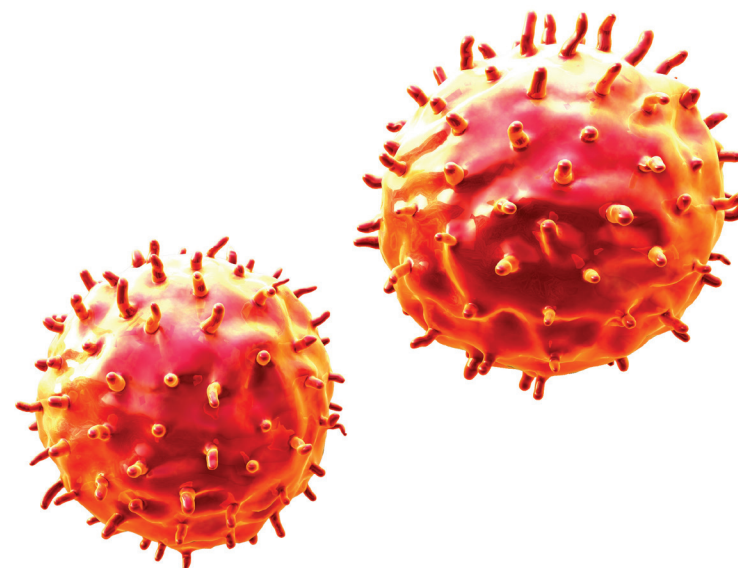


Interactive Example Candidate Responses

Paper 4 (May / June 2016), Question 1

Cambridge IGCSE™
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.

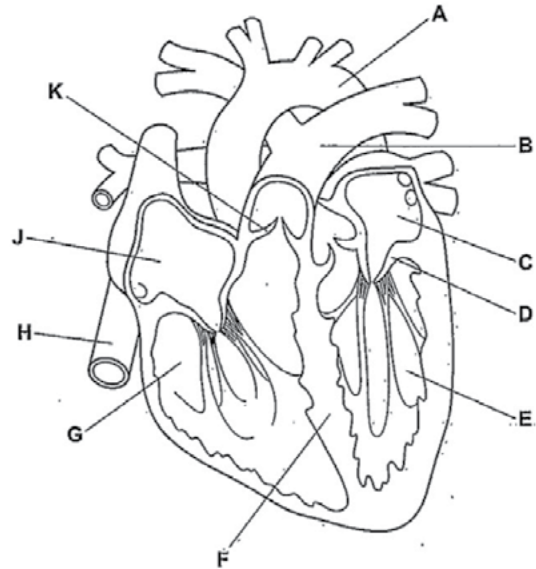


Fig. 1.1

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]

Select page

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 ;
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	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.

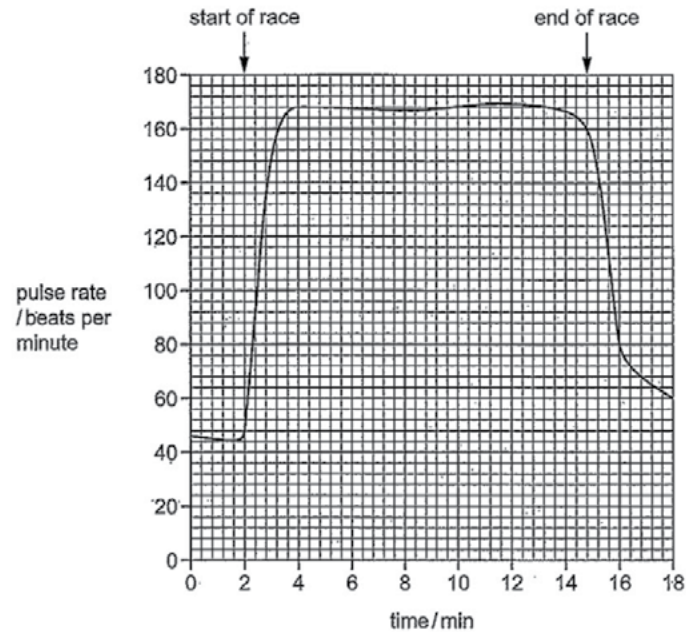


Fig. 1.2

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

- (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)	<p>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</p> <p>maximum / 164–170 bpm, at, 4 min(utes) / 2 min(utes) after race starts ;</p> <p>3 marks</p>
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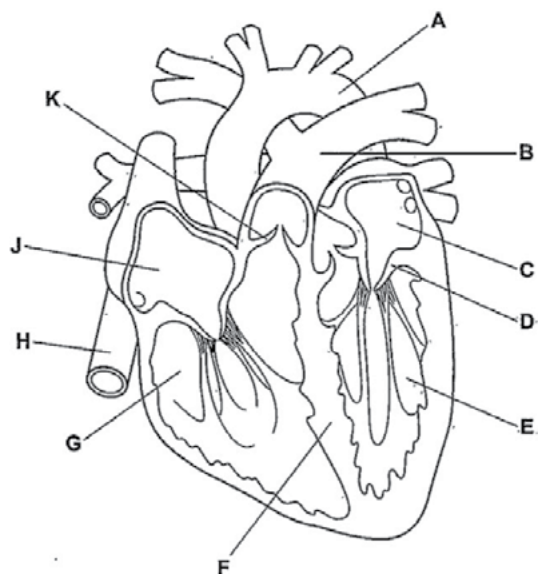


Fig. 1.1

Select
page

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 ;
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	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 & F	Left chamber
chamber of the heart that contains deoxygenated blood	G	Right chamber

[6]

Select page

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1 Mark scheme

(a)	Function	Letter on Fig 1.1	Name
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	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.

