g. no/little, pollution / waste products / toxins 4 marks
(b)	between 1950 and 2012 units must be used at least once mass of fish caught increased and levels off ; 17 to 90 million tonnes / increase = 73 million tonnes ; A 16 to 18 / increase of 72 to 74 fluctuations / increases and decreases / described ; e.g. around 1970 / any time after 1990 ; mp4 cannot be awarded without mp3 maximum catch, 94 million tonnes / in 1996 ; steep increase between, 1950–1970 / 1973–1989 ; 3 marks

(c) It is predicted that wild fish stocks will decrease and become depleted because of overfishing.

Suggest ways in which governments can try to maintain the stocks of wild fish.

Less fishing and Less killing for experiments

Your Mark

5(a)(i)

5(a)(ii)

5(b)

5(c)

5(d)

(d) Like fish stocks, forests can be a sustainable resource.

Discuss what is meant by the term *sustainable resource*, using forests as an example.

Losses of forest are deforests cut down causing deforestation in which more carbon dioxide is present and less oxygen is made and you can't grow trees fast and it also destroys lots of habitat

[6]

[3]

[Total: 19]

Q5	Mark scheme
(c)	answers can refer to seas, lakes and/or rivers international, agreements/treaties ; A set maximum mass/number/amount/quantity quotas/permits/licenses ; A 'ban unauthorised fishing' fines/sanctions, for, overfishing/illegal/unauthorised, fishing ; A consequences other than fines fishery protection vessels/wardens/patrols/AW ; restrictions on times when fishing can occur ; A not in breeding season exclusion zones/nursery zones/'no take' zones/reserves ; A descriptions or examples total ban for some species ; A named examples regulations on method of fishing ; e.g. mesh size of nets/ban nets/use of lines instead/size of fishing vessel/'fishing effort' I ban on all wild fish education/raise awareness/any example ; monitoring fish stocks ; captive breeding (of wild fish) ; re-stocking (of wild stocks) ; encourage farmed fish ; e.g. provide subsidies AVP ; e.g. tax on wild fish/increase the cost of wild fish 6 marks
(d)	definition of sustainable resource renewable/self-renewing/regenerates/described ; e.g. produced as rapidly as it is removed I reused/recycled resource, does not/will not, run out/become exhausted ; replanting/reseeding/regrowing ; AVP ; e.g. pollarding/coppicing/leaving mature trees 3 marks

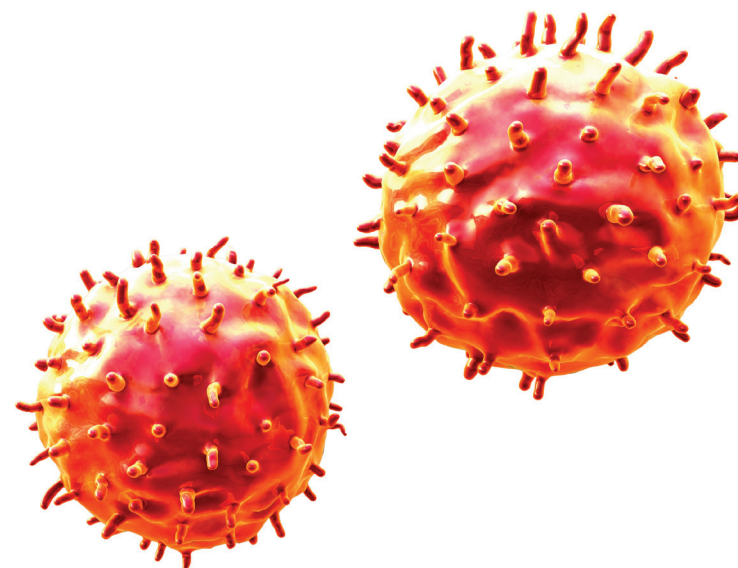
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Interactive Example Candidate Responses

Paper 4 (May / June 2016), Question 6

Cambridge IGCSE™
Biology 0610



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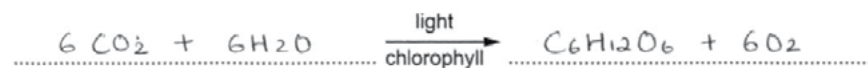
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6 (a) State the balanced chemical equation for photosynthesis.



[2]

A student investigated the effect of different wavelengths of light on the rate of photosynthesis of the water plant, *Cabomba*.

The student used the apparatus shown in Fig. 6.1.

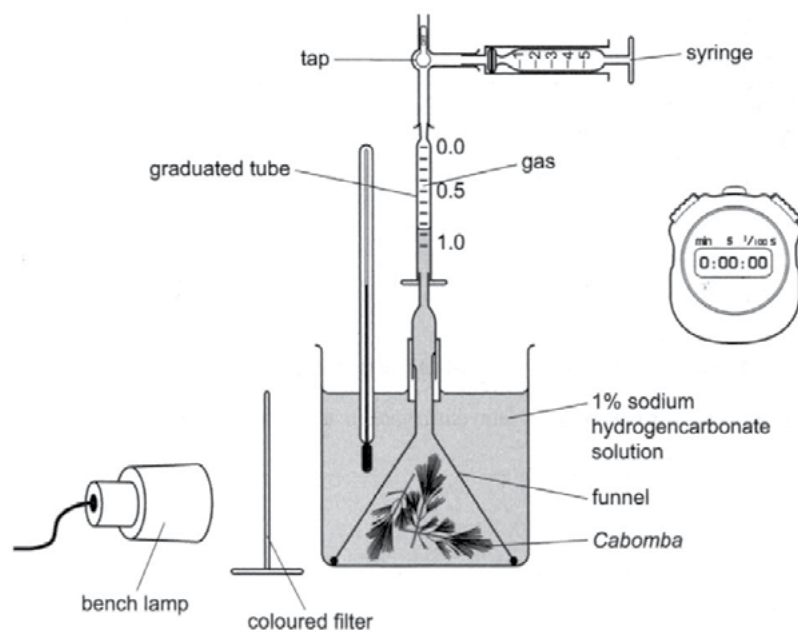


Fig. 6.1

Select page

HIGH

MIDDLE

LOW

Your Mark

6(a)

6(b)

6(c)

6(d)(i)

6(d)(ii)

6(e)

Q6	Mark scheme
(a)	$6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$; one mark for the correct chemical formulae one mark for balancing the equation correctly R word equation 2 marks
(b)	as <u>wavelength</u> increases, rate (of photosynthesis) decreases and increases ; units must be used once in the answer A volume of gas for rate high rates in, blue and violet and red/400–475 nm and 675 nm ; low(est) rate in, green and yellow/550–600 nm ; <i>either</i> maximum rate = 0.9 cm ³ , at 675 nm/red <i>or</i> minimum rate = 0.2 cm ³ , at 550 nm/green ; 3 marks
(c)	divide the volumes by, five (minutes)/time ; 1 mark

EXAMINER COMMENTS

MARK SCHEME

(b) The student collected the gas produced by the plant for five minutes. The results are shown in Table 6.1.

Table 6.1

colour of filter	wavelength of light / nm	volume of gas collected / cm ³
violet	400	0.80
blue	475	0.80
green	550	0.20
yellow	600	0.40
red	675	0.90

Describe the effect of wavelength of light on the rate of photosynthesis as shown in the student's results in Table 6.1:

You will gain credit if you use data from the table.

As wavelength increases from 400 to 550, rate of photosynthesis decreases, but as wavelength is increased further, it increases. Greatest rate with wavelength 675 nm and volume of gas collected was 0.90 cm^3 in 5 minutes. At 400 nm, it was 0.8 cm^3 in 5 minutes and at 550 nm, it was 0.2 cm^3 in 5 minutes. [3]

[3]

(c) State how the student would calculate the rates of photosynthesis from the results in Table 6.1.

Divide volume of gas collected by 5.
to obtain rate in $\text{cm}^3 \text{min}^{-1}$

·[1]

Select page

HIGH

MIDDLE

LOW

Your Mark

6(a)

5

6(b)

9

6(c)

9

6(d)(i)

5

6(d)(ii)

5

6(e)

5

Q6 Mark scheme

(a)	$6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$;; one mark for the correct chemical formulae one mark for balancing the equation correctly R word equation	2 marks
(b)	as <u>wavelength</u> increases, rate (of photosynthesis) decreases and increases ; units must be used once in the answer A volume of gas for rate high rates in, blue and violet and red/400–475 nm and 675 nm ; low(est) rate in, green and yellow/550–600 nm ; <i>either</i> maximum rate = 0.9cm^3 , at 675nm/red <i>or</i> minimum rate = 0.2cm^3 , at 550nm/green ;	3 marks
(c)	divide the volumes by, five (minutes)/time ;	1 mark

2 marks

3 marks

1 mark

**EXAMINER
COMMENTS**

MARK SCHEME

(d) State why the student:

(i) kept the lamp at the same distance during the investigation,

To keep light intensity constant as it is a controlled variable.

[1]

(ii) used sodium hydrogencarbonate solution.

To provide carbon dioxide to the plant for photosynthesis.

[1]

(e) State **three** uses in a plant of the carbohydrate produced in photosynthesis.

1. to release energy by respiration.
2. converted to starch for storage
3. converted to cellulose to make cell walls for new cells.

[3]

[Total: 11]

Your Mark

6(a)

6(b)

6(c)

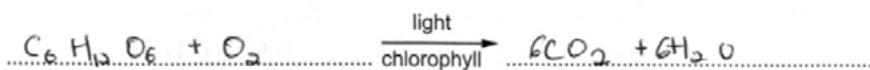
6(d)(i)

6(d)(ii)

6(e)

Q6	Mark scheme
(d)(i)	to keep the light intensity the same ; R temperature I 'fair test' A 'control light intensity'/'light intensity is a control(led) variable' 1 mark
(d)(ii)	to provide carbon dioxide/so carbon dioxide is not a limiting factor/so the only limiting factor is wavelength ; 1 mark
(e)	for, respiration/energy ; I protein synthesis/growth/active transport R produces energy converted to sucrose ; used to make, nectar/fruits ; used to make, cellulose/lignin ; used in cell walls ; used to make, starch/oils/fats ; I 'makes food', but A 'stores food' for 1 mark storage ; used to make, amino acids ; used to make, chlorophyll ; 3 marks

6 (a) State the balanced chemical equation for photosynthesis.



[2]

A student investigated the effect of different wavelengths of light on the rate of photosynthesis of the water plant, *Cabomba*.

The student used the apparatus shown in Fig. 6.1.

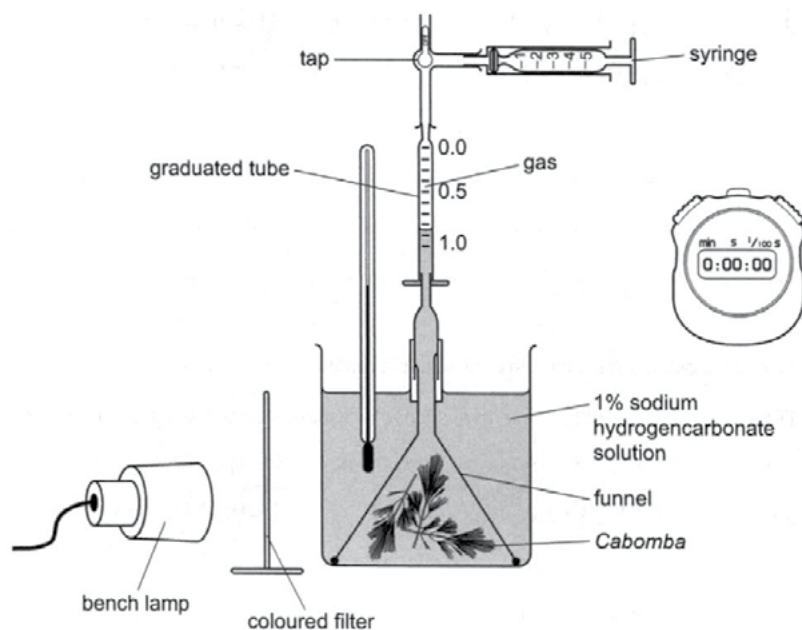


Fig. 6.1

Select page

HIGH MIDDLE LOW

Your Mark

6(a)

6(b)

6(c)

6(d)(i)

6(d)(ii)

6(e)

Q6	Mark scheme
(a)	$6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$; one mark for the correct chemical formulae one mark for balancing the equation correctly R word equation 2 marks
(b)	as <u>wavelength</u> increases, rate (of photosynthesis) decreases and increases ; units must be used once in the answer A volume of gas for rate high rates in, blue and violet and red/400–475 nm and 675 nm ; low(est) rate in, green and yellow/550–600 nm ; <i>either</i> maximum rate = 0.9 cm ³ , at 675 nm/red or minimum rate = 0.2 cm ³ , at 550 nm/green ; 3 marks
(c)	divide the volumes by, five (minutes)/time ; 1 mark

EXAMINER COMMENTS MARK SCHEME

(b) The student collected the gas produced by the plant for five minutes. The results are shown in Table 6.1.

Table 6.1

colour of filter	wavelength of light / nm	volume of gas collected / cm ³
violet	400	0.80
blue	475	0.80
green	550	0.20
yellow	600	0.40
red	675	0.90

Describe the effect of wavelength of light on the rate of photosynthesis as shown in the student's results in Table 6.1.

You will gain credit if you use data from the table.

Generally, as wavelength of light increases, volume of gas collected increases. At first the volume of gas collected was 0.80 cm³ at a wavelength of 400 nm. But at 675 nm, the volume increased to 0.90 cm³

[3]

(c) State how the student would calculate the rates of photosynthesis from the results in Table 6.1.

By finding the average or
By dividing the wavelength over the time

[1]

Your Mark

6(a)

6(b)

6(c)

6(d)(i)

6(d)(ii)

6(e)

Q6	Mark scheme
(a)	$6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$;; one mark for the correct chemical formulae one mark for balancing the equation correctly R word equation 2 marks
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(c)	divide the volumes by, five (minutes)/time ; 1 mark

(d) State why the student:

(i) kept the lamp at the same distance during the investigation,

Controlled variable for a fair test

[1]

(ii) used sodium hydrogencarbonate solution.

As a supply of carbon dioxide

[1]

(e) State three uses in a plant of the carbohydrate produced in photosynthesis.

1. To make starch for growth.

2. For energy

3. To help in respiration.

[3]

[Total: 11]

Select page

HIGH

MIDDLE

LOW

Your Mark

6(a)

6(b)

6(c)

6(d)(i)

6(d)(ii)

6(e)

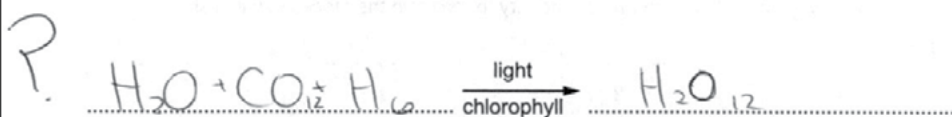
Q6 Mark scheme

(d)(i)	to keep the light intensity the same ; R temperature I 'fair test' A 'control light intensity' / 'light intensity is a control(led) variable' 1 mark
(d)(ii)	to provide carbon dioxide/so carbon dioxide is not a limiting factor/so the only limiting factor is wavelength ; 1 mark
(e)	for, respiration/energy ; I protein synthesis/growth/active transport R produces energy converted to sucrose ; used to make, nectar/fruits ; used to make, cellulose/lignin ; used in cell walls ; used to make, starch/oils/fats ; I 'makes food', but A 'stores food' for 1 mark storage ; used to make, amino acids ; used to make, chlorophyll ; 3 marks

EXAMINER
COMMENTS

MARK
SCHEME

6 (a) State the balanced chemical equation for photosynthesis.



[2]

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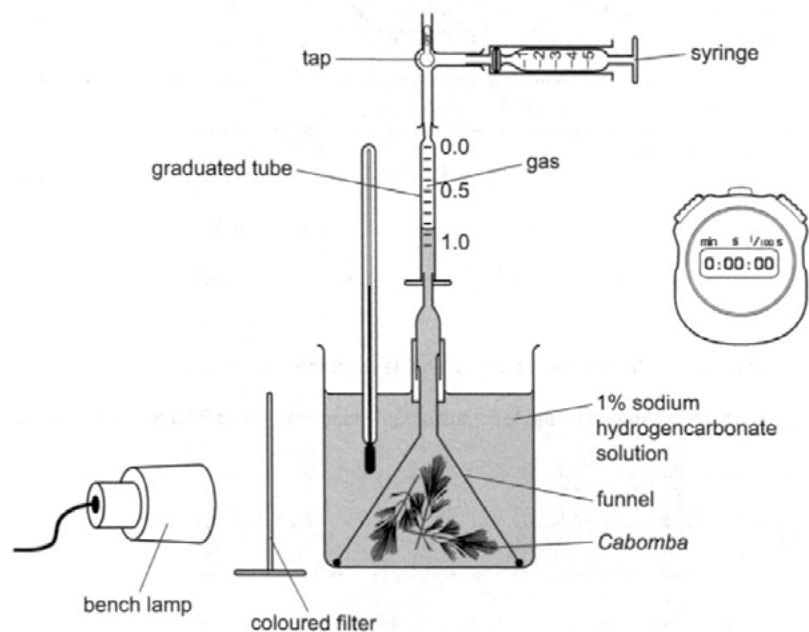


Fig. 6.1

Select page

HIGH

MIDDLE

LOW

Your Mark

6(a)

6(b)

6(c)

6(d)(i)

6(d)(ii)

6(e)

Q6	Mark scheme
(a)	$6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$; one mark for the correct chemical formulae one mark for balancing the equation correctly R word equation 2 marks
(b)	as <u>wavelength</u> increases, rate (of photosynthesis) decreases and increases ; units must be used once in the answer A volume of gas for rate high rates in, blue and violet and red/400–475 nm and 675 nm ; low(est) rate in, green and yellow/550–600 nm ; <i>either</i> maximum rate = 0.9 cm ³ , at 675 nm/red or minimum rate = 0.2 cm ³ , at 550 nm/green ; 3 marks
(c)	divide the volumes by, five (minutes)/time ; 1 mark

EXAMINER COMMENTS

MARK SCHEME

(b) The student collected the gas produced by the plant for five minutes. The results are shown in Table 6.1.

Table 6.1

colour of filter	wavelength of light / nm	volume of gas collected / cm ³
violet	400	0.80
blue	475	0.80
green	550	0.20
yellow	600	0.40
red	675	0.90

Describe the effect of wavelength of light on the rate of photosynthesis as shown in the student's results in Table 6.1.

You will gain credit if you use data from the table.

The effect of wavelength of light on the rate of photosynthesis as shown in the table is that

[3]

(c) State how the student would calculate the rates of photosynthesis from the results in Table 6.1.

By seeing and figuring out how the results relate to rates of photosynthesis.

[1]

Your Mark

6(a)

6(b)

6(c)

6(d)(i)

6(d)(ii)

6(e)

Q6	Mark scheme
(a)	$6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$; one mark for the correct chemical formulae one mark for balancing the equation correctly R word equation 2 marks
(b)	as <u>wavelength</u> increases, rate (of photosynthesis) decreases and increases ; units must be used once in the answer A volume of gas for rate high rates in, blue and violet and red/400–475 nm and 675 nm ; low(est) rate in, green and yellow/550–600 nm ; <i>either</i> maximum rate = 0.9 cm ³ , at 675 nm/red <i>or</i> minimum rate = 0.2 cm ³ , at 550 nm/green ; 3 marks
(c)	divide the volumes by, five (minutes)/time ; 1 mark

Select page

LOW

So that ~~the~~ results would be accurate and that variable would remain controlled. [1]

[1]

Because this solution gives the most accurate results and it's better to use for this experiment. [1]

[1]

1. Used to make sugars
2. Used to make the plant produce food
3. Used to help the plant grow.

[3]

[Total: 11]

6(a)

--	--

6(b)

--	--

6(c)

5

6(d)(i)

5

6(d)(ii)

--	--

6(e)

--	--

Q6	Mark scheme
(d)(i)	to keep the light intensity the same ; R temperature I 'fair test' A 'control light intensity' / 'light intensity is a control(led) variable' 1 mark
(d)(ii)	to provide carbon dioxide/so carbon dioxide is not a limiting factor/so the only limiting factor is wavelength ; 1 mark
(e)	for, respiration/energy ; I protein synthesis/growth/active transport R produces energy converted to sucrose ; used to make, nectar/fruits ; used to make, cellulose/lignin ; used in cell walls ; used to make, starch/oils/fats ; I 'makes food', but A 'stores food' for 1 mark storage ; used to make, amino acids ; used to make, chlorophyll ; 3 marks

MARK SCHEME

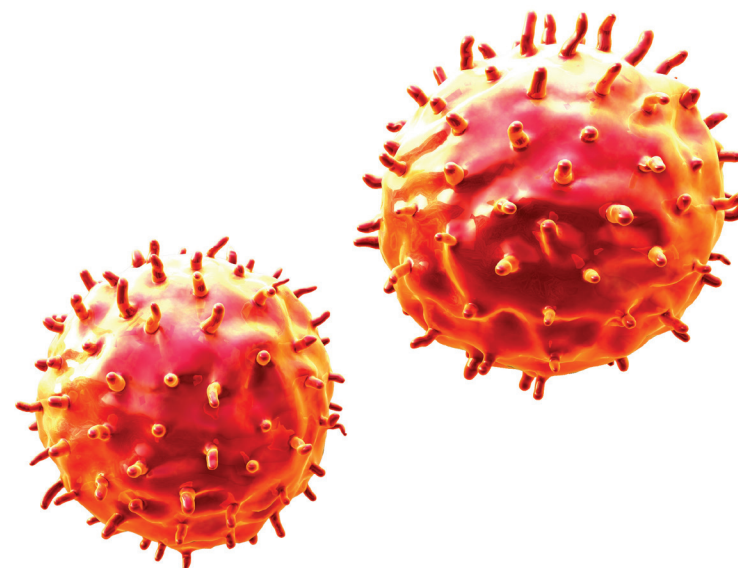
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Interactive Example Candidate Responses

Paper 5 (May / June 2016), Question 1

Cambridge IGCSE™
Biology 0610



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Read through all the questions on this paper carefully before starting work.

