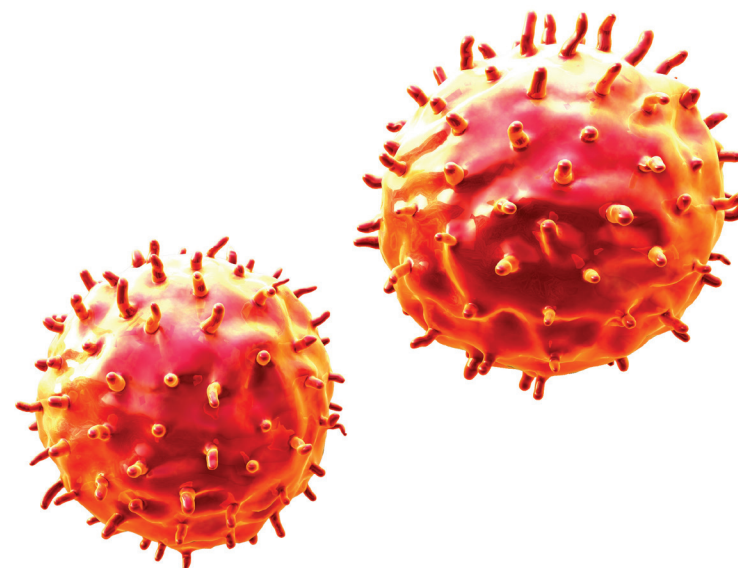


Interactive Example Candidate Responses

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.

- 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.

[2]

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

to ensure the pulse rate would reduce back down to the rate before the exercise.

[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 different pulse rates of each student
effect on results the average pulse rate may significantly drop or rise because of one student's pulse rate which may be totally different to the other students.

[2]

Your
Mark

2(a)(i)

2(a)(ii)

2(a)(iii)

2(a)(iv)

2(b)(i)

2(b)(ii)

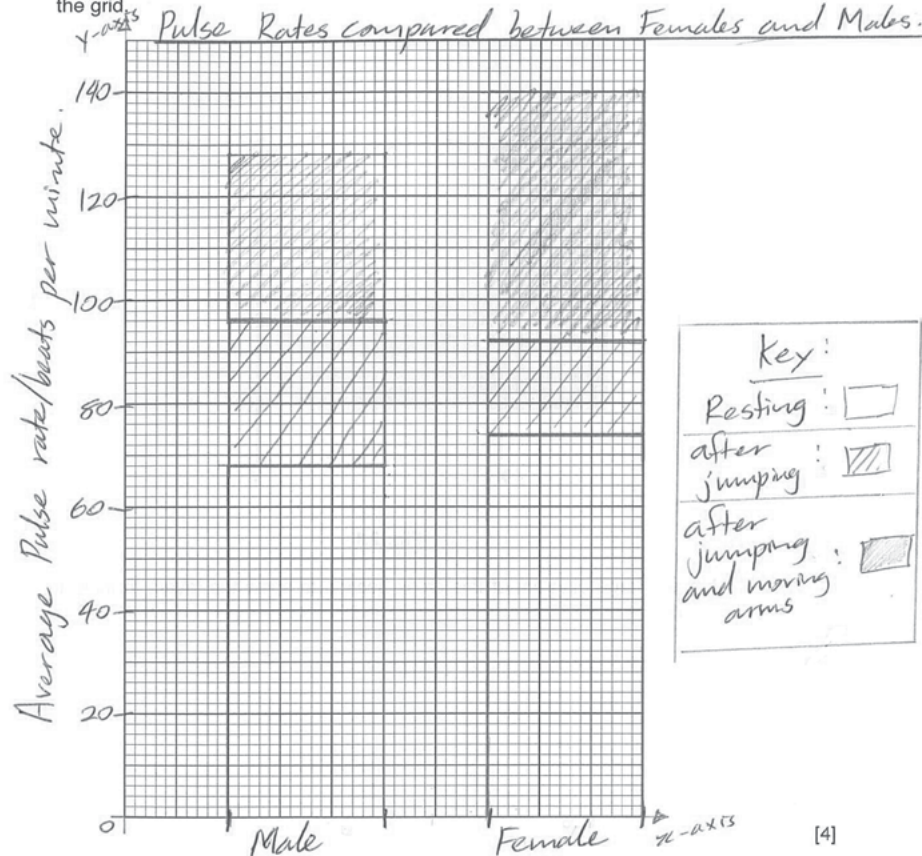
2(c)(i)