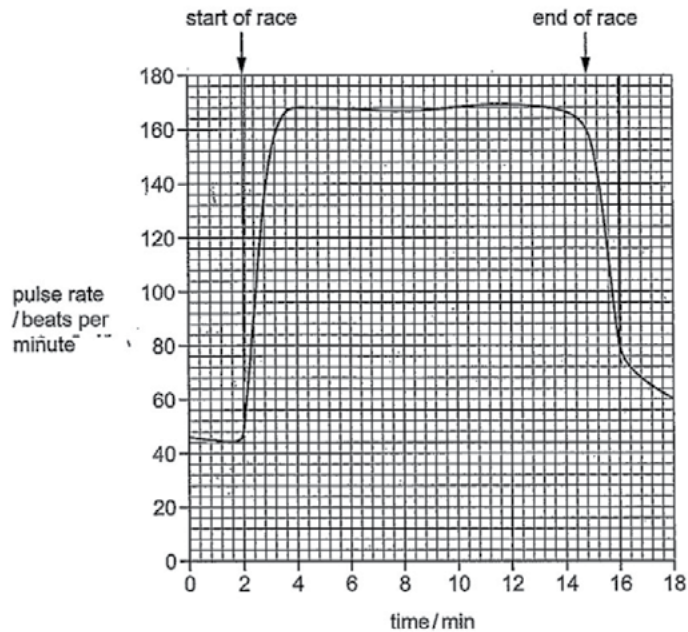


Fig. 1.2

- (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

(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.

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]

Select
page

Your
Mark

1(a)

1(b)(i)

1(b)(ii)

Q1	Mark scheme
(b)(i)	<p>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</p> <p>maximum / 164–170 bpm, at, 4 min(utes) / 2 min(utes) after race starts ;</p> <p>3 marks</p>
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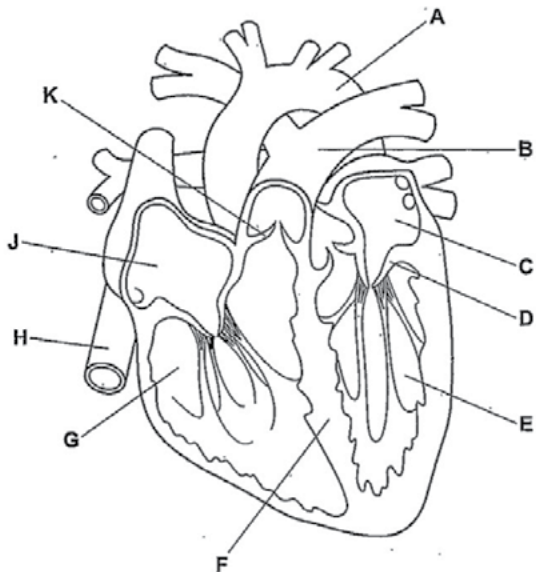


Fig. 1.1

Your
Mark

1(a)

1(b)(i)

1(b)(ii)

Q1 Mark scheme			
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	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]

Select page

Your Mark

1(a)

1(b)(i)

1(b)(ii)

Q1 Mark scheme

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6 marks

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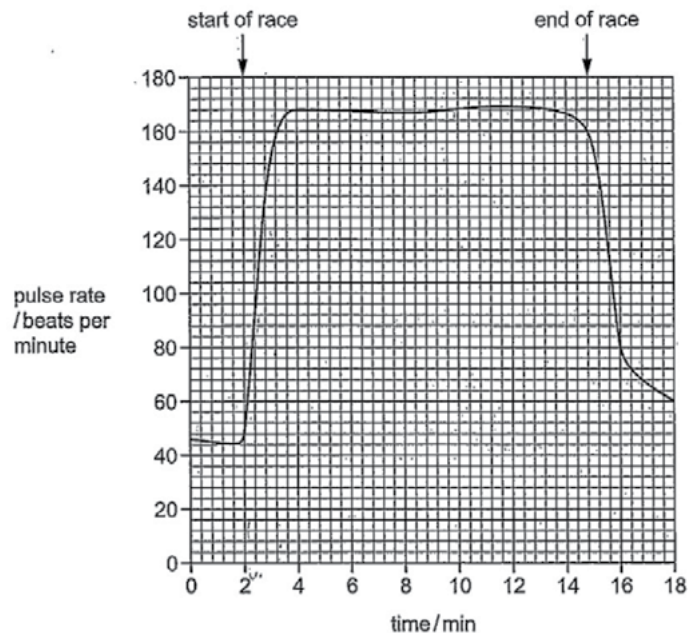


Fig. 1.2

- (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)	<p>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</p> <p>maximum / 164–170 bpm, at, 4 min(utes) / 2 min(utes) after race starts ;</p> <p>3 marks</p>
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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)	<p>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</p> <p>maximum / 164–170 bpm, at, 4 min(utes) / 2 min(utes) after race starts ;</p> <p>3 marks</p>
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