- 1 Maize (corn) is an important food crop that produces grain. Fig. 1.1 shows a maize grain that has germinated to form a seedling.

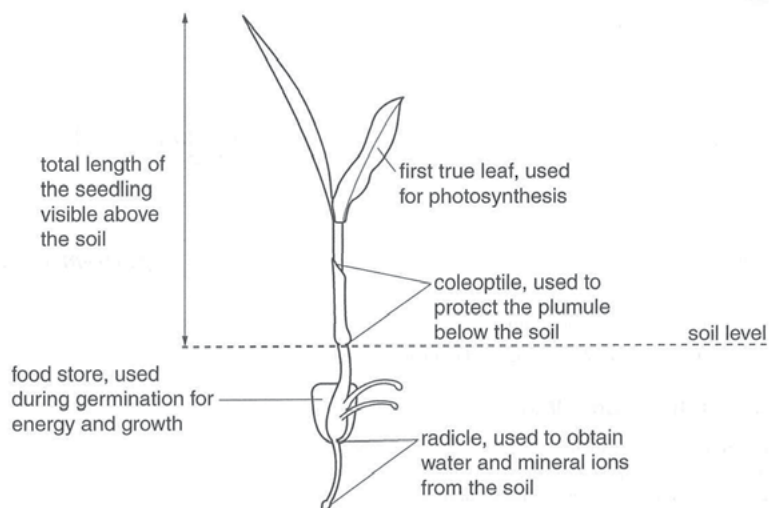


Fig. 1.1

You are going to investigate the effect of light on the germination and early growth of maize. You will measure and observe maize grown in the light and maize grown in the dark.

Three maize grains were planted in each of the two pots labelled **L** and **D**. One pot (**L**) was placed in the light and the other pot (**D**) placed in the dark. The seedlings were kept at a constant temperature.

Step 1 Observe the appearance of the seedlings carefully.

- (a) Complete Table 1.1 by recording two **visible** differences in the seedlings grown in the light and the seedlings grown in the dark.

Table 1.1

feature	seedlings grown in the light	seedlings grown in the dark
Stem	upright, firm	bending, weak, floppy
Leaves	green in colour	pale yellow in colour

[2]

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1 Mark scheme

(a)	any 2 of : comparisons must match																					
	<table><tr><th>feature</th><th>seedlings grown in light</th><th>seedlings grown in dark</th></tr><tr><td>height</td><td>short(er)</td><td>tall(er)</td></tr><tr><td>colour</td><td>green</td><td>yellow/light green</td></tr><tr><td>coleoptiles</td><td>green/pink/brown/short</td><td>white/pale pink/brown/long</td></tr><tr><td>leaves</td><td>two or three leaves/wider</td><td>one or two leaves</td></tr><tr><td>coleoptile/shoot/stem</td><td>wide(er)</td><td>narrow(er)</td></tr><tr><td>coleoptile/shoot/stem</td><td>almost vertical/upright</td><td>bent/AW</td></tr></table>	feature	seedlings grown in light	seedlings grown in dark	height	short(er)	tall(er)	colour	green	yellow/light green	coleoptiles	green/pink/brown/short	white/pale pink/brown/long	leaves	two or three leaves/wider	one or two leaves	coleoptile/shoot/stem	wide(er)	narrow(er)	coleoptile/shoot/stem	almost vertical/upright	bent/AW
feature	seedlings grown in light	seedlings grown in dark																				
height	short(er)	tall(er)																				
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coleoptiles	green/pink/brown/short	white/pale pink/brown/long																				
leaves	two or three leaves/wider	one or two leaves																				
coleoptile/shoot/stem	wide(er)	narrow(er)																				
coleoptile/shoot/stem	almost vertical/upright	bent/AW																				
	2 marks																					
(b)(i)	1 one table drawn with (ruled) lines; 2 column/row headings with units in the header only; 3 trials identified/numbered; 4 twelve measurements recorded in the appropriate light and dark conditions; R if measurements recorded are inconsistent with the unit heading 5 all coleoptile lengths should be shorter than the total length; 6 majority of measurements are consistent with Supervisor's range;																					
(b)(ii)	any 2 of: 1 the seeds germinate in both light and dark; 2 light is needed for the leaves become green (as chlorophyll is made/ ora ; 3 idea that seedlings grow longer (and thinner) without light (because there is no light)/ ora ;																					
	2 marks																					

You are going to measure the length of the coleoptiles and the total length of the seedlings visible above the soil. You will measure **all** the seedlings grown in the light and **all** the seedlings grown in the dark.

(b) (i) Prepare a table to record your results.

FEATURE	SEEDLINGS GROWN IN LIGHT (L)			SEEDLINGS GROWN IN DARK (D)		
	1	2	3	1	2	3
LENGTH OF COLEOPTILES (cm)	2.0	1.5	3.0	3.0	2.5	3.5
TOTAL LENGTH OF SEEDLING (cm)	39.0	41.0	41.0	42.0	42.0	43.0

[6]

Step 2 Use a ruler to measure the length of the coleoptile and the total length of the seedling visible above the soil for each seedling.

Record the results for the seedlings grown in pot **L** and in pot **D** in your table.

(ii) Look at Table 1.1 and the results of your measurements. State **two** conclusions that can be made about the effect of light on the germination and early growth of maize.

1. Lack of light causes the lack of photosynthesis and the lack of production of chlorophyll.

2. Lack of light causes the plant to be weaker.

[2]

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1 Mark scheme		
(a)	any 2 of: comparisons must match	
	feature	seedlings grown in light
	height	short(er)
	colour	green
	coleoptiles	green/pink/brown/short
	leaves	two or three leaves/wider
	coleoptile/shoot/stem	wide(er)
	coleoptile/shoot/stem	almost vertical/upright
		seedlings grown in dark
		tall(er)
		yellow/light green
		white/pale pink/brown/long
		one or two leaves
		narrow(er)
		bent/AW
		2 marks
(b)(i)	1 one table drawn with (ruled) lines; 2 column/row headings with units in the header only; 3 trials identified/numbered; 4 twelve measurements recorded in the appropriate light and dark conditions; R if measurements recorded are inconsistent with the unit heading 5 all coleoptile lengths should be shorter than the total length; 6 majority of measurements are consistent with Supervisor's range;	
(b)(ii)	any 2 of: 1 the seeds germinate in both light and dark; 2 light is needed for the leaves become green (as chlorophyll is made/ ora ; 3 idea that seedlings grow longer (and thinner) without light (because there is no light)/ ora ;	
		2 marks

Use gloves and eye protection while carrying out steps 3 to 14 of the practical work for question 1.

- Step 3 Use a marker pen to draw a line down the centre of a white tile. Label one side **L** and the other side **D**.
- Step 4 Use a spatula to carefully dig out from each pot, **two** of the seedlings grown in the light and **two** of the seedlings grown in the dark.
- Step 5 Use a scalpel or razor blade to cut the remains of the food store from each of the seedlings.
- Step 6 Use the water in the beaker labelled **water for washing** to wash each of these food stores and remove the outer covering. Put the outer covering in the beaker labelled **waste**.
- Step 7 Place the food stores from the seedlings grown in the light on the side of the tile labelled **L** and the food stores from seedlings grown in the dark on the side of the tile labelled **D**.
- Step 8 Wash the spatula in the beaker labelled **water for washing** and dry it with a paper towel. Use the spatula to crush together the two food stores from the seedlings grown in the light on the part of the tile labelled **L**.
- Separate the crushed food store into two equal parts spaced at least 2cm apart, as shown in Fig. 1.2.
- Step 9 Repeat step 8 using the two food stores from the seedlings grown in the dark on the part of the tile labelled **D**.



Fig. 1.2

- Step 10 Label two test-tubes, one with the letter **L** and the other with the letter **D**.
- Step 11 Scrape one of the food stores from the seedlings grown in the light into the test-tube labelled **L**. Add 2cm³ of water from the beaker labelled **water**, taking care to wash the crushed food store to the bottom of the test-tube.
- Step 12 Repeat step 11 using one of the food stores from the seedlings grown in the dark and the test-tube labelled **D**.
- Step 13 Carry out a Benedict's test on the contents of test-tube **L** and test-tube **D**.
- Raise your hand when you are ready for hot water to be placed in the beaker labelled **water-bath**.
- Leave the test-tubes for 5 minutes.
- During this time carry out step 14 and answer question (c)(i).
- Step 14 Add 1 drop of iodine solution to the remaining two food stores on the white tile. Record your results in Table 1.2.

Your Mark

1(c)(i)

1(c)(ii)

1(c)(iii)

1(d)(i)

1(d)(ii)

Q1 Mark scheme																
(c)(i)	add biuret reagent to the crushed seed/crushed seed and water (and observe the colour change); R if heated															
	1 mark															
(c)(ii)	<table><tr><th rowspan="2">test reagent</th><th colspan="2">results</th></tr><tr><th>seedlings grown in light</th><th>seedlings grown in dark</th></tr><tr><td>biuret</td><td>purple</td><td>purple</td></tr><tr><td>Benedict's</td><td>blue</td><td>blue;</td></tr><tr><td>iodine</td><td>blue-black</td><td>blue-black;</td></tr></table>		test reagent	results		seedlings grown in light	seedlings grown in dark	biuret	purple	purple	Benedict's	blue	blue;	iodine	blue-black	blue-black;
test reagent	results															
	seedlings grown in light	seedlings grown in dark														
biuret	purple	purple														
Benedict's	blue	blue;														
iodine	blue-black	blue-black;														
	2 marks															
(c)(iii)	(maize stores) starch and protein (reducing sugar);															
	1 mark															
(d)(i)	<i>any 6 of:</i> 1 ref. to using same species/type/age of maize; 2 ref. to finding starting (dry) mass; 3 ref. to method of drying; 4 ref. to planting maize (grains) in soil/AW; 5 ref. to planting two sets of at least 100 maize/seeds; 6 ref. to keeping (both sets) in a warm room at/given °C/constant temperature; 7 one other valid detail of the method; 8 ref. to one set place in (constant) light/ref. to one set placed in (constant) dark; 9 ref to removing (10) seedlings (from each set) every two days for drying and weighing; 10 repeat and calculate the mean/average;															
	6 marks															
(d)(ii)	water content in, seeds/seedlings, is variable; for comparisons to be valid;															
	1 mark															

(c) (i) Describe how to carry out a biuret test on a crushed food store.

Crush up the food source and place it in a test tube. Add some water and shake the test tube. Add biuret solution and if it turns purple protein is present. [1]

(ii) The results of a biuret test are recorded in Table 1.2. Complete step 13 by recording the results of your Benedict's tests in Table 1.2.

Table 1.2

test	seedlings grown in light	seedlings grown in dark
biuret	purple	purple
Benedict's	blue	blue
iodine	dark brown	blue black

[2]

(iii) State the conclusion for the results shown in Table 1.2.

Plants grown in the dark contain starch, Plants grown in the light don't [1]

Your Mark

1(c)(i)

1(c)(ii)

1(c)(iii)

1(d)(i)

1(d)(ii)

Q1	Mark scheme		
(c)(i)	add biuret reagent to the crushed seed/crushed seed and water (and observe the colour change); R if heated 1 mark		
(c)(ii)	test reagent	results	
		seedlings grown in light	seedlings grown in dark
	biuret	purple	purple
	Benedict's	blue	blue;
	iodine	blue-black	blue-black;
	2 marks		
(c)(iii)	(maize stores) starch and protein (reducing sugar); 1 mark		
(d)(i)	any 6 of: 1 ref. to using same species/type/age of maize; 2 ref. to finding starting (dry) mass; 3 ref. to method of drying; 4 ref. to planting maize (grains) in soil/AW; 5 ref. to planting two sets of at least 100 maize/seeds; 6 ref. to keeping (both sets) in a warm room at/given °C/constant temperature; 7 one other valid detail of the method; 8 ref. to one set place in (constant) light/ref. to one set placed in (constant) dark; 9 ref to removing (10) seedlings (from each set) every two days for drying and weighing; 10 repeat and calculate the mean/average; 6 marks		
(d)(ii)	water content in, seeds/seedlings, is variable; for comparisons to be valid; 1 mark		

(d) A group of students investigated the changes in dry mass during germination and growth of maize grown in the light and maize grown in the dark.

The dry mass is the total mass left after all the water has been evaporated.

Table 1.3 shows the results of the investigation for the maize seedlings grown in the light.

Table 1.3

	time / days										
	0	2	4	6	8	10	12	14	16	18	20
dry mass of 10 maize seedlings/g	22	20	17	12	10	8	11	13	14	15	17

(i) Describe a method the students could have used to carry out this investigation.

Use the information on page 2 to help you.

Plant 10 seeds in a container with the same type of soil. Place a seed that has not been planted in the oven to remove the water and measure its dry mass. At 2 day intervals dig up one of the seeds you planted place it in the oven to dry out, and measure its dry mass by weighing it on a scale. Record your readings. For the seeds that germinate cut off the leaves, stem and roots, and only measure the dry mass of the food store.

[6]

(ii) Suggest why the students measured the dry mass instead of the mass including water in their investigation.

To have a more accurate result in how much actual mass is produced

[1]

[Total: 21]

Your Mark

1(c)(i)

1(c)(ii)

1(c)(iii)

1(d)(i)

1(d)(ii)

Q1 Mark scheme																
(c)(i)	add biuret reagent to the crushed seed/crushed seed and water (and observe the colour change); R if heated	1 mark														
(c)(ii)	<table><tr><th rowspan="2">test reagent</th><th colspan="2">results</th></tr><tr><th>seedlings grown in light</th><th>seedlings grown in dark</th></tr><tr><td>biuret</td><td>purple</td><td>purple</td></tr><tr><td>Benedict's</td><td>blue</td><td>blue;</td></tr><tr><td>iodine</td><td>blue-black</td><td>blue-black;</td></tr></table>	test reagent	results		seedlings grown in light	seedlings grown in dark	biuret	purple	purple	Benedict's	blue	blue;	iodine	blue-black	blue-black;	2 marks
test reagent	results															
	seedlings grown in light	seedlings grown in dark														
biuret	purple	purple														
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iodine	blue-black	blue-black;														
(c)(iii)	(maize stores) starch and protein (reducing sugar);	1 mark														
(d)(i)	any 6 of: 1 ref. to using same species/type/age of maize; 2 ref. to finding starting (dry) mass; 3 ref. to method of drying; 4 ref. to planting maize (grains) in soil/AW; 5 ref. to planting two sets of at least 100 maize/seeds; 6 ref. to keeping (both sets) in a warm room at/given °C/constant temperature; 7 one other valid detail of the method; 8 ref. to one set place in (constant) light/ref. to one set placed in (constant) dark; 9 ref to removing (10) seedlings (from each set) every two days for drying and weighing; 10 repeat and calculate the mean/average;	6 marks														
(d)(ii)	water content in, seeds/seedlings, is variable; for comparisons to be valid;	1 mark														

Read through all the questions on this paper carefully before starting work.

- 1 Maize (corn) is an important food crop that produces grain. Fig. 1.1 shows a maize grain that has germinated to form a seedling.

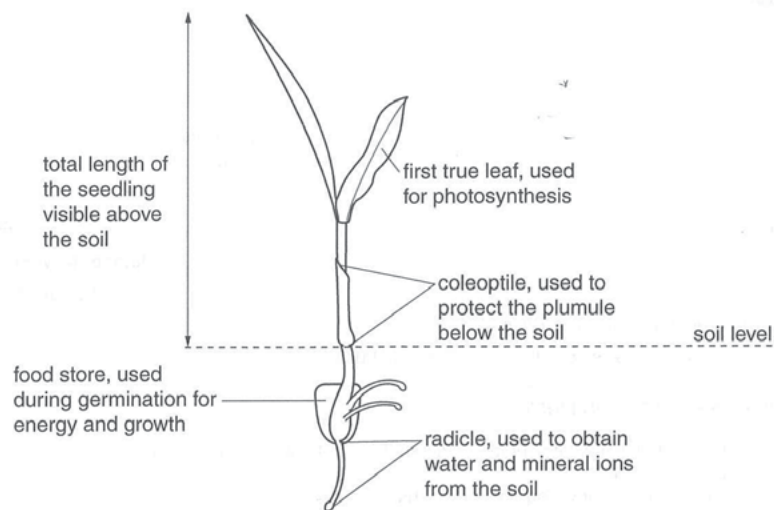


Fig. 1.1

You are going to investigate the effect of light on the germination and early growth of maize. You will measure and observe maize grown in the light and maize grown in the dark.

Three maize grains were planted in each of the two pots labelled **L** and **D**. One pot (**L**) was placed in the light and the other pot (**D**) placed in the dark. The seedlings were kept at a constant temperature.

Step 1 Observe the appearance of the seedlings carefully.

- (a) Complete Table 1.1 by recording two **visible** differences in the seedlings grown in the light and the seedlings grown in the dark.

Table 1.1

feature	seedlings grown in the light	seedlings grown in the dark
Colour of leaves	leaves are green	leaves are yellow.
Roots	Roots are below the soil	Roots are above the soil.

[2]

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1 Mark scheme

(a)	any 2 of : comparisons must match		
	feature	seedlings grown in light	seedlings grown in dark
	height	short(er)	tall(er)
	colour	green	yellow/light green
	coleoptiles	green/pink/ brown/short	white/pale pink/ brown/long
	leaves	two or three leaves/wider	one or two leaves
	coleoptile/shoot/ stem	wide(er)	narrow(er)
	coleoptile/shoot/ stem	almost vertical/ upright	bent/AW
	2 marks		
(b)(i)	1 one table drawn with (ruled) lines; 2 column/row headings with units in the header only; 3 trials identified/numbered; 4 twelve measurements recorded in the appropriate light and dark conditions; R if measurements recorded are inconsistent with the unit heading 5 all coleoptile lengths should be shorter than the total length; 6 majority of measurements are consistent with Supervisor's range;		
(b)(ii)	any 2 of: 1 the seeds germinate in both light and dark; 2 light is needed for the leaves become green (as chlorophyll is made/ ora ; 3 idea that seedlings grow longer (and thinner) without light (because there is no light)/ ora ;		
	2 marks		

You are going to measure the length of the coleoptiles and the total length of the seedlings visible above the soil. You will measure **all** the seedlings grown in the light and **all** the seedlings grown in the dark.

(b) (i) Prepare a table to record your results.

	Length of coleoptiles	Total length of the seedlings visible above the soil
L 1	2 mm	120 mm
L 2	4 mm	240 mm
L 3	20 mm	250 mm
D 1	50 mm	345 mm
D 2	110 mm	320 mm
D 3	90 mm	340 mm

[6]

Step 2 Use a ruler to measure the length of the coleoptile and the total length of the seedling visible above the soil for each seedling.

Record the results for the seedlings grown in pot **L** and in pot **D** in your table.

(ii) Look at Table 1.1 and the results of your measurements.

State **two** conclusions that can be made about the effect of light on the germination and early growth of maize.

1 Seeds grown in the dark have a longer coleoptile than those grown in the light.

2 Seed grown in the light have a shorter total length than those grown in the dark.

[2]

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1 Mark scheme

(a)	any 2 of : comparisons must match		
	feature	seedlings grown in light	seedlings grown in dark
	height	short(er)	tall(er)
	colour	green	yellow/light green
	coleoptiles	green/pink/ brown/short	white/pale pink/ brown/long
	leaves	two or three leaves/wider	one or two leaves
	coleoptile/shoot/ stem	wide(er)	narrow(er)
	coleoptile/shoot/ stem	almost vertical/ upright	bent/AW
	2 marks		
(b)(i)	1 one table drawn with (ruled) lines; 2 column/row headings with units in the header only; 3 trials identified/numbered; 4 twelve measurements recorded in the appropriate light and dark conditions; R if measurements recorded are inconsistent with the unit heading 5 all coleoptile lengths should be shorter than the total length; 6 majority of measurements are consistent with Supervisor's range;		
(b)(ii)	any 2 of: 1 the seeds germinate in both light and dark; 2 light is needed for the leaves become green (as chlorophyll is made/ ora ; 3 idea that seedlings grow longer (and thinner) without light (because there is no light)/ ora ;		
	2 marks		

Use gloves and eye protection while carrying out steps 3 to 14 of the practical work for question 1.