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><th>variable</th><th>effect on results</th></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 *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)	<p>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</p>
(b)(ii)	<p>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;</p> <p>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;</p> <p>2 marks</p>
(c)(i)	<p>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</p>
(c)(ii)	<p>diameter of lumen = $47 (\pm 1)$ mm; diameter of drawing = X ± 1 mm; correct magnification;</p> <p>3 marks</p>

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

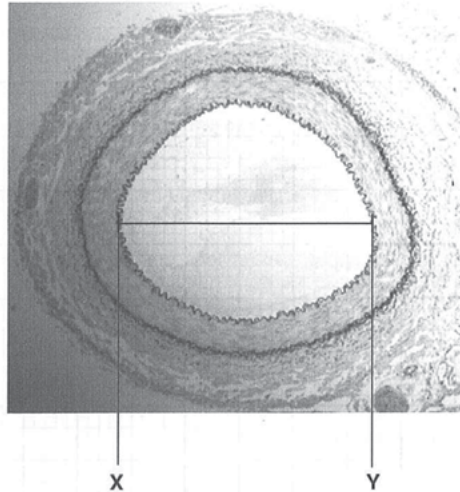
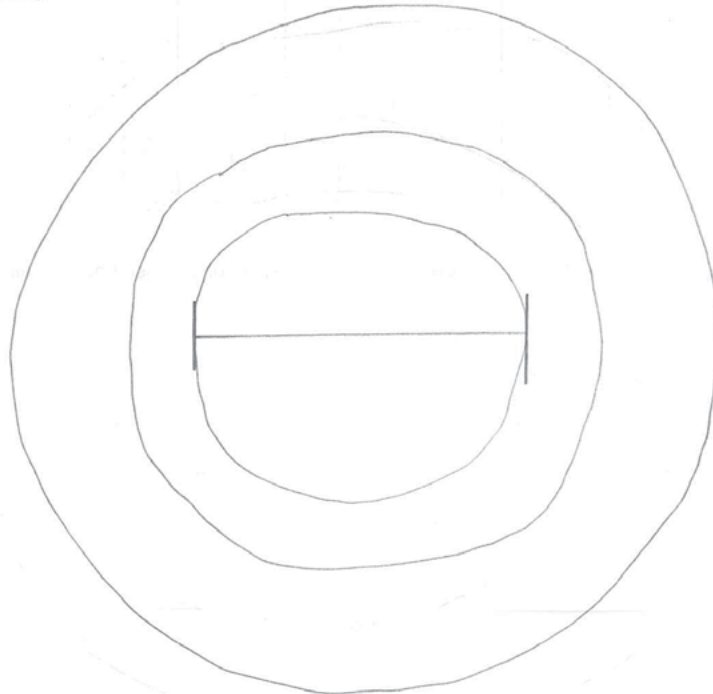


Fig. 2.1

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



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)	<p>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</p>
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- (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

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

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

Show your working.

$$\begin{aligned} \text{Mgn} &= \frac{\text{Drawing}}{\text{Actual}} \\ &= \frac{62\text{mm}}{47\text{mm}} = 1.319148936 \end{aligned}$$

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)	<p>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</p>
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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.

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

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	male students	female students	all students
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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)