- Step 3 Use a marker pen to draw a line down the centre of a white tile. Label one side **L** and the other side **D**.
- Step 4 Use a spatula to carefully dig out from each pot, **two** of the seedlings grown in the light and **two** of the seedlings grown in the dark.
- Step 5 Use a scalpel or razor blade to cut the remains of the food store from each of the seedlings.
- Step 6 Use the water in the beaker labelled **water for washing** to wash each of these food stores and remove the outer covering. Put the outer covering in the beaker labelled **waste**.
- Step 7 Place the food stores from the seedlings grown in the light on the side of the tile labelled **L** and the food stores from seedlings grown in the dark on the side of the tile labelled **D**.
- Step 8 Wash the spatula in the beaker labelled **water for washing** and dry it with a paper towel. Use the spatula to crush together the two food stores from the seedlings grown in the light on the part of the tile labelled **L**.
- Separate the crushed food store into two equal parts spaced at least 2cm apart, as shown in Fig. 1.2.
- Step 9 Repeat step 8 using the two food stores from the seedlings grown in the dark on the part of the tile labelled **D**.

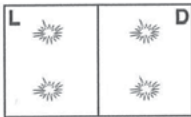


Fig. 1.2

- Step 10 Label two test-tubes, one with the letter **L** and the other with the letter **D**.
- Step 11 Scrape one of the food stores from the seedlings grown in the light into the test-tube labelled **L**. Add 2cm³ of water from the beaker labelled **water**, taking care to wash the crushed food store to the bottom of the test-tube.
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- Step 13 Carry out a Benedict's test on the contents of test-tube **L** and test-tube **D**.
- Raise your hand when you are ready for hot water to be placed in the beaker labelled **water-bath**.
- Leave the test-tubes for 5 minutes.
- During this time carry out step 14 and answer question (c)(i).
- Step 14 Add 1 drop of iodine solution to the remaining two food stores on the white tile. Record your results in Table 1.2.

Your Mark

1(c)(i)

1(c)(ii)

1(c)(iii)

1(d)(i)

1(d)(ii)

Q1 Mark scheme			
(c)(i)	add biuret reagent to the crushed seed/crushed seed and water (and observe the colour change); R if heated		
	1 mark		
(c)(ii)	test reagent	results	
		seedlings grown in light	seedlings grown in dark
	biuret	purple	purple
	Benedict's	blue	blue;
	iodine	blue-black	blue-black;
	2 marks		
(c)(iii)	(maize stores) starch and protein (reducing sugar);		
	1 mark		
(d)(i)	any 6 of: 1 ref. to using same species/type/age of maize; 2 ref. to finding starting (dry) mass; 3 ref. to method of drying; 4 ref. to planting maize (grains) in soil/AW; 5 ref. to planting two sets of at least 100 maize/seeds; 6 ref. to keeping (both sets) in a warm room at/given °C/constant temperature; 7 one other valid detail of the method; 8 ref. to one set place in (constant) light/ref. to one set placed in (constant) dark; 9 ref to removing (10) seedlings (from each set) every two days for drying and weighing; 10 repeat and calculate the mean/average;		
	6 marks		
(d)(ii)	water content in, seeds/seedlings, is variable; for comparisons to be valid;		
	1 mark		

- (c) (i) Describe how to carry out a biuret test on a crushed food store.
Crush the contents add biuret solution (sodium hydroxide and copper (II) sulfate) positive lilac [1]
negative-blue
- (ii) The results of a biuret test are recorded in Table 1.2.
Complete step 13 by recording the results of your Benedict's tests in Table 1.2.

Table 1.2

test	seedlings grown in light	seedlings grown in dark
biuret	purple	purple
Benedict's	orange	orange
iodine	blue / black	blue / black

[2]

- (iii) State the conclusion for the results shown in Table 1.2.
Both seedlings contain starch and reducing sugars and no proteins [1]

Your Mark

1(c)(i)

1(c)(ii)

1(c)(iii)

1(d)(i)

1(d)(ii)

Q1	Mark scheme														
(c)(i)	add biuret reagent to the crushed seed/crushed seed and water (and observe the colour change); R if heated 1 mark														
(c)(ii)	<table><tr><th rowspan="2">test reagent</th><th colspan="2">results</th></tr><tr><th>seedlings grown in light</th><th>seedlings grown in dark</th></tr><tr><td>biuret</td><td>purple</td><td>purple</td></tr><tr><td>Benedict's</td><td>blue</td><td>blue;</td></tr><tr><td>iodine</td><td>blue-black</td><td>blue-black;</td></tr></table> 2 marks	test reagent	results		seedlings grown in light	seedlings grown in dark	biuret	purple	purple	Benedict's	blue	blue;	iodine	blue-black	blue-black;
test reagent	results														
	seedlings grown in light	seedlings grown in dark													
biuret	purple	purple													
Benedict's	blue	blue;													
iodine	blue-black	blue-black;													
(c)(iii)	(maize stores) starch and protein (reducing sugar); 1 mark														
(d)(i)	<i>any 6 of:</i> 1 ref. to using same species/type/age of maize; 2 ref. to finding starting (dry) mass; 3 ref. to method of drying; 4 ref. to planting maize (grains) in soil/AW; 5 ref. to planting two sets of at least 100 maize/seeds; 6 ref. to keeping (both sets) in a warm room at/given °C/constant temperature; 7 one other valid detail of the method; 8 ref. to one set place in (constant) light/ref. to one set placed in (constant) dark; 9 ref to removing (10) seedlings (from each set) every two days for drying and weighing; 10 repeat and calculate the mean/average; 6 marks														
(d)(ii)	water content in, seeds/seedlings, is variable; for comparisons to be valid; 1 mark														

(d) A group of students investigated the changes in dry mass during germination and growth of maize grown in the light and maize grown in the dark.

The dry mass is the total mass left after all the water has been evaporated.

Table 1.3 shows the results of the investigation for the maize seedlings grown in the light.

Table 1.3

	time / days										
	0	2	4	6	8	10	12	14	16	18	20
dry mass of 10 maize seedlings/g	22	20	17	12	10	8	11	13	14	15	17

(i) Describe a method the students could have used to carry out this investigation.

Use the information on page 2 to help you.

You could use seedling approximately 10* and calculate its mass prior to germination and thereafter calculate mass after germination and the the growth of maize you could grow one maize plant in light and another in the dark and make a comparison everyday and note it down in a table as the one about the dry mass changes with the days as the pass and for the growth of maize at the end of 20 day compare the maize cobs the one in light and the one in dark light comparing size of seeds, [6] cob colour etc and put information in a table and make a comparison

(ii) Suggest why the students measured the dry mass instead of the mass including water in their investigation.

So as to know only the mass of seedlings without water and be able to make comparison only in [1] changes occurred in the seed and not including water

[Total: 21]

Your Mark

1(c)(i)

1(c)(ii)

1(c)(iii)

1(d)(i)

1(d)(ii)

Q1 Mark scheme																
(c)(i)	add biuret reagent to the crushed seed/crushed seed and water (and observe the colour change); R if heated															
		1 mark														
(c)(ii)	<table><tr><th rowspan="2">test reagent</th><th colspan="2">results</th></tr><tr><th>seedlings grown in light</th><th>seedlings grown in dark</th></tr><tr><td>biuret</td><td>purple</td><td>purple</td></tr><tr><td>Benedict's</td><td>blue</td><td>blue;</td></tr><tr><td>iodine</td><td>blue-black</td><td>blue-black;</td></tr></table>		test reagent	results		seedlings grown in light	seedlings grown in dark	biuret	purple	purple	Benedict's	blue	blue;	iodine	blue-black	blue-black;
test reagent	results															
	seedlings grown in light	seedlings grown in dark														
biuret	purple	purple														
Benedict's	blue	blue;														
iodine	blue-black	blue-black;														
		2 marks														
(c)(iii)	(maize stores) starch and protein (reducing sugar);															
		1 mark														
(d)(i)	any 6 of: 1 ref. to using same species/type/age of maize; 2 ref. to finding starting (dry) mass; 3 ref. to method of drying; 4 ref. to planting maize (grains) in soil/AW; 5 ref. to planting two sets of at least 100 maize/seeds; 6 ref. to keeping (both sets) in a warm room at/given °C/constant temperature; 7 one other valid detail of the method; 8 ref. to one set place in (constant) light/ref. to one set placed in (constant) dark; 9 ref to removing (10) seedlings (from each set) every two days for drying and weighing; 10 repeat and calculate the mean/average;															
		6 marks														
(d)(ii)	water content in, seeds/seedlings, is variable; for comparisons to be valid;															
		1 mark														

Read through all the questions on this paper carefully before starting work.

1 Maize (corn) is an important food crop that produces grain. Fig. 1.1 shows a maize grain that has germinated to form a seedling.

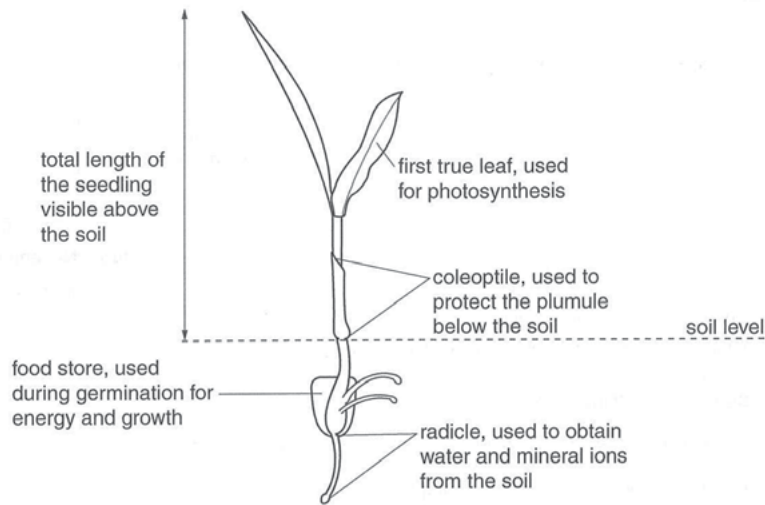


Fig. 1.1

You are going to investigate the effect of light on the germination and early growth of maize. You will measure and observe maize grown in the light and maize grown in the dark.

Three maize grains were planted in each of the two pots labelled **L** and **D**. One pot (**L**) was placed in the light and the other pot (**D**) placed in the dark. The seedlings were kept at a constant temperature.

Step 1 Observe the appearance of the seedlings carefully.

(a) Complete Table 1.1 by recording two **visible** differences in the seedlings grown in the light and the seedlings grown in the dark.

Table 1.1

feature	seedlings grown in the light	seedlings grown in the dark
Leaves	Fresh (green)	Pale (yellowish)
Coleoptile	Green coloured	White coloured

[2]

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1	Mark scheme																					
(a)	any 2 of : comparisons must match <table><tr><th>feature</th><th>seedlings grown in light</th><th>seedlings grown in dark</th></tr><tr><td>height</td><td>short(er)</td><td>tall(er)</td></tr><tr><td>colour</td><td>green</td><td>yellow/light green</td></tr><tr><td>coleoptiles</td><td>green/pink/brown/short</td><td>white/pale pink/brown/long</td></tr><tr><td>leaves</td><td>two or three leaves/wider</td><td>one or two leaves</td></tr><tr><td>coleoptile/shoot/stem</td><td>wide(er)</td><td>narrow(er)</td></tr><tr><td>coleoptile/shoot/stem</td><td>almost vertical/upright</td><td>bent/AW</td></tr></table> 2 marks	feature	seedlings grown in light	seedlings grown in dark	height	short(er)	tall(er)	colour	green	yellow/light green	coleoptiles	green/pink/brown/short	white/pale pink/brown/long	leaves	two or three leaves/wider	one or two leaves	coleoptile/shoot/stem	wide(er)	narrow(er)	coleoptile/shoot/stem	almost vertical/upright	bent/AW
feature	seedlings grown in light	seedlings grown in dark																				
height	short(er)	tall(er)																				
colour	green	yellow/light green																				
coleoptiles	green/pink/brown/short	white/pale pink/brown/long																				
leaves	two or three leaves/wider	one or two leaves																				
coleoptile/shoot/stem	wide(er)	narrow(er)																				
coleoptile/shoot/stem	almost vertical/upright	bent/AW																				
(b)(i)	1 one table drawn with (ruled) lines; 2 column/row headings with units in the header only; 3 trials identified/numbered; 4 twelve measurements recorded in the appropriate light and dark conditions; R if measurements recorded are inconsistent with the unit heading 5 all coleoptile lengths should be shorter than the total length; 6 majority of measurements are consistent with Supervisor's range;																					
(b)(ii)	any 2 of: 1 the seeds germinate in both light and dark; 2 light is needed for the leaves become green (as chlorophyll is made/ora; 3 idea that seedlings grow longer (and thinner) without light (because there is no light)/ora; 2 marks																					

Use gloves and eye protection while carrying out steps 3 to 14 of the practical work for question 1.

- Step 3 Use a marker pen to draw a line down the centre of a white tile. Label one side **L** and the other side **D**.
- Step 4 Use a spatula to carefully dig out from each pot, **two** of the seedlings grown in the light and **two** of the seedlings grown in the dark.
- Step 5 Use a scalpel or razor blade to cut the remains of the food store from each of the seedlings.
- Step 6 Use the water in the beaker labelled **water for washing** to wash each of these food stores and remove the outer covering. Put the outer covering in the beaker labelled **waste**.
- Step 7 Place the food stores from the seedlings grown in the light on the side of the tile labelled **L** and the food stores from seedlings grown in the dark on the side of the tile labelled **D**.
- Step 8 Wash the spatula in the beaker labelled **water for washing** and dry it with a paper towel. Use the spatula to crush together the two food stores from the seedlings grown in the light on the part of the tile labelled **L**.
- Separate the crushed food store into two equal parts spaced at least 2cm apart, as shown in Fig. 1.2.
- Step 9 Repeat step 8 using the two food stores from the seedlings grown in the dark on the part of the tile labelled **D**.

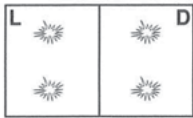


Fig. 1.2

- Step 10 Label two test-tubes, one with the letter **L** and the other with the letter **D**.
- Step 11 Scrape one of the food stores from the seedlings grown in the light into the test-tube labelled **L**. Add 2cm³ of water from the beaker labelled **water**, taking care to wash the crushed food store to the bottom of the test-tube.
- Step 12 Repeat step 11 using one of the food stores from the seedlings grown in the dark and the test-tube labelled **D**.
- Step 13 Carry out a Benedict's test on the contents of test-tube **L** and test-tube **D**.
- Raise your hand when you are ready for hot water to be placed in the beaker labelled **water-bath**.
- Leave the test-tubes for 5 minutes.
- During this time carry out step 14 and answer question (c)(i).
- Step 14 Add 1 drop of iodine solution to the remaining two food stores on the white tile. Record your results in Table 1.2.

Your Mark

1(c)(i)

1(c)(ii)

1(c)(iii)

1(d)(i)

1(d)(ii)

Q1 Mark scheme																	
(c)(i)	add biuret reagent to the crushed seed/crushed seed and water (and observe the colour change); R if heated																
	1 mark																
(c)(ii)	<table><tr><th rowspan="2">test reagent</th><th colspan="2">results</th></tr><tr><th>seedlings grown in light</th><th>seedlings grown in dark</th></tr><tr><td>biuret</td><td>purple</td><td>purple</td></tr><tr><td>Benedict's</td><td>blue</td><td>blue;</td></tr><tr><td>iodine</td><td>blue-black</td><td>blue-black;</td></tr></table>			test reagent	results		seedlings grown in light	seedlings grown in dark	biuret	purple	purple	Benedict's	blue	blue;	iodine	blue-black	blue-black;
test reagent	results																
	seedlings grown in light	seedlings grown in dark															
biuret	purple	purple															
Benedict's	blue	blue;															
iodine	blue-black	blue-black;															
	2 marks																
(c)(iii)	(maize stores) starch and protein (reducing sugar);																
	1 mark																
(d)(i)	<i>any 6 of:</i> 1 ref. to using same species/type/age of maize; 2 ref. to finding starting (dry) mass; 3 ref. to method of drying; 4 ref. to planting maize (grains) in soil/AW; 5 ref. to planting two sets of at least 100 maize/seeds; 6 ref. to keeping (both sets) in a warm room at/given °C/constant temperature; 7 one other valid detail of the method; 8 ref. to one set place in (constant) light/ref. to one set placed in (constant) dark; 9 ref to removing (10) seedlings (from each set) every two days for drying and weighing; 10 repeat and calculate the mean/average;																
	6 marks																
(d)(ii)	water content in, seeds/seedlings, is variable; for comparisons to be valid;																
	1 mark																

(c) (i) Describe how to carry out a biuret test on a crushed food store.
Drop the solution into the crushed food store
.....[1]

(ii) The results of a biuret test are recorded in Table 1.2.
Complete step 13 by recording the results of your Benedict's tests in Table 1.2.

Table 1.2

test	seedlings grown in light	seedlings grown in dark
biuret	purple	purple
Benedict's	yellow	yellow
iodine	Black	Black

[2]

(iii) State the conclusion for the results shown in Table 1.2.
The starch is present in the maize
.....[1]

Your Mark

1(c)(i)

1(c)(ii)

1(c)(iii)

1(d)(i)

1(d)(ii)

Q1 Mark scheme																
(c)(i)	add biuret reagent to the crushed seed/crushed seed and water (and observe the colour change); R if heated															
		1 mark														
(c)(ii)	<table><tr><th rowspan="2">test reagent</th><th colspan="2">results</th></tr><tr><th>seedlings grown in light</th><th>seedlings grown in dark</th></tr><tr><td>biuret</td><td>purple</td><td>purple</td></tr><tr><td>Benedict's</td><td>blue</td><td>blue;</td></tr><tr><td>iodine</td><td>blue-black</td><td>blue-black;</td></tr></table>		test reagent	results		seedlings grown in light	seedlings grown in dark	biuret	purple	purple	Benedict's	blue	blue;	iodine	blue-black	blue-black;
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biuret	purple	purple														
Benedict's	blue	blue;														
iodine	blue-black	blue-black;														
		2 marks														
(c)(iii)	(maize stores) starch and protein (reducing sugar);															
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		6 marks														
(d)(ii)	water content in, seeds/seedlings, is variable; for comparisons to be valid;															
		1 mark														

(d) A group of students investigated the changes in dry mass during germination and growth of maize grown in the light and maize grown in the dark.

The dry mass is the total mass left after all the water has been evaporated.

Table 1.3 shows the results of the investigation for the maize seedlings grown in the light.

Table 1.3

	time / days										
	0	2	4	6	8	10	12	14	16	18	20
dry mass of 10 maize seedlings/g	22	20	17	12	10	8	11	13	14	15	17

(i) Describe a method the students could have used to carry out this investigation.

Use the information on page 2 to help you.

Students should grow the maize grown in light and maize grown in dark with the constant temperature. every 2 days, the students should measure the weight in grams and make the record.

[6]

(ii) Suggest why the students measured the dry mass instead of the mass including water in their investigation.

If the water is counted, the result will not be specific & the weight of water may vary.

[1]

[Total: 21]

Your Mark

1(c)(i)

1(c)(ii)

1(c)(iii)

1(d)(i)

1(d)(ii)

Q1 Mark scheme																
(c)(i)	add biuret reagent to the crushed seed/crushed seed and water (and observe the colour change); R if heated															
		1 mark														
(c)(ii)	<table><tr><th rowspan="2">test reagent</th><th colspan="2">results</th></tr><tr><th>seedlings grown in light</th><th>seedlings grown in dark</th></tr><tr><td>biuret</td><td>purple</td><td>purple</td></tr><tr><td>Benedict's</td><td>blue</td><td>blue;</td></tr><tr><td>iodine</td><td>blue-black</td><td>blue-black;</td></tr></table>		test reagent	results		seedlings grown in light	seedlings grown in dark	biuret	purple	purple	Benedict's	blue	blue;	iodine	blue-black	blue-black;
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biuret	purple	purple														
Benedict's	blue	blue;														
iodine	blue-black	blue-black;														
		2 marks														
(c)(iii)	(maize stores) starch and protein (reducing sugar);															
		1 mark														
(d)(i)	any 6 of: 1 ref. to using same species/type/age of maize; 2 ref. to finding starting (dry) mass; 3 ref. to method of drying; 4 ref. to planting maize (grains) in soil/AW; 5 ref. to planting two sets of at least 100 maize/seeds; 6 ref. to keeping (both sets) in a warm room at/given °C/constant temperature; 7 one other valid detail of the method; 8 ref. to one set place in (constant) light/ref. to one set placed in (constant) dark; 9 ref to removing (10) seedlings (from each set) every two days for drying and weighing; 10 repeat and calculate the mean/average;															
		6 marks														
(d)(ii)	water content in, seeds/seedlings, is variable; for comparisons to be valid;															
		1 mark														

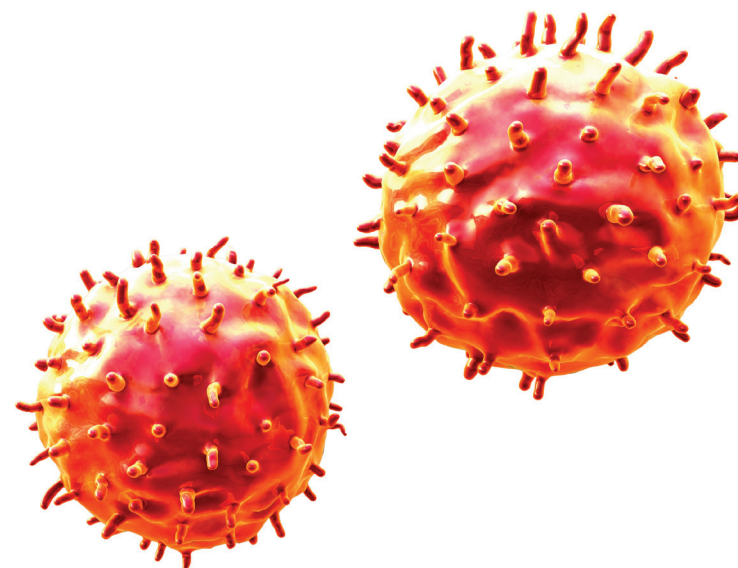
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Interactive Example Candidate Responses

Paper 5 (May / June 2016), Question 2

Cambridge IGCSE™
Biology 0610



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2 (a) A group of students investigated the effect of two different exercises on the heart rate of ten male and ten female students.

Before the first exercise, the pulse rate at rest was measured and the group then jumped on the same spot for two minutes without moving their arms. Every two seconds an investigator shouted 'jump'.

After two minutes the pulse rate was measured and the students were allowed ten minutes to rest.

Before the second exercise, the pulse rate at rest was measured again and the group was asked to do a different exercise.

The students jumped on the same spot for two minutes lifting their arms above their head as they jumped up and dropping their arms as they came down. Every two seconds an investigator shouted 'jump'.

Table 2.1 shows the results of this investigation.

Table 2.1

activity	average pulse rate /beats per minute		
	male students	female students	all students
resting	68	74	71
after jumping	96	92	94
after jumping and moving arms	128	140	134

(i) Complete Table 2.1 by writing in the average pulse rate for all students after both forms of exercise. [2]

(ii) Describe **two** variables in this investigation that have been controlled. [2]
1 the duration of both forms of exercise were kept constant at 2 minutes.
2 the investigator shouted the word jump every 2 seconds for each form of exercise.

(iii) Explain why the students had to rest before carrying out the second exercise. [1]
to ensure the pulse rate would reduce back down to the rate before the exercise.

(iv) State **one** variable that cannot be controlled during the exercise and describe the effect of this variable on the results of the investigation. [2]
variable the different pulse rates of each student
effect on results the average pulse rate may significantly drop or rise because of one students pulse rate which may be totally different to the other students.

Your Mark

2(a)(i)

2(a)(ii)

2(a)(iii)

2(a)(iv)

2(b)(i)

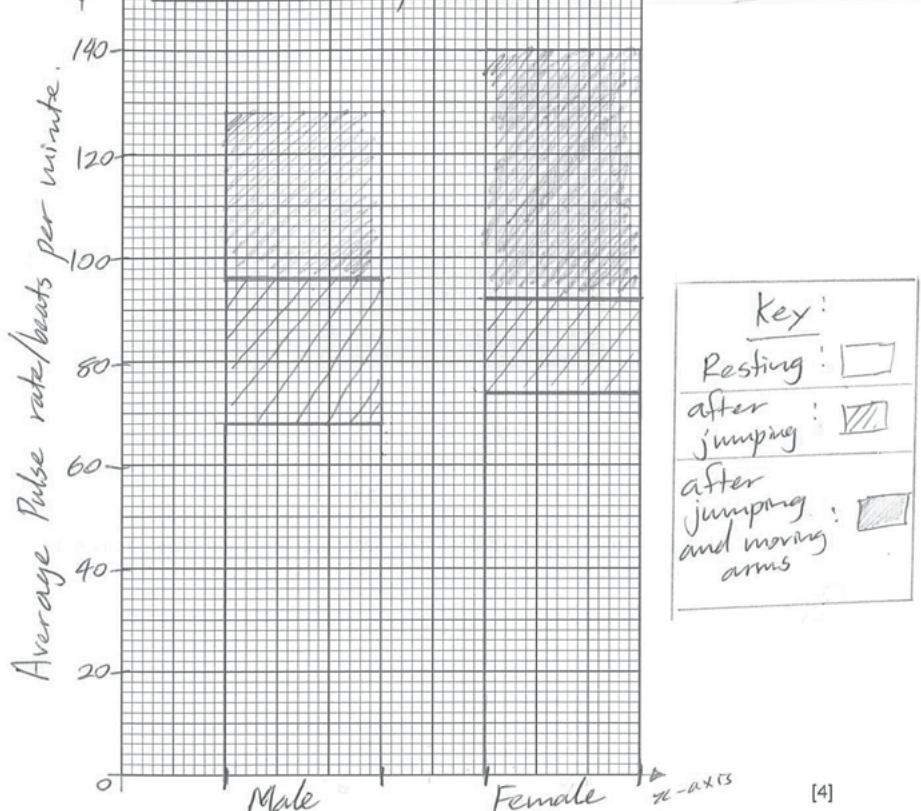
2(b)(ii)

2(c)(i)

2(c)(ii)

Q2	Mark scheme	
(a)(i)	94; 134;	2 marks
(a)(ii)	same time/2 minutes for whole exercise; same time/10 minutes for rest between exercises; same rate/every 2 seconds for each jump; equal numbers of male and female students; idea of same students in each exercise;	2 marks
(a)(iii)	to allow pulse rate to recover/return to normal/resting (before doing another exercise); so the effect of the two exercises can be compared;	1 mark
(a)(iv)	variable	effect on results
	idea of effort put into exercise	more effort would make pulse rate increase more
	idea of fitness	pulse would increase less for fitter students
	2 marks	

(b) (i) Plot a bar chart of the data in Table 2.1, for both the male and the female students, on the grid. *Pulse Rates compared between Females and Males.*



(ii) State **one** similarity and **one** difference the effect of exercise has on males and females.

similarity *they their pulse rates both increase with exercise*

difference *the females pulse rate increases higher than the males pulse rate with exercise*

Your Mark

2(a)(i)

2(a)(ii)

2(a)(iii)

2(a)(iv)

2(b)(i)

2(b)(ii)

2(c)(i)

2(c)(ii)

Q2	Mark scheme
(b)(i)	A (xes) – labelled with units on y axis; S (cale) – suitable even linear scale and plots to fill more than half of the printed grid; P (lot) – all points plotted accurately $\pm \frac{1}{2}$ square; B (ars) – have a gap between each component; R if line graph drawn
(b)(ii)	any 1 of: (s) exercise increases heart/pulse rate; I ref. to resting pulses rate (s) idea that the more intense the exercise the more increase in heart/pulse rate; any 1 from (d) jumping without moving arms shows greater increase in males than females; (d) jumping and moving arms shows greater increase in females than males; 2 marks
(c)(i)	<i>drawing of cross section of artery</i> O (utline) – single clear lines and without shading; S (ize) – occupies at least half of the space provided; D (etail) to show at least 2 layers and wavy lining; 3 marks
(c)(ii)	diameter of lumen = $47 (\pm 1)$ mm; diameter of drawing = $X \pm 1$ mm; correct magnification; 3 marks

LOW

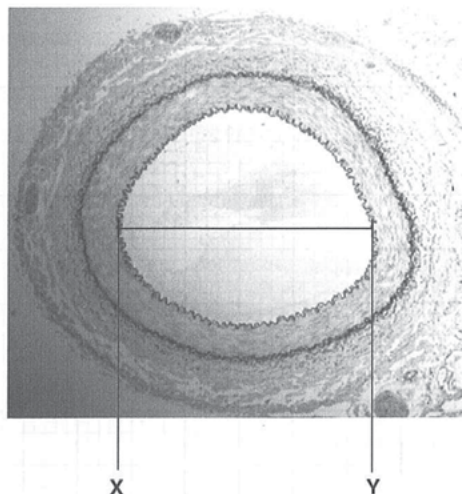
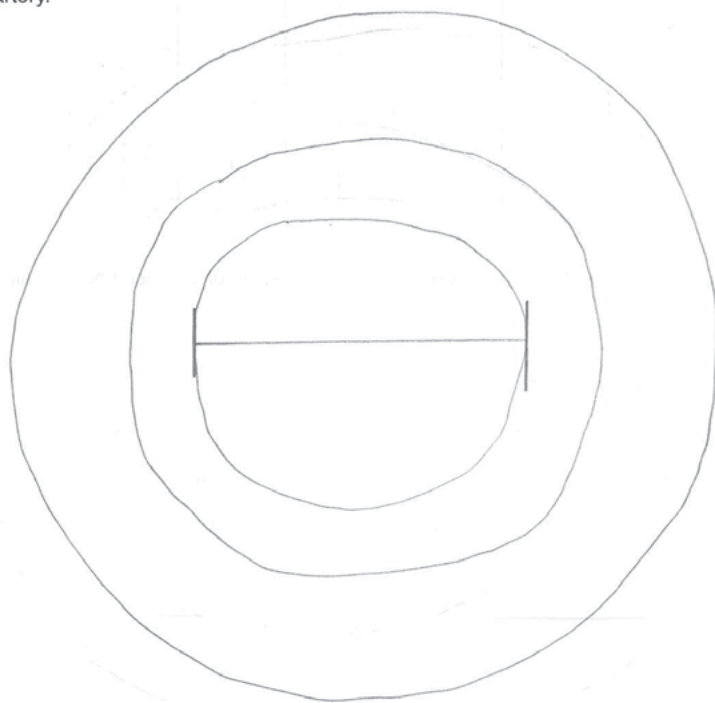


Fig. 2.1

(i) Make a large diagram of this cross section to show the layers forming the wall of the artery.



[3]

Your Mark

2(a)(i)

--	--

2(a)(ii)

--	--

2(a)(iii)

5

2(a)(iv)

5

2(b)(i)

5

2(b)(ii)

9

2(c)(i)

9

2(c)(ii)

9

Q2	Mark scheme
(b)(i)	A(xes) – labelled with units on y axis; S(cale) – suitable even linear scale and plots to fill more than half of the printed grid; P(lot) – all points plotted accurately $\pm \frac{1}{2}$ square; B(ars) – have a gap between each component; R if line graph drawn
(b)(ii)	<i>any 1 of:</i> (s) exercise increases heart/pulse rate; I ref. to resting pulses rate (s) idea that the more intense the exercise the more increase in heart/pulse rate; <i>any 1 from</i> (d) jumping without moving arms shows greater increase in males than females; (d) jumping and moving arms shows greater increase in females than males; 2 marks
(c)(i)	<i>drawing of cross section of artery</i> O(utline) – single clear lines and without shading; S(ize) – occupies at least half of the space provided; D (etail) to show at least 2 layers and wavy lining; 3 marks
(c)(ii)	diameter of lumen = $47 (\pm 1)$ mm; diameter of drawing = X ± 1 mm; correct magnification; 3 marks

EXAMINER COMMENTS

MARK SCHEME

(ii) Measure the diameter of the lumen of the artery between points X and Y on Fig. 2.1. Include the unit.

Diameter of the lumen on Fig. 2.1 47mm

Draw a line in the same position on your drawing and measure the diameter of the lumen on your drawing.

Diameter of the lumen on your drawing 62mm

magnification = $\frac{\text{diameter of the lumen on your drawing}}{\text{diameter of the lumen on Fig. 2.1}}$

Calculate the magnification of your drawing using the equation given and your answers.

Show your working.

Magn = $\frac{\text{Drawing}}{\text{Actual}}$

= $\frac{62\text{mm}}{47\text{mm}} = 1.319148936$

magnification x 1.32 [3]

[Total: 19]

Your Mark

2(a)(i)

2(a)(ii)

2(a)(iii)

2(a)(iv)

2(b)(i)

2(b)(ii)

2(c)(i)

2(c)(ii)

Q2	Mark scheme
(b)(i)	A (xes) – labelled with units on y axis; S (cale) – suitable even linear scale and plots to fill more than half of the printed grid; P (lot) – all points plotted accurately $\pm \frac{1}{2}$ square; B (ars) – have a gap between each component; R if line graph drawn
(b)(ii)	<i>any 1 of:</i> (s) exercise increases heart/pulse rate; I ref. to resting pulses rate (s) idea that the more intense the exercise the more increase in heart/pulse rate; <i>any 1 from</i> (d) jumping without moving arms shows greater increase in males than females; (d) jumping and moving arms shows greater increase in females than males; 2 marks
(c)(i)	<i>drawing of cross section of artery</i> O (utline) – single clear lines and without shading; S (ize) – occupies at least half of the space provided; D (detail) to show at least 2 layers and wavy lining; 3 marks
(c)(ii)	diameter of lumen = 47 (± 1) mm; diameter of drawing = X ± 1 mm; correct magnification; 3 marks

- 2 (a) A group of students investigated the effect of two different exercises on the heart rate of ten male and ten female students.

Before the first exercise, the pulse rate at rest was measured and the group then jumped on the same spot for two minutes without moving their arms. Every two seconds an investigator shouted 'jump'.

After two minutes the pulse rate was measured and the students were allowed ten minutes to rest.

Before the second exercise, the pulse rate at rest was measured again and the group was asked to do a different exercise.

The students jumped on the same spot for two minutes lifting their arms above their head as they jumped up and dropping their arms as they came down. Every two seconds an investigator shouted 'jump'.

Table 2.1 shows the results of this investigation.

Table 2.1

activity	average pulse rate/beats per minute		
	male students	female students	all students
resting	68	74	71
after jumping	96	92	94
after jumping and moving arms	128	140	134

- (i) Complete Table 2.1 by writing in the average pulse rate for all students after both forms of exercise.

[2]

- (ii) Describe **two** variables in this investigation that have been controlled.

1 Time

2 Where the students jumped, they must land on the same spot.

[2]

- (iii) Explain why the students had to rest before carrying out the second exercise.

So their pulse rate can go back to normal so it

[1]

- (iv) State **one** variable that cannot be controlled during the exercise and describe the effect of this variable on the results of the investigation.

variable How high the students jump

effect on results This will alter the results, as the students will jump at different heights.

[2]

Your Mark

2(a)(i)

2(a)(ii)

2(a)(iii)

2(a)(iv)

2(b)(i)

2(b)(ii)

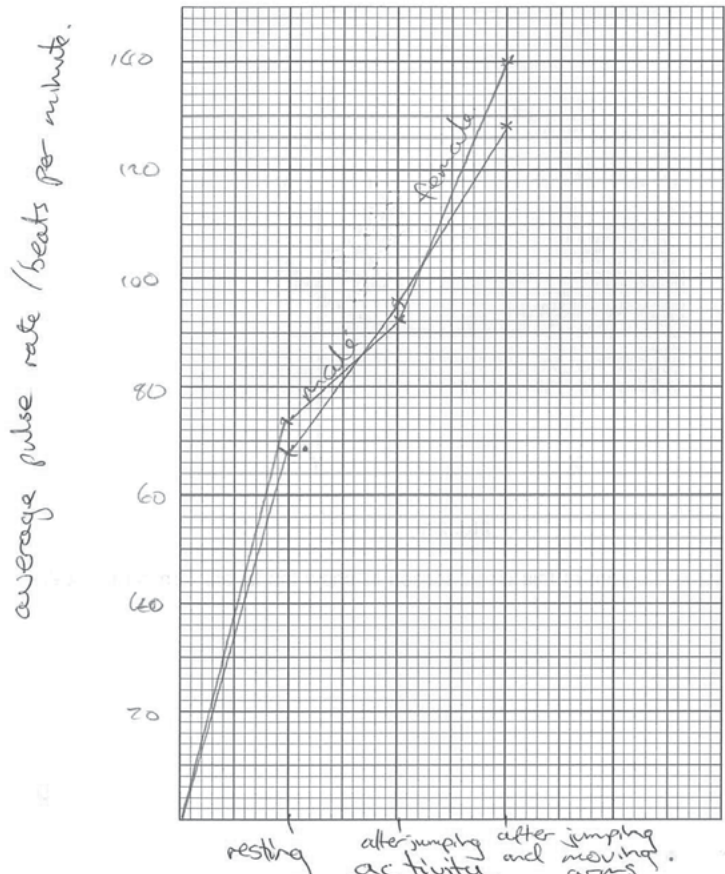
2(c)(i)

2(c)(ii)

Q2 Mark scheme

(a)(i)	94; 134;	2 marks						
(a)(ii)	same time/2 minutes for whole exercise; same time/10 minutes for rest between exercises; same rate/every 2 seconds for each jump; equal numbers of male and female students; idea of same students in each exercise;	2 marks						
(a)(iii)	to allow pulse rate to recover/return to normal/resting (before doing another exercise); so the effect of the two exercises can be compared;	1 mark						
(a)(iv)	<table><tr><td>variable</td><td>effect on results</td></tr><tr><td>idea of effort put into exercise</td><td>more effort would make pulse rate increase more</td></tr><tr><td>idea of fitness</td><td>pulse would increase less for fitter students</td></tr></table>	variable	effect on results	idea of effort put into exercise	more effort would make pulse rate increase more	idea of fitness	pulse would increase less for fitter students	2 marks
variable	effect on results							
idea of effort put into exercise	more effort would make pulse rate increase more							
idea of fitness	pulse would increase less for fitter students							

(b) (i) Plot a bar chart of the data in Table 2.1, for both the male and the female students, on the grid.



(ii) State one similarity and one difference the effect of exercise has on males and females.

similarity heart beat per minute increases

difference male heart rate increases less than females

Your Mark

2(a)(i)

2(a)(ii)

2(a)(iii)

2(a)(iv)

2(b)(i)

2(b)(ii)

2(c)(i)

2(c)(ii)

Q2	Mark scheme
(b)(i)	A (xes) – labelled with units on y axis; S (cale) – suitable even linear scale and plots to fill more than half of the printed grid; P (lot) – all points plotted accurately $\pm \frac{1}{2}$ square; B (ars) – have a gap between each component; R if line graph drawn
(b)(ii)	any 1 of: (s) exercise increases heart/pulse rate; I ref. to resting pulses rate (s) idea that the more intense the exercise the more increase in heart/pulse rate; any 1 from (d) jumping without moving arms shows greater increase in males than females; (d) jumping and moving arms shows greater increase in females than males; 2 marks
(c)(i)	drawing of cross section of artery O (utline) – single clear lines and without shading; S (ize) – occupies at least half of the space provided; D (detail) to show at least 2 layers and wavy lining; 3 marks
(c)(ii)	diameter of lumen = $47 (\pm 1)$ mm; diameter of drawing = $X \pm 1$ mm; correct magnification; 3 marks

(c) Fig. 2.1 shows a photomicrograph of a cross section of an artery from a mammal.

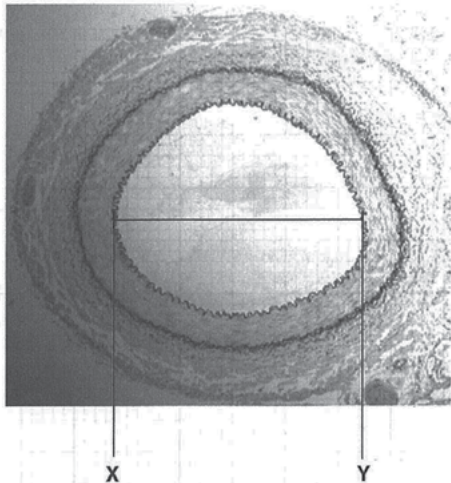
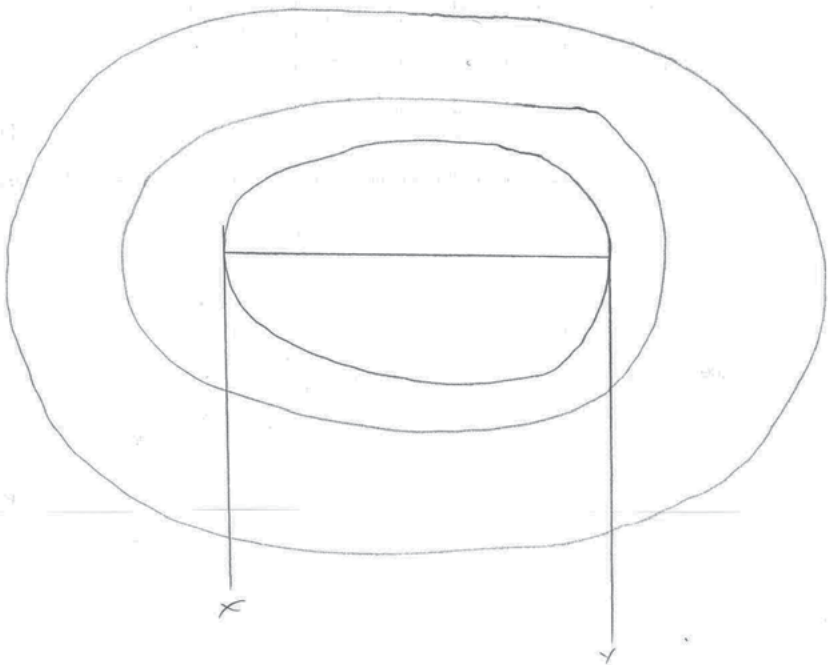


Fig. 2.1

(i) Make a large diagram of this cross section to show the layers forming the wall of the artery.