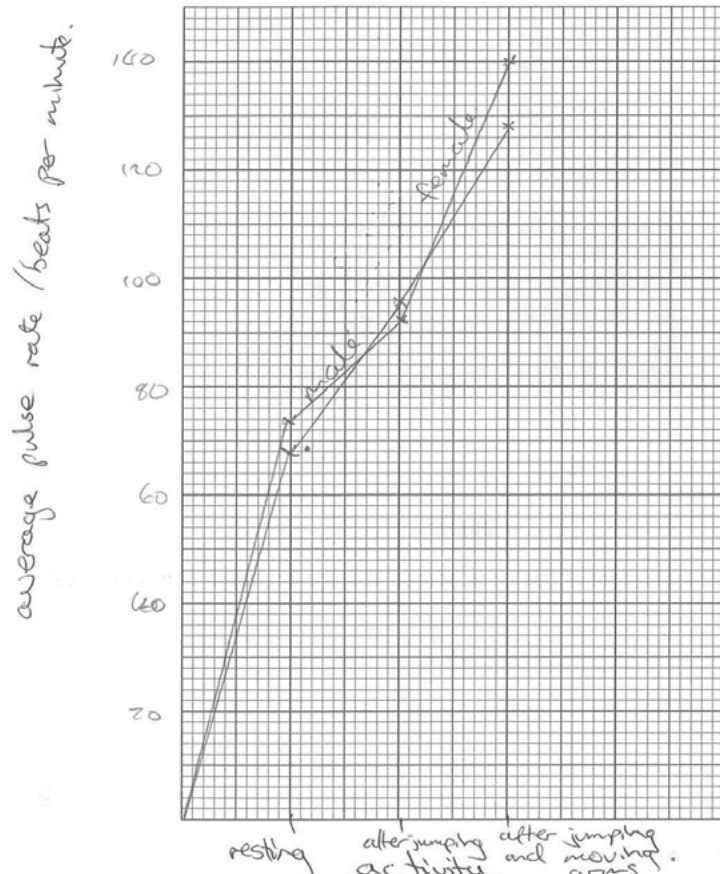
2(c)(i)

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						
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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.



[4]

- (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

.....

[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

(b)(i)	<p>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</p>
(b)(ii)	<p>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;</p> <p>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;</p> <p>2 marks</p>
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(c) Fig. 2.1 shows a photomicrograph of a cross section of an artery from a mammal.

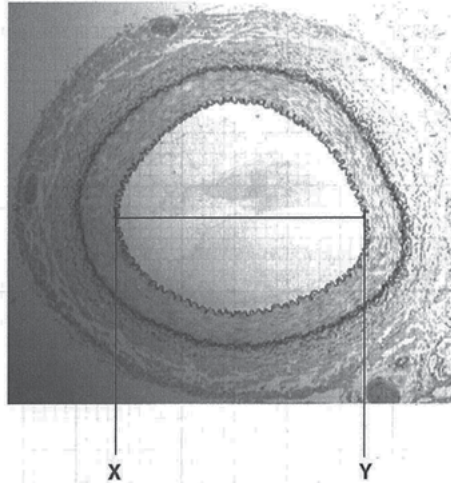
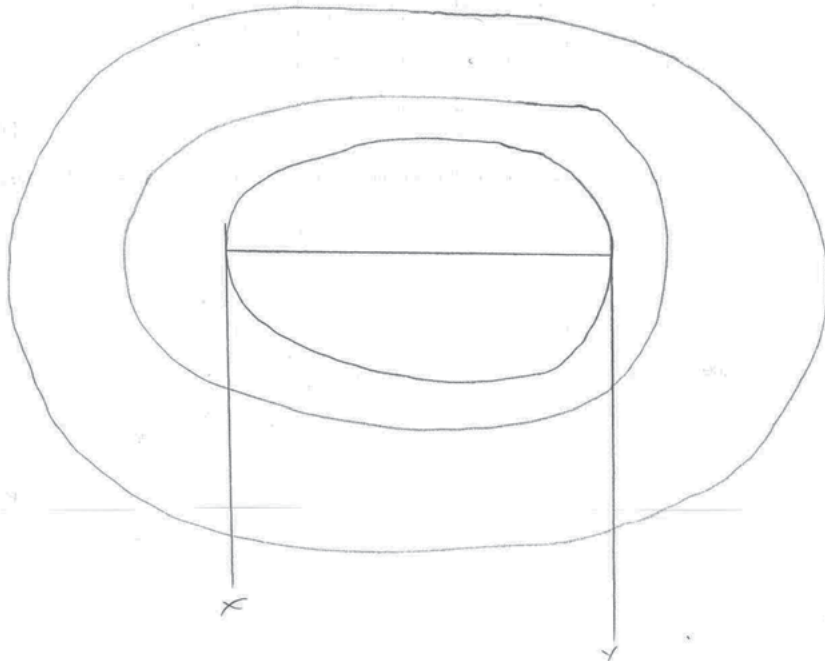