[3]

Your Mark

2(a)(i)

2(a)(ii)

2(a)(iii)

2(a)(iv)

2(b)(i)

2(b)(ii)

2(c)(i)

2(c)(ii)

Q2	Mark scheme
(b)(i)	A (xes) – labelled with units on y axis; S (cale) – suitable even linear scale and plots to fill more than half of the printed grid; P (lot) – all points plotted accurately $\pm \frac{1}{2}$ square; B (ars) – have a gap between each component; R if line graph drawn
(b)(ii)	<i>any 1 of:</i> (s) exercise increases heart/pulse rate; I ref. to resting pulses rate (s) idea that the more intense the exercise the more increase in heart/pulse rate; <i>any 1 from</i> (d) jumping without moving arms shows greater increase in males than females; (d) jumping and moving arms shows greater increase in females than males; 2 marks
(c)(i)	<i>drawing of cross section of artery</i> O (utline) – single clear lines and without shading; S (ize) – occupies at least half of the space provided; D (detail) to show at least 2 layers and wavy lining; 3 marks
(c)(ii)	diameter of lumen = $47 (\pm 1)$ mm; diameter of drawing = X ± 1 mm; correct magnification; 3 marks

(ii) Measure the diameter of the lumen of the artery between points X and Y on Fig. 2.1. Include the unit.

Diameter of the lumen on Fig. 2.1 4.7 cm

Draw a line in the same position on your drawing and measure the diameter of the lumen on your drawing.

Diameter of the lumen on your drawing 7.2 cm

magnification = $\frac{\text{diameter of the lumen on your drawing}}{\text{diameter of the lumen on Fig. 2.1}}$

Calculate the magnification of your drawing using the equation given and your answers.

Show your working.

$$\frac{7.2 \text{ cm}}{4.7 \text{ cm}} = 1.5 \text{ cm}$$

magnification x 1.5 cm [3]

[Total: 19]

Your Mark

2(a)(i)

2(a)(ii)

2(a)(iii)

2(a)(iv)

2(b)(i)

2(b)(ii)

2(c)(i)

2(c)(ii)

Q2	Mark scheme
(b)(i)	A (xes) – labelled with units on y axis; S (cale) – suitable even linear scale and plots to fill more than half of the printed grid; P (lot) – all points plotted accurately $\pm \frac{1}{2}$ square; B (ars) – have a gap between each component; R if line graph drawn
(b)(ii)	<i>any 1 of:</i> (s) exercise increases heart/pulse rate; I ref. to resting pulses rate (s) idea that the more intense the exercise the more increase in heart/pulse rate; <i>any 1 from</i> (d) jumping without moving arms shows greater increase in males than females; (d) jumping and moving arms shows greater increase in females than males; 2 marks
(c)(i)	<i>drawing of cross section of artery</i> O (utline) – single clear lines and without shading; S (ize) – occupies at least half of the space provided; D (etail) to show at least 2 layers and wavy lining; 3 marks
(c)(ii)	diameter of lumen = 47 (± 1) mm; diameter of drawing = X ± 1 mm; correct magnification; 3 marks

- 2 (a) A group of students investigated the effect of two different exercises on the heart rate of ten male and ten female students.

Before the first exercise, the pulse rate at rest was measured and the group then jumped on the same spot for two minutes without moving their arms. Every two seconds an investigator shouted 'jump'.

After two minutes the pulse rate was measured and the students were allowed ten minutes to rest.

Before the second exercise, the pulse rate at rest was measured again and the group was asked to do a different exercise.

The students jumped on the same spot for two minutes lifting their arms above their head as they jumped up and dropping their arms as they came down. Every two seconds an investigator shouted 'jump'.

Table 2.1 shows the results of this investigation.

Table 2.1

activity	average pulse rate/beats per minute		
	male students	female students	all students
resting	68	74	71
after jumping	96	92	94
after jumping and moving arms	128	140	134

- (i) Complete Table 2.1 by writing in the average pulse rate for all students after both forms of exercise.

[2]

- (ii) Describe **two** variables in this investigation that have been controlled.

1 Resting it is low com

2 After jumping and moving arms

[2]

- (iii) Explain why the students had to rest before carrying out the second exercise.

To reduce heart beats

[1]

- (iv) State **one** variable that cannot be controlled during the exercise and describe the effect of this variable on the results of the investigation.

variable The heart beating fast After jumping and moving arms

effect on results the average pulse rate (beats per minutes) is high in all students it is 134 beats per minutes.

[2]

Your Mark

2(a)(i)

2(a)(ii)

2(a)(iii)

2(a)(iv)

2(b)(i)

2(b)(ii)

2(c)(i)

2(c)(ii)

Q2 Mark scheme

(a)(i)	94; 134;	2 marks						
(a)(ii)	same time/2 minutes for whole exercise; same time/10 minutes for rest between exercises; same rate/every 2 seconds for each jump; equal numbers of male and female students; idea of same students in each exercise;	2 marks						
(a)(iii)	to allow pulse rate to recover/return to normal/resting (before doing another exercise); so the effect of the two exercises can be compared;	1 mark						
(a)(iv)	<table><tr><td>variable</td><td>effect on results</td></tr><tr><td>idea of effort put into exercise</td><td>more effort would make pulse rate increase more</td></tr><tr><td>idea of fitness</td><td>pulse would increase less for fitter students</td></tr></table>	variable	effect on results	idea of effort put into exercise	more effort would make pulse rate increase more	idea of fitness	pulse would increase less for fitter students	2 marks
variable	effect on results							
idea of effort put into exercise	more effort would make pulse rate increase more							
idea of fitness	pulse would increase less for fitter students							

LOW

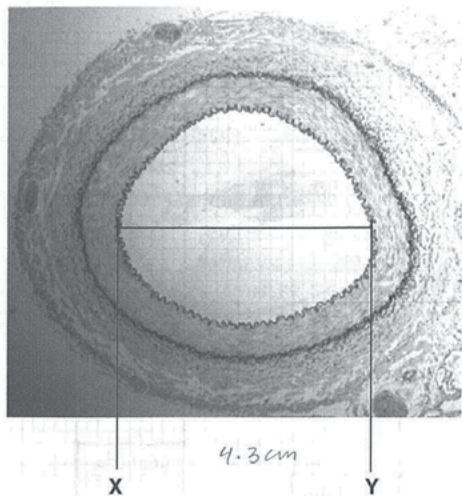


Fig. 2.1

(I) Make a large diagram of this cross section to show the layers forming the wall of the artery.



Your Mark

2(a)(i)

--	--

2(a)(ii)

--	--

2(a)(iii)

--	--

2(a)(iv)

101

2(b)(i)

--	--

2(b)(ii)

--	--

2(c)(i)

--	--

2(c)(ii)

--	--

Q2	Mark scheme
(b)(i)	A(xes) – labelled with units on y axis; S(cale) – suitable even linear scale and plots to fill more than half of the printed grid; P(lot) – all points plotted accurately $\pm \frac{1}{2}$ square; B(ars) – have a gap between each component; R if line graph drawn
(b)(ii)	<i>any 1 of:</i> (s) exercise increases heart/pulse rate; I ref. to resting pulses rate (s) idea that the more intense the exercise the more increase in heart/pulse rate; <i>any 1 from</i> (d) jumping without moving arms shows greater increase in males than females; (d) jumping and moving arms shows greater increase in females than males; 2 marks
(c)(i)	<i>drawing of cross section of artery</i> O(utline) – single clear lines and without shading; S(ize) – occupies at least half of the space provided; D (detail) to show at least 2 layers and wavy lining; 3 marks
(c)(ii)	diameter of lumen = $47 (\pm 1)$ mm; diameter of drawing = X ± 1 mm; correct magnification; 3 marks

EXAMINER COMMENTS

MARK SCHEME

(ii) Measure the diameter of the lumen of the artery between points X and Y on Fig. 2.1. Include the unit.

Diameter of the lumen on Fig. 2.1 4.3 cm

Draw a line in the same position on your drawing and measure the diameter of the lumen on your drawing.

Diameter of the lumen on your drawing 6.5 cm

magnification = $\frac{\text{diameter of the lumen on your drawing}}{\text{diameter of the lumen on Fig. 2.1}}$

Calculate the magnification of your drawing using the equation given and your answers.

Show your working.

magnification: $\frac{6.5 \text{ cm}}{4.3 \text{ cm}}$
 $= 1.51162791 \times$
 $\approx 1.51 \times$

magnification 1.51 x [3]

[Total: 19]

Your Mark

2(a)(i)

2(a)(ii)

2(a)(iii)

2(a)(iv)

2(b)(i)

2(b)(ii)

2(c)(i)

2(c)(ii)

Q2	Mark scheme
(b)(i)	A (xes) – labelled with units on y axis; S (cale) – suitable even linear scale and plots to fill more than half of the printed grid; P (lot) – all points plotted accurately $\pm \frac{1}{2}$ square; B (ars) – have a gap between each component; R if line graph drawn
(b)(ii)	<i>any 1 of:</i> (s) exercise increases heart/pulse rate; I ref. to resting pulses rate (s) idea that the more intense the exercise the more increase in heart/pulse rate; <i>any 1 from</i> (d) jumping without moving arms shows greater increase in males than females; (d) jumping and moving arms shows greater increase in females than males; 2 marks
(c)(i)	<i>drawing of cross section of artery</i> O (utline) – single clear lines and without shading; S (ize) – occupies at least half of the space provided; D (detail) to show at least 2 layers and wavy lining; 3 marks
(c)(ii)	diameter of lumen = 47 (± 1) mm; diameter of drawing = X ± 1 mm; correct magnification; 3 marks

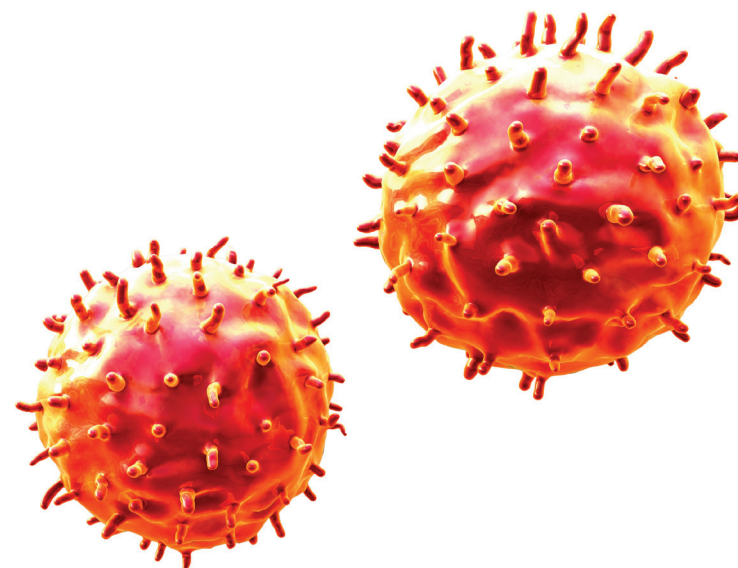
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Interactive Example Candidate Responses

Paper 6 (May / June 2016), Question 1

Cambridge IGCSE™
Biology 0610



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- 1 Metabolic reactions in cells produce toxic chemicals which can be converted to harmless or less toxic chemicals.

Hydrogen peroxide is broken down using the enzyme catalase which is found in most cells.

Fig. 1.1 shows this reaction.

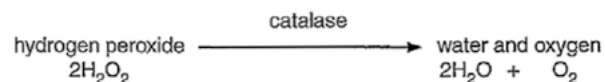


Fig. 1.1

A student investigated the effect of alcohol (ethanol) on the activity of catalase found in potato, using three pieces of potato cut to the same size.

Fig. 1.2 shows these pieces of potato.

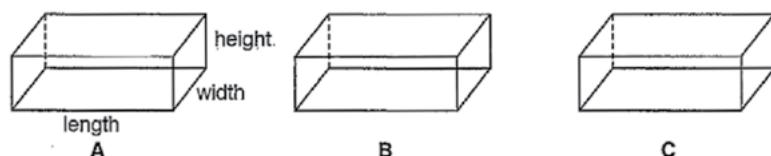


Fig. 1.2

- (a) (i). Measure the length, width and height of one of these pieces of potato.

Record your results in Table 1.1.

Table 1.1

length of potato piece /mm	width of potato piece /mm	height of potato piece /mm
30	10	10

[1]

- Step 1 The student labelled six test-tubes, 1, 2, 3, 4, 5, and 6 and used a syringe to add 10 cm³ of hydrogen peroxide solution to each of the test-tubes.
- Step 2 They cut potato piece A to obtain two slices of similar size.
- Step 3 The student placed the free end of a delivery tube into a large test-tube containing water.
- Step 4 They placed one of the slices of potato piece A into the hydrogen peroxide solution in test-tube 1.
- Step 5 The student immediately placed the rubber bung attached to the delivery tube into test-tube 1 and pushed it in as tightly as possible, as shown in Fig. 1.3.

Your Mark

1(a)(i)

1(a)(ii)

1(b)(i)

1(b)(ii)

Q1	Mark scheme
(a)(i)	length: 30 (mm) width: 10 (mm) height: 10 (mm) ; 1 mark
(a)(ii)	1 table drawn with rows or columns ; 1 graphs 2 table drawn with cells for at least 6 bubble readings and 3 means; 3 appropriate column headings with units R if units given in cells instead of header (number of) bubbles per (or in) 3 minutes/min or (number of) bubbles/minute or min potato/piece of potato/piece/tube slice/stick and 1 or 2 mean/average (number of bubbles per 3 min (or per 1 min) ; 4 correct tally results recorded ; 5 correct mean/average calculated for each potato piece ; 5 marks
(b)(i)	prevents leakage of oxygen/all oxygen collected; A gas/air/bubbles can observe reaction/bubbles as soon as it starts/AW; I no air/oxygen can enter tube I "quicker" unqualified for mp 2 1 mark
(b)(ii)	prevents leakage of oxygen/all oxygen collected ; A gas/air/bubbles I loose bung could come out/no gas from outside enters the tube I fair test comments increases accuracy/results will be comparable/consistent/reliable/valid; allow a pressure to build up/bubbles to form; 2 marks

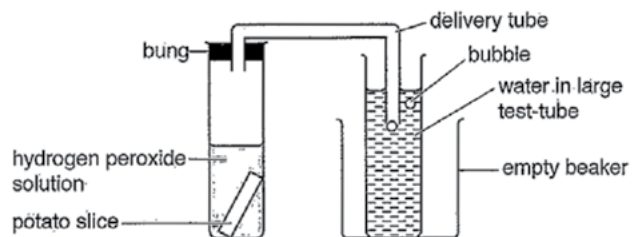


Fig. 1.3

Step 6 They counted the number of bubbles released from the delivery tube in 3 minutes.

Step 7 The student repeated steps 4–6 for the second slice of potato piece A using test-tube 2.

Step 8 They repeated steps 2–7 for potato piece B using test-tubes 3 and 4.

Step 9 They repeated steps 2–7 for potato piece C using test-tubes 5 and 6.

The student used a tally to count the number of bubbles.

Fig. 1.4 shows their tally count.

A1 IIII	A2 III
B1 IIII IIII IIII	B2 IIII IIII I
C1 IIII IIII II	C2 IIII IIII

Fig. 1.4

MEAN CALCULATIONS

$$A = \frac{5 + 3}{2} = 4$$

$$B = \frac{18 + 14}{2} = 14.5$$

$$C = \frac{12 + 10}{2} = 11$$

Your Mark

1(a)(i)

1(a)(ii)

1(b)(i)

1(b)(ii)

Q1	Mark scheme
(a)(i)	length: 30 (mm) width: 10 (mm) height: 10 (mm) ; 1 mark
(a)(ii)	1 table drawn with rows or columns ; 1 graphs 2 table drawn with cells for at least 6 bubble readings and 3 means; 3 appropriate column headings with units R if units given in cells instead of header (number of) bubbles per (or in) 3 minutes/min or (number of) bubbles/minute or min potato/piece of potato/piece/tube slice/stick and 1 or 2 mean/average (number of bubbles per 3 min (or per 1 min) ; 4 correct tally results recorded ; 5 correct mean/average calculated for each potato piece ; 5 marks
(b)(i)	prevents leakage of oxygen/all oxygen collected; A gas/air/bubbles can observe reaction/bubbles as soon as it starts/AW; I no air/oxygen can enter tube I "quicker" unqualified for mp 2 1 mark
(b)(ii)	prevents leakage of oxygen/all oxygen collected ; A gas/air/bubbles I loose bung could come out/no gas from outside enters the tube I fair test comments increases accuracy/results will be comparable/consistent/reliable/valid; allow a pressure to build up/bubbles to form; 2 marks

- (ii) Prepare a table to record the student's results.
Your table should show:
- the numbers of bubbles produced by each slice of potato in 3 minutes
 - the mean number of bubbles produced by each of potato piece A, B and C.

Complete your table using the results from Fig. 1.4.

POTATO PIECES	BUBBLES PRODUCED in 3min	MEAN of bubbles
A ₁	5	4
A ₂	3	
B ₁	18	14.5
B ₂	11	
C ₁	12	11
C ₂	10	

[5]

- (b) (i) Suggest why the free end of the delivery tube was placed in the water before adding the potato slice to the hydrogen peroxide solution and connecting the test-tube to the bung of the delivery tube.

TO MAKE SURE THAT THE TEST TUBE WAS COVERED
AS FAST AS POSSIBLE

[1]

- (ii) Explain why the bung of the delivery tube must fit tightly into the test-tube.

BECAUSE THERE WILL NO LOSS OF O₂ IN THE AIR
OUTSIDE AND ALL THE O₂ PRODUCED WILL PASS
THROUGH THE DELIVERY TUBE

[2]

Your Mark

1(a)(i)

1(a)(ii)

1(b)(i)

1(b)(ii)

Q1	Mark scheme
(a)(i)	length: 30 (mm) width: 10 (mm) height: 10 (mm) ; 1 mark
(a)(ii)	1 table drawn with rows or columns ; I graphs 2 table drawn with cells for at least 6 bubble readings and 3 means; 3 appropriate column headings with units R if units given in cells instead of header (number of) bubbles per (or in) 3 minutes/min or (number of) bubbles/minute or min potato/piece of potato/piece/tube slice/stick and 1 or 2 mean/average (number of bubbles per 3 min (or per 1 min) ; 4 correct tally results recorded ; 5 correct mean/average calculated for each potato piece ; 5 marks
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(b)(ii)	prevents leakage of oxygen/all oxygen collected ; A gas/air/bubbles I loose bung could come out/no gas from outside enters the tube I fair test comments increases accuracy/results will be comparable/consistent/reliable/valid; allow a pressure to build up/bubbles to form; 2 marks

(c) The pieces of potato that the student used in their investigation were soaked in different concentrations of alcohol for 24 hours.

- Potato piece **A** was soaked in 20% alcohol.
- Potato piece **B** was soaked in 2% alcohol.
- Potato piece **C** was soaked in 10% alcohol.

(i) Suggest the relationship between the number of bubbles and the activity of catalase.

THE ACTIVITY OF THE CATALASE IS RELATED TO THE AMOUNT OF ALCOHOL IN WHICH THE PIECES WERE SOAKED, WHERE AS THE ALCOHOL INCREASES IT STOPS THE ACTIVITY OF THE CATALASE AND SO LESS BUBBLES ARE PRODUCED [1]

(ii) Compare the activity of catalase in the potato pieces **A**, **B** and **C**.

THE ACTIVITY IS MORE EFFICIENT IN PIECE B (14.5 bubbles) WHILE IT DECREASES IN C (4) AND THE LEAST EFFICIENT WAS IN A (4 bubbles) [1]

(iii) Predict the number of bubbles that would be produced in 3 minutes if a piece of potato was soaked in 50% alcohol before being placed in hydrogen peroxide solution.

IT WILL BE LESS THAN 4, maybe 2 or 1 or none. [1]

(d) (i) State **one** variable that has been controlled in the student's investigation.

Describe how this variable was controlled.

variable the sizes of the potatoes the amount of $2H_2O_2$
how it was controlled IT WAS CONTROLLED BY CUTTING PIECES OF THE SAME SIZE USING A SYRINGE. IT WAS ADDED 10 cm^3 IN EACH TEST TUBE [2]

(ii) The method of measuring the oxygen gas produced is a source of error.

State **one** reason why this method is a source of error.

COUNTING THE BUBBLES DELIVERED ISN'T RELIABLE.

Suggest how to improve the method to minimise this error.

Repeat the experiment more times and to have a more accurate mean.

Your Mark

1(c)(i)

1(c)(ii)

1(c)(iii)

1(d)(i)

1(d)(ii)

Q1 Mark scheme

(c)(i)	catalase produces more bubbles when it is active/ora; A as number of bubbles increases the activity of the catalase increases/positive correlation the lower the percentage of alcohol (used for soaking) the more bubbles are produced/AW/ora; need not refer to catalase (more bubbles means more activity) the higher the percentage of alcohol used the lower the activity of the catalase/ora; 1 mark
(c)(ii)	B has more catalase activity/bubbles, A has least activity/bubbles; I restatement of results (number of bubbles from each piece of potato) A B more, C medium and A fewer bubbles/AW 1 mark
(c)(iii)	number 4 or less than 4 ; A no bubbles/none/zero 1 mark

(c) The pieces of potato that the student used in their investigation were soaked in different concentrations of alcohol for 24 hours.

- Potato piece **A** was soaked in 20% alcohol.
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(i) Suggest the relationship between the number of bubbles and the activity of catalase.

THE ACTIVITY OF THE CATALASE IS RELATED TO THE AMOUNT OF ALCOHOL IN WHICH THE PIECES WERE SOAKED, THE AS THE ALCOHOL INCREASES IT STOPS THE ACTIVITY OF THE CATALASE AND SO LESS BUBBLES ARE PRODUCED [1]

(ii) Compare the activity of catalase in the potato pieces **A**, **B** and **C**.

THE ACTIVITY IS MORE EFFICIENT IN PIECE B (14.5 bubbles) WHILE IT DECREASES IN C (4) AND THE LEAST EFFICIENT WAS IN A (4 bubbles) [1]

(iii) Predict the number of bubbles that would be produced in 3 minutes if a piece of potato was soaked in 50% alcohol before being placed in hydrogen peroxide solution.

IT WILL BE LESS THAN 4, maybe 2 or 1 or none. [1]

(d) (i) State **one** variable that has been controlled in the student's investigation.

Describe how this variable was controlled.

variable the sizes of the potatoes the amount of H_2O_2
how it was controlled IT WAS CONTROLLED BY CUTTING PIECES OF THE SAME SIZE USING A SYRINGE. IT WAS ADDED 10 cm^3 IN EACH TEST TUBE [2]

(ii) The method of measuring the oxygen gas produced is a source of error.

State **one** reason why this method is a source of error.

COUNTING THE BUBBLES DELIVERED ISN'T RELIABLE.

Suggest how to improve the method to minimise this error.

Repeat the experiment more times and to have a more accurate mean.

Your Mark

1(c)(i)

1(c)(ii)

1(c)(iii)

1(d)(i)

1(d)(ii)

Q1 Mark scheme

(d)(i)	variable must match control given	
	variable	controlled by
	hydrogen peroxide (volume/concentration).	measured 10 cm^3 or used same strength solution;
	Potato (size/length/volume/surface area/type of potato sample of potato);	same dimensions used for each piece//30 mm $\times$ 5 mm $\times$ 10 mm or pieces cut from same potato/type of potato;
	time for measuring bubbles ;	counted for 3 min for each piece
(d)(ii)	time of soaking in alcohol;	same time/24 hours for each piece;
	2 marks	
	method must match the error. 1 mark for error, 1 mark for method.	
1(d)(i)	source of error	method of reducing error
	bubbles are all different sizes;	measure the volume use a gas syringe/collect in a measuring cylinder/AVP;
	bubbles difficult to count ;	use a (tally) counter/ method of collecting the gas/measure the volume/ use 2 people/repeat for reliability/AW;
	setting up and starting time;	use 2 people;
2 marks		

- (iii)

Identify the source of error in step 2. State why this is a source of error.

source of error the sizes are similar, not identical

reason As the sizes are not the same the number of bubbles will be different for sure.

[2]
- (iv)

Describe a control experiment that the student could carry out for this investigation.

instead of putting the pieces of potato in hydrogen peroxide solution, put them in distilled water and do all the steps of the real experiment.

[2]
- (v)

Predict the result expected from the control experiment described in (iv).

there will be no bubbles produced

[1]
- (e)

State one safety precaution required when ethanol is used in an investigation.

use proper safety glasses and gloves

[1]

Your Mark

1(d)(iii)

1(d)(iv)

1(d)(v)

1(e)

1(f)(i)

1(f)(ii)

1(f)(iii)

Q1	Mark scheme
(d)(iii)	size/mass/volume/of the slices or type/age of potato, may not be equal ; surface area is different/quantity of available catalase is different/AW ; 2 marks
(d)(iv)	use exactly the same procedure/do the same/repeat/AW/or description of original method; I use boiled potato/boiled catalase/repeat without potato/ use water instead of hydrogen peroxide/use liver or yeast/ use glass beads except soak potato in water (and not ethanol)/use 0% alcohol/without alcohol/use untreated potato/AW; 2 marks
(d)(v)	same or greater number of bubbles than 2% alcohol/B/ figures quoted (11–18) (mean of 14.5+)/more bubbles as more gas produced/most number of bubbles; 1 mark
(e)	keep away from flames/heat source ; wear goggles/safety glasses: A use a water bath when heating ethanol wear gloves; wear lab coat; use tongs/AW; 1 mark
(f)(i)	280; 1 mark
(f)(ii)	A axes labelled even scale; y-axis: (mean) reaction time/ms x-axis: before drinking alcohol and after drinking alcohol/ before and after/r key given x-axis labels approximately under each bar P both plots accurate $\pm \frac{1}{2}$ small square ; C columns not touching R superimposed columns of same width columns at least half the grid on y-axis; 3 marks
(f)(iii)	220–350 (milliseconds) ; 1 mark

- (f) In an investigation into the effects of alcohol on the nervous system, people were asked to carry out a test on their reaction time.

The person being tested looked at a coloured block on a computer screen.
As soon as the colour changed they pressed a button.
The time taken to press the button was recorded by the computer.
This was their reaction time.

Twenty people were tested before and after consuming a drink containing the same concentration of alcohol

Table 1.2 shows the results of this investigation.

Table 1.2

test person	reaction time before consuming alcohol /milliseconds	reaction time after consuming alcohol /milliseconds
1	272	322
2	310	350
3	225	270
4	243	290
5	240	308
6	264	315
7	201	238
8	262	300
9	225	252
10	235	278
11	225	253
12	247	271
13	226	266
14	194	220
15	206	239
16	309	340
17	223	261
18	243	286
19	270	316
20	180	225
mean	240	280

- (i) Calculate the mean for the reaction time after consuming alcohol.

Write your answer in Table 1.2.

[1]

Your Mark

1(d)(iii)

1(d)(iv)

1(d)(v)

1(e)

1(f)(i)

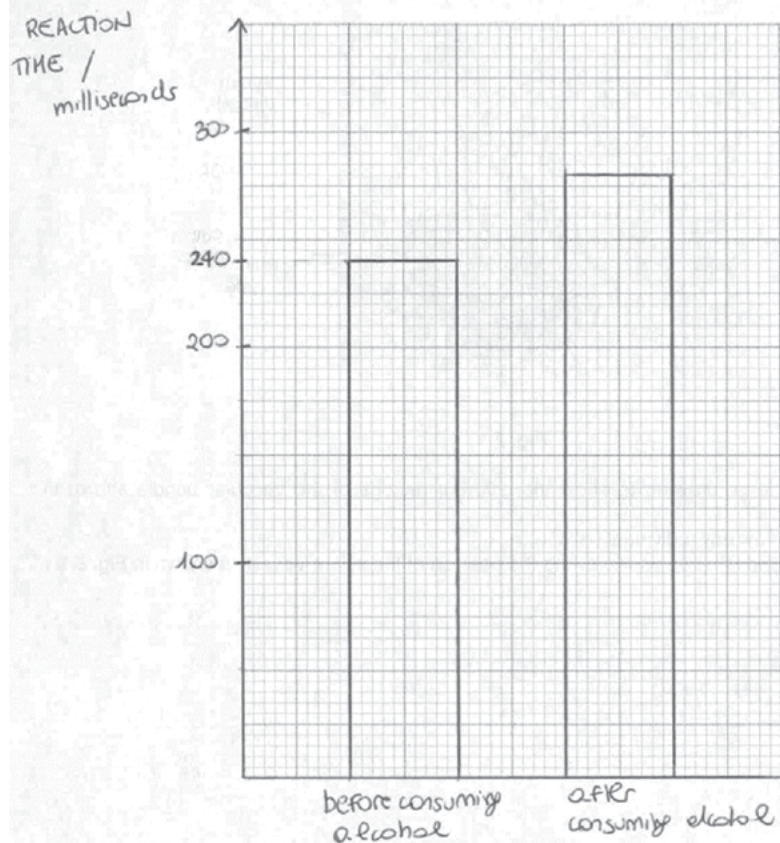
1(f)(ii)

1(f)(iii)

Q1 Mark scheme

(d)(iii)	size/mass/volume/of the slices or type/age of potato, may not be equal ; surface area is different/quantity of available catalase is different/AW ; 2 marks
(d)(iv)	use exactly the same procedure/do the same/repeat/AW/or description of original method; I use boiled potato/boiled catalase/repeat without potato/use water instead of hydrogen peroxide/use liver or yeast/use glass beads except soak potato in water (and not ethanol)/use 0% alcohol/without alcohol/use untreated potato/AW; 2 marks
(d)(v)	same or greater number of bubbles than 2% alcohol/B/figures quoted (11–18) (mean of 14.5+)/more bubbles as more gas produced/most number of bubbles; 1 mark
(e)	keep away from flames/heat source ; wear goggles/safety glasses: A use a water bath when heating ethanol wear gloves; wear lab coat; use tongs/AW; 1 mark
(f)(i)	280; 1 mark
(f)(ii)	A axes labelled even scale; y-axis: (mean) reaction time/ms x-axis: before drinking alcohol and after drinking alcohol/ before and after/r key given x-axis labels approximately under each bar P both plots accurate $\pm \frac{1}{2}$ small square ; C columns not touching R superimposed columns of same width columns at least half the grid on y-axis; 3 marks
(f)(iii)	220–350 (milliseconds) ; 1 mark

(ii) Plot a bar chart to show the mean reaction time of the people tested before and after consuming alcohol.



[3]

(iii) The range of reaction times recorded before consuming alcohol is 180–310 milliseconds.

Use Table 1.2 to identify the range of reaction times recorded after consuming alcohol.

225 ~~250~~ – 350 milliseconds [1]

[Total: 27]

Your Mark

1(d)(iii)

1(d)(iv)

1(d)(v)

1(e)

1(f)(i)

1(f)(ii)

1(f)(iii)

Q1	Mark scheme
(d)(iii)	size/mass/volume/of the slices or type/age of potato, may not be equal ; surface area is different/quantity of available catalase is different/AW ; 2 marks
(d)(iv)	use exactly the same procedure/do the same/repeat/AW/or description of original method; I use boiled potato/boiled catalase/repeat without potato/use water instead of hydrogen peroxide/use liver or yeast/use glass beads except soak potato in water (and not ethanol)/use 0% alcohol/without alcohol/use untreated potato/AW; 2 marks
(d)(v)	same or greater number of bubbles than 2% alcohol/B/figures quoted (11–18) (mean of 14.5+)/more bubbles as more gas produced/most number of bubbles; 1 mark
(e)	keep away from flames/heat source ; wear goggles/safety glasses: A use a water bath when heating ethanol wear gloves; wear lab coat; use tongs/AW; 1 mark
(f)(i)	280; 1 mark
(f)(ii)	A axes labelled even scale; y-axis: (mean) reaction time/ms x-axis: before drinking alcohol and after drinking alcohol/ before and after/r key given x-axis labels approximately under each bar P both plots accurate $\pm \frac{1}{2}$ small square ; C columns not touching R superimposed columns of same width columns at least half the grid on y-axis; 3 marks
(f)(iii)	220–350 (milliseconds) ; 1 mark

- 1 Metabolic reactions in cells produce toxic chemicals which can be converted to harmless or less toxic chemicals.

Hydrogen peroxide is broken down using the enzyme catalase which is found in most cells.

Fig. 1.1 shows this reaction.

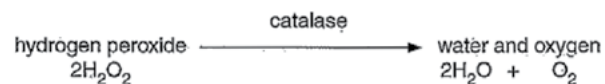


Fig. 1.1

A student investigated the effect of alcohol (ethanol) on the activity of catalase found in potato, using three pieces of potato cut to the same size.

Fig. 1.2 shows these pieces of potato.

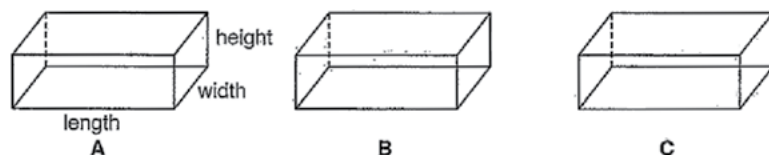


Fig. 1.2

- (a) (i) Measure the length, width and height of one of these pieces of potato.

Record your results in Table 1.1.

Table 1.1

length of potato piece /mm	width of potato piece /mm	height of potato piece /mm
30	10	10

[1]

- Step 1 The student labelled six test-tubes, 1, 2, 3, 4, 5, and 6 and used a syringe to add 10 cm³ of hydrogen peroxide solution to each of the test-tubes.
- Step 2 They cut potato piece A to obtain two slices of similar size.
- Step 3 The student placed the free end of a delivery tube into a large test-tube containing water.
- Step 4 They placed one of the slices of potato piece A into the hydrogen peroxide solution in test-tube 1.
- Step 5 The student immediately placed the rubber bung attached to the delivery tube into test-tube 1 and pushed it in as tightly as possible, as shown in Fig. 1.3.

Your Mark

1(a)(i)

1(a)(ii)

1(b)(i)

1(b)(ii)

Q1	Mark scheme
(a)(i)	length: 30 (mm) width: 10 (mm) height: 10 (mm) ; 1 mark
(a)(ii)	1 table drawn with rows or columns ; I graphs 2 table drawn with cells for at least 6 bubble readings and 3 means; 3 appropriate column headings with units R if units given in cells instead of header (number of) bubbles per (or in) 3 minutes/min or (number of) bubbles/minute or min potato/piece of potato/piece/tube slice/stick and 1 or 2 mean/average (number of bubbles per 3 min (or per 1 min) ; 4 correct tally results recorded ; 5 correct mean/average calculated for each potato piece ; 5 marks
(b)(i)	prevents leakage of oxygen/all oxygen collected; A gas/air/bubbles can observe reaction/bubbles as soon as it starts/AW; I no air/oxygen can enter tube I "quicker" unqualified for mp 2 1 mark
(b)(ii)	prevents leakage of oxygen/all oxygen collected ; A gas/air/bubbles I loose bung could come out/no gas from outside enters the tube I fair test comments increases accuracy/results will be comparable/consistent/reliable/valid; allow a pressure to build up/bubbles to form; 2 marks

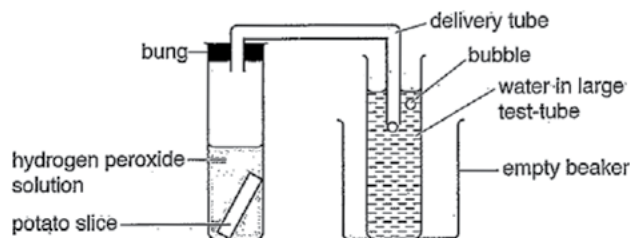


Fig. 1.3

Step 6 They counted the number of bubbles released from the delivery tube in 3 minutes.

Step 7 The student repeated steps 4–6 for the second slice of potato piece A using test-tube 2.

Step 8 They repeated steps 2–7 for potato piece B using test-tubes 3 and 4.

Step 9 They repeated steps 2–7 for potato piece C using test-tubes 5 and 6.

The student used a tally to count the number of bubbles.

Fig. 1.4 shows their tally count.

4	
A1 IIII 5	A2 III 3
B1 IIII IIII 10	B2 IIII I 6
C1 IIII II 12	C2 IIII I 6

Fig. 1.4

Your Mark

1(a)(i)

1(a)(ii)

1(b)(i)

1(b)(ii)

Q1	Mark scheme
(a)(i)	length: 30 (mm) width: 10 (mm) height: 10 (mm) ; 1 mark
(a)(ii)	1 table drawn with rows or columns ; 1 graphs 2 table drawn with cells for at least 6 bubble readings and 3 means; 3 appropriate column headings with units R if units given in cells instead of header (number of) bubbles per (or in) 3 minutes/min or (number of) bubbles/minute or min potato/piece of potato/piece/tube slice/stick and 1 or 2 mean/average (number of bubbles per 3 min (or per 1 min) ; 4 correct tally results recorded ; 5 correct mean/average calculated for each potato piece ; 5 marks
(b)(i)	prevents leakage of oxygen/all oxygen collected; A gas/air/bubbles can observe reaction/bubbles as soon as it starts/AW; I no air/oxygen can enter tube I "quicker" unqualified for mp 2 1 mark
(b)(ii)	prevents leakage of oxygen/all oxygen collected ; A gas/air/bubbles I loose bung could come out/no gas from outside enters the tube I fair test comments increases accuracy/results will be comparable/consistent/reliable/valid; allow a pressure to build up/bubbles to form; 2 marks

- (ii) Prepare a table to record the student's results.
Your table should show:
- the numbers of bubbles produced by each slice of potato in 3 minutes
 - the mean number of bubbles produced by each of potato piece A, B and C.

Complete your table using the results from Fig. 1.4.

number of bubbles	potato pieces					
	A		B		C	
	1	2	1	2	1	2
number of bubbles produced	5	3	18	11	12	10
mean	4		14.5		11	

[5]

- (b) (i) Suggest why the free end of the delivery tube was placed in the water before adding the potato slice to the hydrogen peroxide solution and connecting the test-tube to the bung of the delivery tube.

To prevent the escape of oxygen gas, as the potato slice contains the catalase enzyme.

[1]

- (ii) Explain why the bung of the delivery tube must fit tightly into the test-tube.

To prevent the gas pressure inside from blocking the tube.

[2]

Your Mark

1(a)(i)

1(a)(ii)

1(b)(i)

1(b)(ii)

Q1	Mark scheme
(a)(i)	length: 30 (mm) width: 10 (mm) height: 10 (mm) ; 1 mark
(a)(ii)	1 table drawn with rows or columns ; I graphs 2 table drawn with cells for at least 6 bubble readings and 3 means; 3 appropriate column headings with units R if units given in cells instead of header (number of) bubbles per (or in) 3 minutes/min or (number of) bubbles/minute or min potato/piece of potato/piece/tube slice/stick and 1 or 2 mean/average (number of bubbles per 3 min (or per 1 min) ; 4 correct tally results recorded ; 5 correct mean/average calculated for each potato piece ; 5 marks
(b)(i)	prevents leakage of oxygen/all oxygen collected; A gas/air/bubbles can observe reaction/bubbles as soon as it starts/AW; I no air/oxygen can enter tube I "quicker" unqualified for mp 2 1 mark
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(c) The pieces of potato that the student used in their investigation were soaked in different concentrations of alcohol for 24 hours.

- Potato piece **A** was soaked in 20% alcohol.
- Potato piece **B** was soaked in 2% alcohol.
- Potato piece **C** was soaked in 10% alcohol.

(i) Suggest the relationship between the number of bubbles and the activity of catalase.

As the activity of catalase enzyme increases, the more hydrogen peroxide broken water and oxygen bubbles are produced. [1]

(ii) Compare the activity of catalase in the potato pieces **A**, **B** and **C**.

The activity in potato piece B was more, as the mean number of bubbles was 14.5, while the mean number of bubbles in A was 4 and in C, it was 11. [1]

(iii) Predict the number of bubbles that would be produced in 3 minutes if a piece of potato was soaked in 50% alcohol before being placed in hydrogen peroxide solution.

10 bubbles. $\frac{4}{10} \rightarrow 0.2$ [1]

(d) (i) State **one** variable that has been controlled in the student's investigation.

Describe how this variable was controlled.

variable temperature
how it was controlled by using a water bath, which can regulate the temperature. [2]

(ii) The method of measuring the oxygen gas produced is a source of error.

State **one** reason why this method is a source of error.

As the student can miscount the number of bubbles produced. [2]

Suggest how to improve the method to minimise this error.