Fig. 2.1

(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)	<p>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</p>
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- (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

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

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 \times 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)	<p>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</p>
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	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)

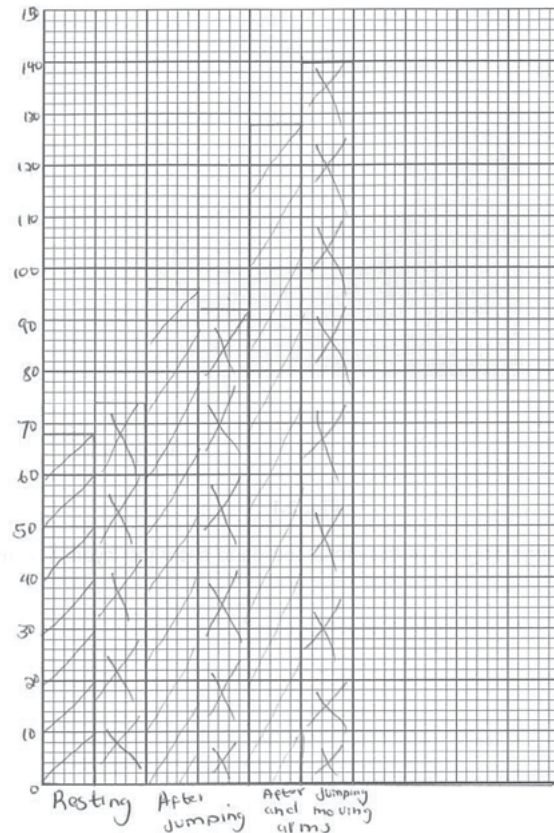
2(b)(ii)

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						
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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.



male student
 Female student

[4]

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

similarity After jumping that exercise almost has the same average pulse rate/beats per minute. There are both in the 90's. female students have 92 male students have 92
 difference Resting females rest more compared to males. Females have 74 beats per minutes while males have 68 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

(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 (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.

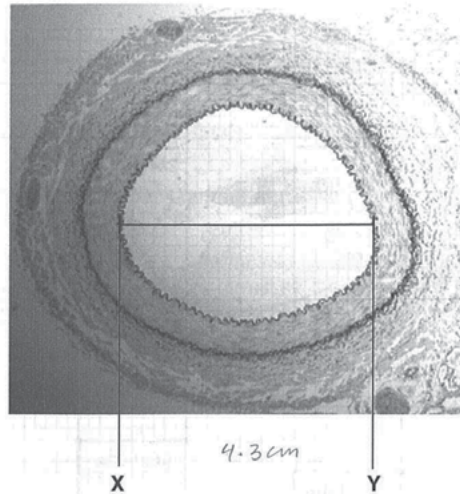
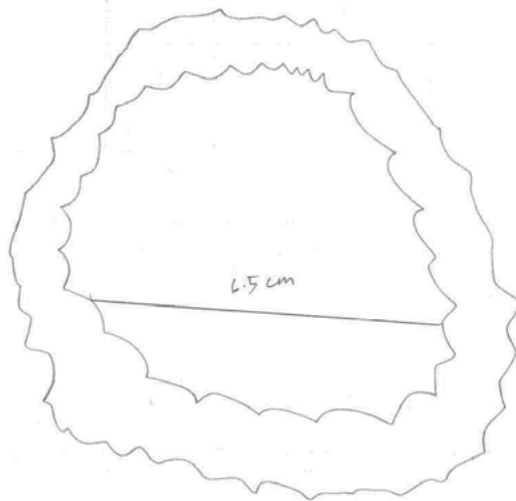


Fig. 2.1

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



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)	<p>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</p>
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(c)(ii)	<p>diameter of lumen = $47 (\pm 1)$ mm; diameter of drawing = X ± 1 mm; correct magnification;</p> <p>3 marks</p>

- (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

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

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

Show your working.

$$\text{magnification: } \frac{6.5 \text{ cm}}{4.3 \text{ cm}}$$

$$= 1.51162791 \times$$

$$\approx 1.51 \times$$

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
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