By measuring the volume of oxygen produced by attaching a gas syringe to the apparatus. [2]

Your Mark

1(c)(i)

1(c)(ii)

1(c)(iii)

1(d)(i)

1(d)(ii)

Q1	Mark scheme										
(d)(i)	variable must match control given <table> <tr> <th>variable</th><th>controlled by</th></tr> <tr> <td>hydrogen peroxide (volume/ concentration).</td><td>measured 10 cm³ or used same strength solution;</td></tr> <tr> <td>Potato (size/length/ volume/surface area/ type of potato sample of potato);</td><td>same dimensions used for each piece//30 mm × 5 mm × 10 mm or pieces cut from same potato/type of potato;</td></tr> <tr> <td>time for measuring bubbles ;</td><td>counted for 3 min for each piece</td></tr> <tr> <td>time of soaking in alcohol;</td><td>same time/24 hours for each piece;</td></tr> </table> 2 marks	variable	controlled by	hydrogen peroxide (volume/ concentration).	measured 10 cm ³ or used same strength solution;	Potato (size/length/ volume/surface area/ type of potato sample of potato);	same dimensions used for each piece//30 mm × 5 mm × 10 mm or pieces cut from same potato/type of potato;	time for measuring bubbles ;	counted for 3 min for each piece	time of soaking in alcohol;	same time/24 hours for each piece;
variable	controlled by										
hydrogen peroxide (volume/ concentration).	measured 10 cm ³ or used same strength solution;										
Potato (size/length/ volume/surface area/ type of potato sample of potato);	same dimensions used for each piece//30 mm × 5 mm × 10 mm or pieces cut from same potato/type of potato;										
time for measuring bubbles ;	counted for 3 min for each piece										
time of soaking in alcohol;	same time/24 hours for each piece;										
(d)(ii)	method must match the error. 1 mark for error, 1 mark for method. <table> <tr> <th>source of error</th><th>method of reducing error</th></tr> <tr> <td>bubbles are all different sizes;</td><td>measure the volume use a gas syringe/collect in a measuring cylinder/AVP;</td></tr> <tr> <td>bubbles difficult to count ;</td><td>use a (tally) counter/ method of collecting the gas/measure the volume/ use 2 people/repeat for reliability/AW;</td></tr> <tr> <td>setting up and starting time;</td><td>use 2 people;</td></tr> </table> 2 marks	source of error	method of reducing error	bubbles are all different sizes;	measure the volume use a gas syringe/collect in a measuring cylinder/AVP;	bubbles difficult to count ;	use a (tally) counter/ method of collecting the gas/measure the volume/ use 2 people/repeat for reliability/AW;	setting up and starting time;	use 2 people;		
source of error	method of reducing error										
bubbles are all different sizes;	measure the volume use a gas syringe/collect in a measuring cylinder/AVP;										
bubbles difficult to count ;	use a (tally) counter/ method of collecting the gas/measure the volume/ use 2 people/repeat for reliability/AW;										
setting up and starting time;	use 2 people;										

(f) In an investigation into the effects of alcohol on the nervous system, people were asked to carry out a test on their reaction time.

The person being tested looked at a coloured block on a computer screen.
As soon as the colour changed they pressed a button.
The time taken to press the button was recorded by the computer.
This was their reaction time.

Twenty people were tested before and after consuming a drink containing the same concentration of alcohol.

Table 1.2 shows the results of this investigation.

Table 1.2

test person	reaction time before consuming alcohol /milliseconds	reaction time after consuming alcohol /milliseconds
1	272	322
2	310	350
3	225	270
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6	264	315
7	201	238
8	262	300
9	225	252
10	235	278
11	225	253
12	247	271
13	226	266
14	194	220
15	206	239
16	309	340
17	223	261
18	243	286
19	270	316
20	180	225
mean	240	280

(i) Calculate the mean for the reaction time after consuming alcohol.

Write your answer in Table 1.2.

Your Mark

1(d)(iii)

1(d)(iv)

1(d)(v)

1(e)

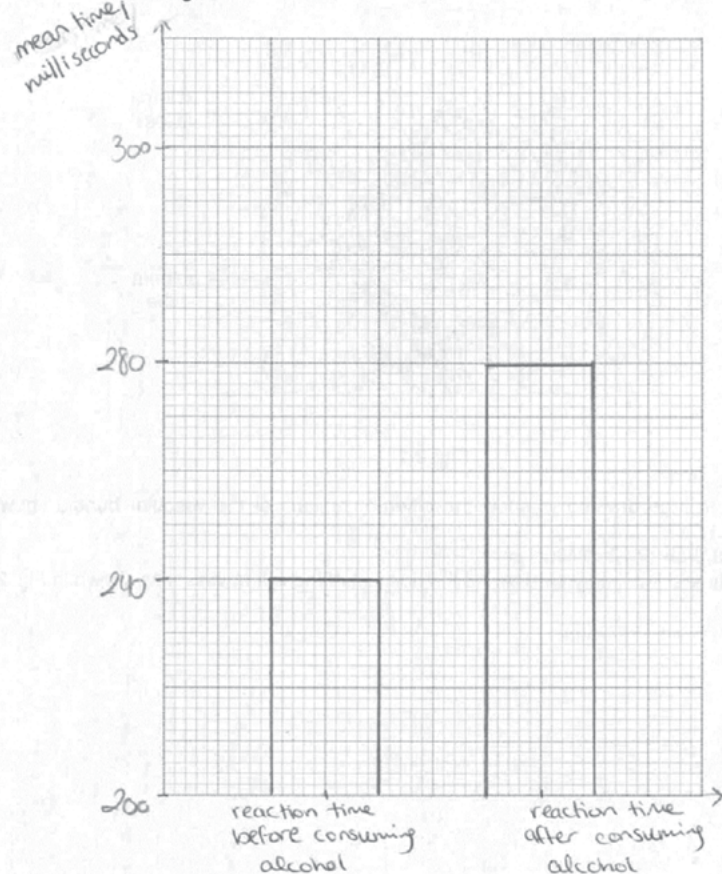
1(f)(i)

1(f)(ii)

1(f)(iii)

Q1	Mark scheme
(d)(iii)	size/mass/volume/of the slices or type/age of potato, may not be equal ; surface area is different/quantity of available catalase is different/AW ; 2 marks
(d)(iv)	use exactly the same procedure/do the same/repeat/AW/or description of original method; I use boiled potato/boiled catalase/repeat without potato/ use water instead of hydrogen peroxide/use liver or yeast/ use glass beads except soak potato in water (and not ethanol)/use 0% alcohol/without alcohol/use untreated potato/AW; 2 marks
(d)(v)	same or greater number of bubbles than 2% alcohol/B/ figures quoted (11–18) (mean of 14.5+)/more bubbles as more gas produced/most number of bubbles; 1 mark
(e)	keep away from flames/heat source ; wear goggles/safety glasses: A use a water bath when heating ethanol wear gloves; wear lab coat; use tongs/AW; 1 mark
(f)(i)	280; 1 mark
(f)(ii)	A axes labelled even scale; y-axis: (mean) reaction time/ms x-axis: before drinking alcohol and after drinking alcohol/ before and after/r key given x-axis labels approximately under each bar P both plots accurate $\pm \frac{1}{2}$ small square ; C columns not touching R superimposed columns of same width columns at least half the grid on y-axis; 3 marks
(f)(iii)	220–350 (milliseconds) ; 1 mark

(ii) Plot a bar chart to show the mean reaction time of the people tested before and after consuming alcohol.



(iii) The range of reaction times recorded before consuming alcohol is 180–310 milliseconds.

Use Table 1.2 to identify the range of reaction times recorded after consuming alcohol.

220–350 milliseconds [1]

[Total: 27]

Your Mark

1(d)(iii)

1(d)(iv)

1(d)(v)

1(e)

1(f)(i)

1(f)(ii)

1(f)(iii)

Q1	Mark scheme
(d)(iii)	size/mass/volume/of the slices or type/age of potato, may not be equal ; surface area is different/quantity of available catalase is different/AW ; 2 marks
(d)(iv)	use exactly the same procedure/do the same/repeat/AW/or description of original method; I use boiled potato/boiled catalase/repeat without potato/use water instead of hydrogen peroxide/use liver or yeast/use glass beads except soak potato in water (and not ethanol)/use 0% alcohol/without alcohol/use untreated potato/AW; 2 marks
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(e)	keep away from flames/heat source ; wear goggles/safety glasses: A use a water bath when heating ethanol wear gloves; wear lab coat; use tongs/AW; 1 mark
(f)(i)	280; 1 mark
(f)(ii)	A axes labelled even scale; y-axis: (mean) reaction time/ms x-axis: before drinking alcohol and after drinking alcohol/ before and after/r key given x-axis labels approximately under each bar P both plots accurate $\pm \frac{1}{2}$ small square ; C columns not touching R superimposed columns of same width columns at least half the grid on y-axis; 3 marks
(f)(iii)	220–350 (milliseconds) ; 1 mark

- 1 Metabolic reactions in cells produce toxic chemicals which can be converted to harmless or less toxic chemicals.

Hydrogen peroxide is broken down using the enzyme catalase which is found in most cells.

Fig. 1.1 shows this reaction.

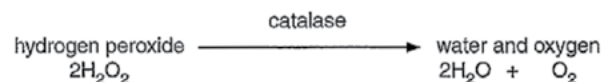


Fig. 1.1

A student investigated the effect of alcohol (ethanol) on the activity of catalase found in potato, using three pieces of potato cut to the same size.

Fig. 1.2 shows these pieces of potato.

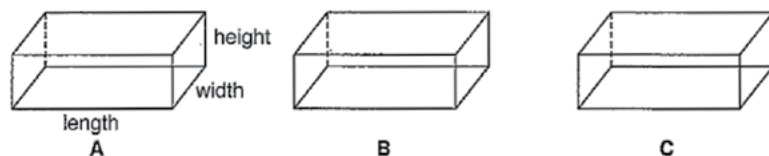


Fig. 1.2

- (a) (i) Measure the length, width and height of one of these pieces of potato.

Record your results in Table 1.1.

Table 1.1

length of potato piece /mm	width of potato piece /mm	height of potato piece /mm
3mm	1mm	1mm

[1]

- Step 1 The student labelled six test-tubes, 1, 2, 3, 4, 5, and 6 and used a syringe to add 10 cm³ of hydrogen peroxide solution to each of the test-tubes.
- Step 2 They cut potato piece A to obtain two slices of similar size.
- Step 3 The student placed the free end of a delivery tube into a large test-tube containing water.
- Step 4 They placed one of the slices of potato piece A into the hydrogen peroxide solution in test-tube 1.
- Step 5 The student immediately placed the rubber bung attached to the delivery tube into test-tube 1 and pushed it in as tightly as possible, as shown in Fig. 1.3.

Your Mark

1(a)(i)

1(a)(ii)

1(b)(i)

1(b)(ii)

Q1	Mark scheme
(a)(i)	length: 30 (mm) width: 10 (mm) height: 10 (mm) ; 1 mark
(a)(ii)	1 table drawn with rows or columns ; 1 graphs 2 table drawn with cells for at least 6 bubble readings and 3 means; 3 appropriate column headings with units R if units given in cells instead of header (number of) bubbles per (or in) 3 minutes/min or (number of) bubbles/minute or min potato/piece of potato/piece/tube slice/stick and 1 or 2 mean/average (number of bubbles per 3 min (or per 1 min) ; 4 correct tally results recorded ; 5 correct mean/average calculated for each potato piece ; 5 marks
(b)(i)	prevents leakage of oxygen/all oxygen collected; A gas/air/bubbles can observe reaction/bubbles as soon as it starts/AW; I no air/oxygen can enter tube I "quicker" unqualified for mp 2 1 mark
(b)(ii)	prevents leakage of oxygen/all oxygen collected ; A gas/air/bubbles I loose bung could come out/no gas from outside enters the tube I fair test comments increases accuracy/results will be comparable/consistent/reliable/valid; allow a pressure to build up/bubbles to form; 2 marks

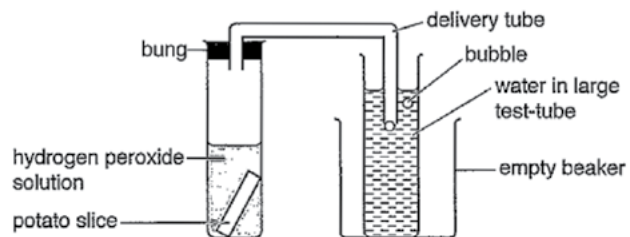


Fig. 1.3

Step 6 They counted the number of bubbles released from the delivery tube in 3 minutes.

Step 7 The student repeated steps 4–6 for the second slice of potato piece A using test-tube 2.

Step 8 They repeated steps 2–7 for potato piece B using test-tubes 3 and 4.

Step 9 They repeated steps 2–7 for potato piece C using test-tubes 5 and 6.

The student used a tally to count the number of bubbles.

Fig. 1.4 shows their tally count.

A1		A2	
B1		B2	
C1		C2	

Fig. 1.4

Your Mark

1(a)(i)

1(a)(ii)

1(b)(i)

1(b)(ii)

Q1	Mark scheme
(a)(i)	length: 30 (mm) width: 10 (mm) height: 10 (mm) ; 1 mark
(a)(ii)	1 table drawn with rows or columns ; I graphs 2 table drawn with cells for at least 6 bubble readings and 3 means; 3 appropriate column headings with units R if units given in cells instead of header (number of) bubbles per (or in) 3 minutes/min or (number of) bubbles/minute or min potato/piece of potato/piece/tube slice/stick and 1 or 2 mean/average (number of bubbles per 3 min (or per 1 min) ; 4 correct tally results recorded ; 5 correct mean/average calculated for each potato piece ; 5 marks
(b)(i)	prevents leakage of oxygen/all oxygen collected; A gas/air/bubbles can observe reaction/bubbles as soon as it starts/AW; I no air/oxygen can enter tube I "quicker" unqualified for mp 2 1 mark
(b)(ii)	prevents leakage of oxygen/all oxygen collected ; A gas/air/bubbles I loose bung could come out/no gas from outside enters the tube I fair test comments increases accuracy/results will be comparable/consistent/reliable/valid; allow a pressure to build up/bubbles to form; 2 marks

(ii) Prepare a table to record the student's results.
Your table should show:

- the numbers of bubbles produced by each slice of potato in 3 minutes
- the mean number of bubbles produced by each of potato piece A, B and C.

Complete your table using the results from Fig. 1.4.

	Number of bubbles Produced by each slice of potato in 3mins	the mean # of bubbles produced by each of potato piece
A ₁	6	4
B ₁	18	14.5
C ₁	12	11
A ₂	3	
B ₂	11	
C ₂	10	
		[5]

(b) (i) Suggest why the free end of the delivery tube was placed in the water before adding the potato slice to the hydrogen peroxide solution and connecting the test-tube to the bung of the delivery tube.

So no reaction happens without the delivery tube and connecting the test-tube to the bung being there [1]

(ii) Explain why the bung of the delivery tube must fit tightly into the test-tube.

① So nothing can escape
② So results are accurate [2]

Your Mark

1(a)(i)

1(a)(ii)

1(b)(i)

1(b)(ii)

Q1	Mark scheme
(a)(i)	length: 30 (mm) width: 10 (mm) height: 10 (mm) ; 1 mark
(a)(ii)	1 table drawn with rows or columns ; 1 graphs 2 table drawn with cells for at least 6 bubble readings and 3 means; 3 appropriate column headings with units R if units given in cells instead of header (number of) bubbles per (or in) 3 minutes/min or (number of) bubbles/minute or min potato/piece of potato/piece/tube slice/stick and 1 or 2 mean/average (number of bubbles per 3 min (or per 1 min) ; 4 correct tally results recorded ; 5 correct mean/average calculated for each potato piece ; 5 marks
(b)(i)	prevents leakage of oxygen/all oxygen collected; A gas/air/bubbles can observe reaction/bubbles as soon as it starts/AW; I no air/oxygen can enter tube I "quicker" unqualified for mp 2 1 mark
(b)(ii)	prevents leakage of oxygen/all oxygen collected ; A gas/air/bubbles I loose bung could come out/no gas from outside enters the tube I fair test comments increases accuracy/results will be comparable/consistent/reliable/valid; allow a pressure to build up/bubbles to form; 2 marks

(c) The pieces of potato that the student used in their investigation were soaked in different concentrations of alcohol for 24 hours.

- Potato piece A was soaked in 20% alcohol.
- Potato piece B was soaked in 2% alcohol.
- Potato piece C was soaked in 10% alcohol.

(i) Suggest the relationship between the number of bubbles and the activity of catalase.
they aren't the same
.....[1]

(ii) Compare the activity of catalase in the potato pieces A, B and C.
they are all different
.....[1]

(iii) Predict the number of bubbles that would be produced in 3 minutes if a piece of potato was soaked in 50% alcohol before being placed in hydrogen peroxide solution.
25
.....[1]

(d) (i) State **one** variable that has been controlled in the student's investigation.
Describe how this variable was controlled.
variable potato slice
how it was controlled in each test tube the same size of potato slice
.....[2]

(ii) The method of measuring the oxygen gas produced is a source of error.
State **one** reason why this method is a source of error. oxygen
Because it can be more or less in each test tube
.....
Suggest how to improve the method to minimise this error.
Use the same tube
.....[2]

Your Mark

1(c)(i)

1(c)(ii)

1(c)(iii)

1(d)(i)

1(d)(ii)

Q1	Mark scheme	
(d)(i)	variable must match control given	
	<i>variable</i>	<i>controlled by</i>
	hydrogen peroxide (volume/ concentration).	measured 10 cm ³ or used same strength solution;
	Potato (size/length/ volume/surface area/ type of potato sample of potato);	same dimensions used for each piece//30 mm × 5 mm × 10 mm or pieces cut from same potato/type of potato;
	time for measuring bubbles ;	counted for 3 min for each piece
(d)(ii)	time of soaking in alcohol;	same time/24 hours for each piece;
	2 marks	
	method must match the error. 1 mark for error, 1 mark for method.	
	<i>source of error</i>	<i>method of reducing error</i>
	bubbles are all different sizes;	measure the volume use a gas syringe/collect in a measuring cylinder/AVP;
1(d)(i)	bubbles difficult to count ;	use a (tally) counter/ method of collecting the gas/measure the volume/ use 2 people/repeat for reliability/AW;
	setting up and starting time;	use 2 people;
	2 marks	

- (f) In an investigation into the effects of alcohol on the nervous system, people were asked to carry out a test on their reaction time.

The person being tested looked at a coloured block on a computer screen.
As soon as the colour changed they pressed a button.
The time taken to press the button was recorded by the computer.
This was their reaction time.

Twenty people were tested before and after consuming a drink containing the same concentration of alcohol.

Table 1.2 shows the results of this investigation.

Table 1.2

test person	reaction time <u>before</u> consuming alcohol /milliseconds	reaction time after consuming alcohol /milliseconds
1	272	322
2	310	350
3	225	270
4	243	290
5	240	308
6	264	315
7	201	238
8	262	300
9	225	252
10	235	278
11	225	253
12	247	271
13	226	266
14	194	220
15	206	239
16	309	340
17	223	261
18	243	286
19	270	316
20	180	225
mean	240	280

- (i) Calculate the mean for the reaction time after consuming alcohol.

Write your answer in Table 1.2.

[1]

Your Mark

1(d)(iii)

1(d)(iv)

1(d)(v)

1(e)

1(f)(i)

1(f)(ii)

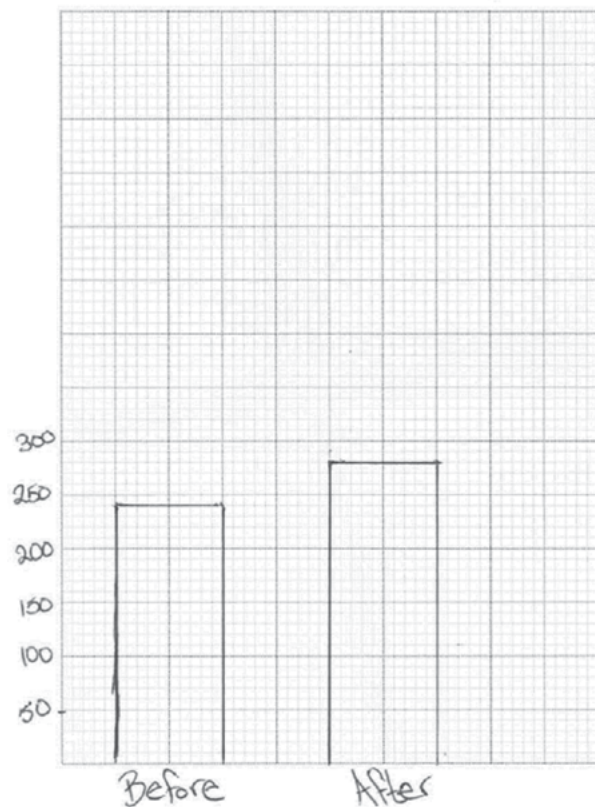
1(f)(iii)

Q1 Mark scheme

(d)(iii)	size/mass/volume/of the slices or type/age of potato, may not be equal ; surface area is different/quantity of available catalase is different/AW ; 2 marks
(d)(iv)	use exactly the same procedure/do the same/repeat/AW/or description of original method; I use boiled potato/boiled catalase/repeat without potato/use water instead of hydrogen peroxide/use liver or yeast/use glass beads except soak potato in water (and not ethanol)/use 0% alcohol/without alcohol/use untreated potato/AW; 2 marks
(d)(v)	same or greater number of bubbles than 2% alcohol/B/figures quoted (11–18) (mean of 14.5+)/more bubbles as more gas produced/most number of bubbles; 1 mark
(e)	keep away from flames/heat source ; wear goggles/safety glasses: A use a water bath when heating ethanol wear gloves; wear lab coat; use tongs/AW; 1 mark
(f)(i)	280; 1 mark
(f)(ii)	A axes labelled even scale; y-axis: (mean) reaction time/ms x-axis: before drinking alcohol and after drinking alcohol/ before and after/r key given x-axis labels approximately under each bar P both plots accurate $\pm \frac{1}{2}$ small square ; C columns not touching R superimposed columns of same width columns at least half the grid on y-axis; 3 marks
(f)(iii)	220–350 (milliseconds) ; 1 mark

777

- (ii) Plot a bar chart to show the mean reaction time of the people tested before and after consuming alcohol.



[3]

- (iii) The range of reaction times recorded before consuming alcohol is 180–310 milliseconds.

Use Table 1.2 to identify the range of reaction times recorded after consuming alcohol.

404.5 milliseconds [1]

[Total: 27]

Your Mark

1(d)(iii)

1(d)(iv)

1(d)(v)

1(e)

1(f)(i)

1(f)(ii)

1(f)(iii)

Q1	Mark scheme
(d)(iii)	size/mass/volume/of the slices or type/age of potato, may not be equal ; surface area is different/quantity of available catalase is different/AW ; 2 marks
(d)(iv)	use exactly the same procedure/do the same/repeat/AW/or description of original method; I use boiled potato/boiled catalase/repeat without potato/use water instead of hydrogen peroxide/use liver or yeast/use glass beads except soak potato in water (and not ethanol)/use 0% alcohol/without alcohol/use untreated potato/AW; 2 marks
(d)(v)	same or greater number of bubbles than 2% alcohol/B/figures quoted (11–18) (mean of 14.5+)/more bubbles as more gas produced/most number of bubbles; 1 mark
(e)	keep away from flames/heat source ; wear goggles/safety glasses: A use a water bath when heating ethanol wear gloves; wear lab coat; use tongs/AW; 1 mark
(f)(i)	280; 1 mark
(f)(ii)	A axes labelled even scale; y-axis: (mean) reaction time/ms x-axis: before drinking alcohol and after drinking alcohol/ before and after/r key given x-axis labels approximately under each bar P both plots accurate $\pm \frac{1}{2}$ small square ; C columns not touching R superimposed columns of same width columns at least half the grid on y-axis; 3 marks
(f)(iii)	220–350 (milliseconds) ; 1 mark

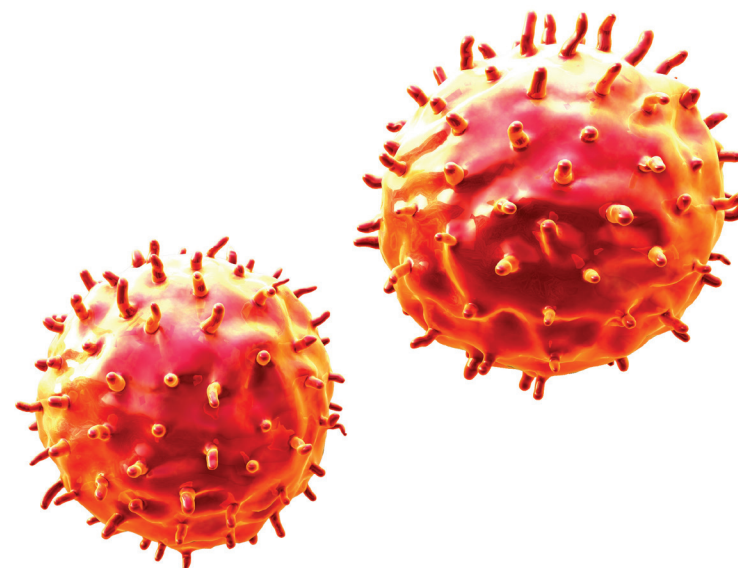
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Interactive Example Candidate Responses

Paper 6 (May / June 2016), Question 2

Cambridge IGCSE™
Biology 0610



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- 2 Fig. 2.1 is a photograph of a cross-section of a vascular bundle in a leaf. Line AB shows the length of the vascular bundle.

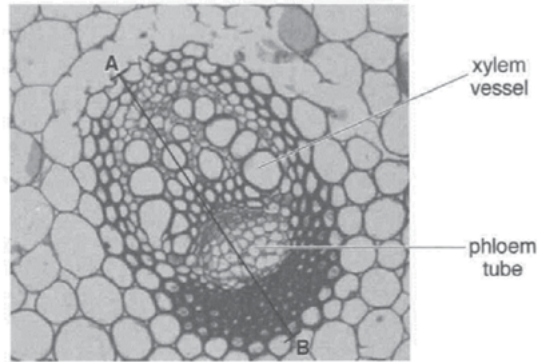
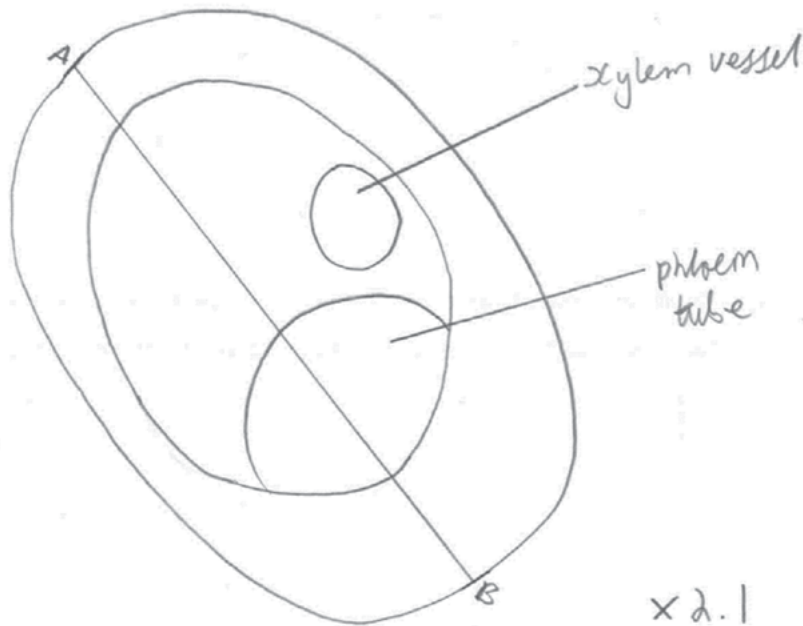


Fig. 2.1

- (a) (i) Make a large drawing to show the different regions of the vascular bundle shown in Fig. 2.1.
Do **not** draw any individual cells.
Identify and label on your drawing the position of the xylem vessel as shown in Fig. 2.1.



[5]

Your Mark

2(a)(i)

2(a)(ii)

2(a)(iii)

2(b)

Q2	Mark scheme
(a)(i)	Outlines – all lines single, clear and unbroken ; Size – occupies at least half of the space provided ; Detail – oval shape + phloem + 1 other area ; two other areas shown ; Label – line to correct area on drawing to show position of xylem (vessel) and line labelled "xylem" 5 marks
(a)(ii)	measurement of AB = 58 mm; ± 1 mm A cm/µm I other units line on their drawing and length measured with correct unit ; ± 1 mm R if no line drawn or position not indicated/line in incorrect Position correct magnification calculation; R if units given ecf if measurement(s) above are incorrect 3 marks
(a)(iii)	(xylem) walls thick(er)/large (er)/wide(er); (xylem vessels) round(er) ; (xylem) has large(r) cross section area/big(ger) ; 1 mark
(b)	1 use of any suitable plant material; 2 put stem/material chosen in (red) dye/add dye to cut (stem) surface; I stain it red 3 time for absorption of dye; 4 cut (sections) of stem or material chosen; 5 (red stained xylem) will indicate position of vascular bundle; I xylem alone 4 marks

(ii) Measure the length of line **AB** as shown on Fig. 2.1. **Include the unit.**

Length of **AB**5.8mm.....

Mark on your drawing a line in the same position as **AB**.

Measure the line you have drawn.

Length of line on drawing12.1mm.....

$$\text{magnification} = \frac{\text{length of line on drawing}}{\text{length of AB}}$$

Calculate the magnification of your drawing using the information above and your answers.

Show your working: $\text{magnification} = \frac{\text{length line on drawing}}{\text{length of AB}}$

$$M = \frac{12.1}{5.8}$$

$$M = 2.086 \text{ magnification} \times 2.1$$

[3]

(iii) State **one** way **visible** in Fig. 2.1 in which the xylem vessel is different from the phloem tube.

The phloem tube is made up of lots of cells whereas the xylem vessel is hollow.

.....[1]

(b) The walls of xylem vessels are supported by a chemical called lignin, which can be stained by a red dye. This makes the xylem vessel walls easily seen when using a microscope.

Use this information to plan how you could find the position of the vascular bundles in a stem.

you could cut ^{out} a cross-section of a stem and place it on a white tile so the ~~back~~ ^{other} side can easily be seen. you could take 5 pieces of samples (cross sections) of the stem and cut them all the same size depth of 10mm. you could then add 5 drops of the dye to each cross section of the stem, which would highlight the xylem vessel. Then you could measure the distance ~~of the~~ ^{from the xylem vessel} on a microscope and compare it with the actual piece, to locate the outline of the vascular bundle in each sample. ^{using light}

Sample allows for errors in the measuring, as the vascular bundle may be in a different place in each case.

[Total: 13]

Your Mark

2(a)(i)

2(a)(ii)

2(a)(iii)

2(b)

Q2	Mark scheme
(a)(i)	Outlines – all lines single, clear and unbroken ; Size – occupies at least half of the space provided ; Detail – oval shape + phloem + 1 other area ; two other areas shown ; Label – line to correct area on drawing to show position of xylem (vessel) and line labelled “xylem” 5 marks
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(a)(iii)	(xylem) walls thick(er)/large (er)/wide(er); (xylem vessels) round(er) ; (xylem) has large(r) cross section area/big(ger) ; 1 mark
(b)	1 use of any suitable plant material; 2 put stem/material chosen in (red) dye/add dye to cut (stem) surface; I stain it red 3 time for absorption of dye; 4 cut (sections) of stem or material chosen; 5 (red stained xylem) will indicate position of vascular bundle; I xylem alone 4 marks

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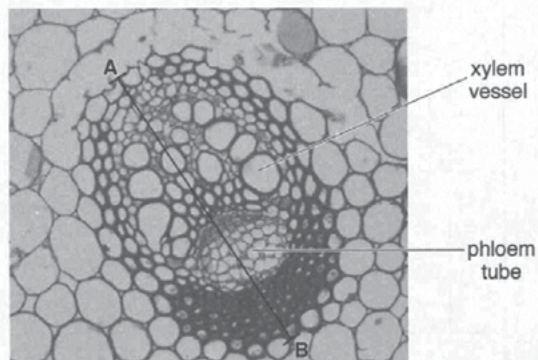
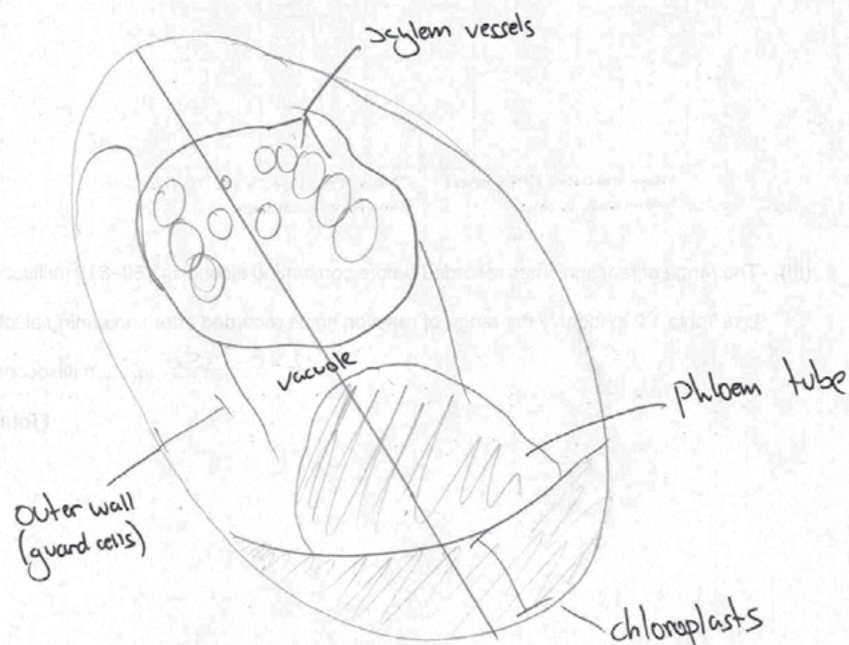


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Do **not** draw any individual cells.
Identify and label on your drawing the position of the xylem vessel as shown in Fig. 2.1.



[5]

Your Mark

2(a)(i)

2(a)(ii)

2(a)(iii)

2(b)

Q2	Mark scheme
(a)(i)	Outlines – all lines single, clear and unbroken ; Size – occupies at least half of the space provided ; Detail – oval shape + phloem + 1 other area ; two other areas shown ; Label – line to correct area on drawing to show position of xylem (vessel) and line labelled “xylem” 5 marks
(a)(ii)	measurement of AB = 58 mm; ± 1 mm A cm/μm I other units line on their drawing and length measured with correct unit ; ± 1 mm R if no line drawn or position not indicated/line in incorrect Position correct magnification calculation; R if units given ecf if measurement(s) above are incorrect 3 marks
(a)(iii)	(xylem) walls thick(er)/large (er)/wide(er); (xylem vessels) round(er) ; (xylem) has large(r) cross section area/big(ger) ; 1 mark
(b)	1 use of any suitable plant material; 2 put stem/material chosen in (red) dye/add dye to cut (stem) surface; I stain it red 3 time for absorption of dye; 4 cut (sections) of stem or material chosen; 5 (red stained xylem) will indicate position of vascular bundle; I xylem alone 4 marks

(ii) Measure the length of line **AB** as shown on Fig. 2.1. Include the unit.

Length of **AB**59mm.....

Mark on your drawing a line in the same position as **AB**.

Measure the line you have drawn.

Length of line on drawing140mm.....

$$\text{magnification} = \frac{\text{length of line on drawing}}{\text{length of AB}}$$

Calculate the magnification of your drawing using the information above and your answers.

Show your working.

$$\frac{140}{59} = 2.37$$

magnificationx 2.37.....
[3]

(iii) State **one** way **visible** in Fig. 2.1 in which the xylem vessel is different from the phloem tube.

The xylem vessels are much wider.
.....
.....
.....[1]

(b) The walls of xylem vessels are supported by a chemical called lignin, which can be stained by a red dye. This makes the xylem vessel walls easily seen when using a microscope.

Use this information to plan how you could find the position of the vascular bundles in a stem.

Use the dye to enter the xylem vessels. Disect the stem.
In order to find the vascular bundle, look for a large area
that is dyed red. This is your bundle.
.....
.....
.....
.....[4]

[Total: 13]

Your Mark

2(a)(i)

2(a)(ii)

2(a)(iii)

2(b)

Q2	Mark scheme
(a)(i)	Outlines – all lines single, clear and unbroken ; Size – occupies at least half of the space provided ; Detail – oval shape + phloem + 1 other area ; two other areas shown ; Label – line to correct area on drawing to show position of xylem (vessel) and line labelled “xylem” 5 marks
(a)(ii)	measurement of AB = 58 mm; ± 1 mm A cm/µm I other units line on their drawing and length measured with correct unit ; ± 1 mm R if no line drawn or position not indicated/line in incorrect Position correct magnification calculation; R if units given ecf if measurement(s) above are incorrect 3 marks
(a)(iii)	(xylem) walls thick(er)/large (er)/wide(er); (xylem vessels) round(er) ; (xylem) has large(r) cross section area/big(ger) ; 1 mark
(b)	1 use of any suitable plant material; 2 put stem/material chosen in (red) dye/add dye to cut (stem) surface; I stain it red 3 time for absorption of dye; 4 cut (sections) of stem or material chosen; 5 (red stained xylem) will indicate position of vascular bundle; I xylem alone 4 marks

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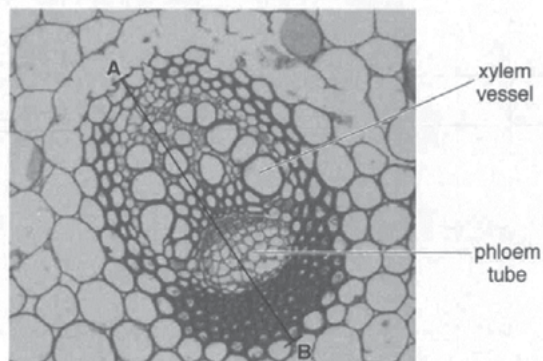
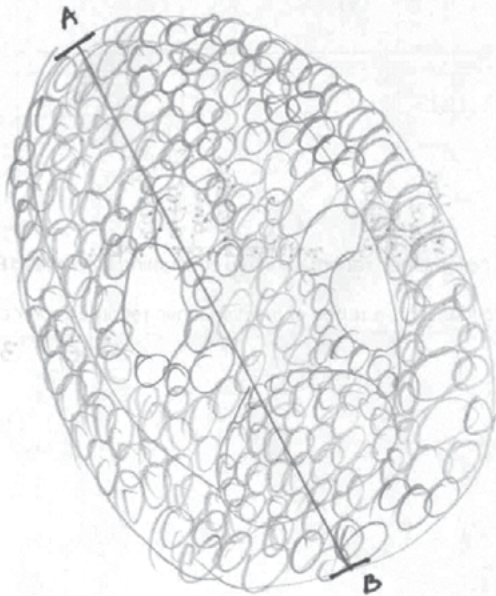


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- (a) (i) Make a large drawing to show the different regions of the vascular bundle shown in Fig. 2.1.
Do **not** draw any individual cells.
Identify and label on your drawing the position of the xylem vessel as shown in Fig. 2.1.



[5]

Your Mark

2(a)(i)

2(a)(ii)

2(a)(iii)

2(b)

Q2	Mark scheme
(a)(i)	Outlines – all lines single, clear and unbroken ; Size – occupies at least half of the space provided ; Detail – oval shape + phloem + 1 other area ; two other areas shown ; Label – line to correct area on drawing to show position of xylem (vessel) and line labelled “xylem” 5 marks
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(b)	1 use of any suitable plant material; 2 put stem/material chosen in (red) dye/add dye to cut (stem) surface; I stain it red 3 time for absorption of dye; 4 cut (sections) of stem or material chosen; 5 (red stained xylem) will indicate position of vascular bundle; I xylem alone 4 marks

(ii) Measure the length of line AB as shown on Fig. 2.1. Include the unit.

Length of AB 59 mm

1 cm = 10 mm
5.9 =

Mark on your drawing a line in the same position as AB.

Measure the line you have drawn.

Length of line on drawing 109 mm

$$\text{magnification} = \frac{\text{length of line on drawing}}{\text{length of AB}}$$

Calculate the magnification of your drawing using the information above and your answers.

Show your working.

$$\begin{array}{r} 109 \\ 59 \end{array}$$

magnification x 109/59 mm [3]

(iii) State one way visible in Fig. 2.1 in which the xylem vessel is different from the phloem tube.

Xylem vessel are bigger and wider than phloem tube.

[1]

(b) The walls of xylem vessels are supported by a chemical called lignin, which can be stained by a red dye. This makes the xylem vessel walls easily seen when using a microscope.

Use this information to plan how you could find the position of the vascular bundles in a stem.

Put few drops of lignin in the steam.

If the colour wait till it diffuse.

The part where you can Put it under the microscope.

The part which will be red in colour → Vascular bundles.

[4]

[Total: 13]

Your Mark

2(a)(i)

2(a)(ii)

2(a)(iii)

2(b)

Q2	Mark scheme
(a)(i)	Outlines – all lines single, clear and unbroken ; Size – occupies at least half of the space provided ; Detail – oval shape + phloem + 1 other area ; two other areas shown ; Label – line to correct area on drawing to show position of xylem (vessel) and line labelled “xylem” 5 marks
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(b)	1 use of any suitable plant material; 2 put stem/material chosen in (red) dye/add dye to cut (stem) surface; I stain it red 3 time for absorption of dye; 4 cut (sections) of stem or material chosen; 5 (red stained xylem) will indicate position of vascular bundle; I xylem alone 4 marks

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