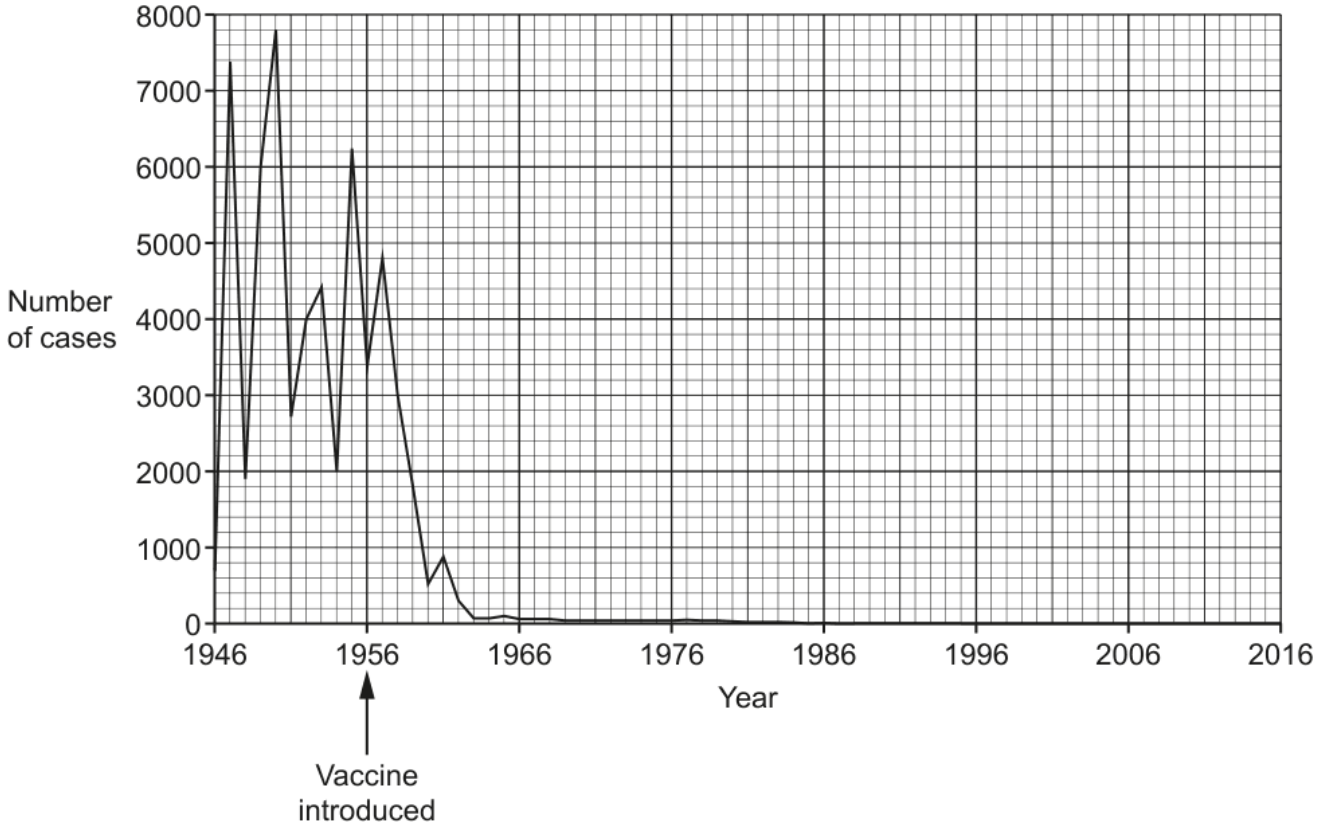
Graph Skills (M3): OCR A Level Biology Exam Questions by Topic

17 questions · 39 marks · about 47 minutes. Answer in the spaces, then check the mark schemes at the end.

Question 1 · A level Paper 2 · June 2024 · Q19(b)(i) · 2 marks

(b) The graph shows the number of cases of polio in England and Wales between 1946 and 2016.



(i) Calculate the percentage decrease in cases between 1956 and 1960.

% decrease = ... **[2]**

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Question 2 · information from earlier in the question

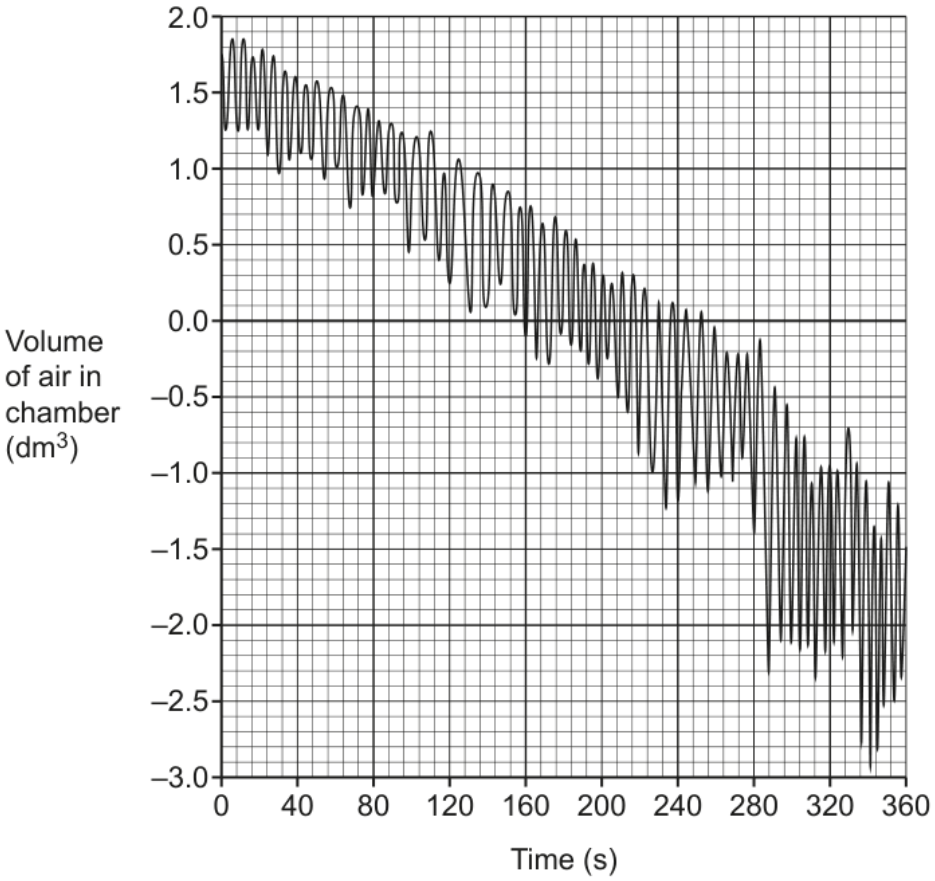
20 A student investigated ventilation and heart rate in a resting subject.

The subject breathed in and out through a spirometer.

The spirometer chamber was filled with room air. Soda lime was present to absorb carbon dioxide.

The results are shown in **Fig. 20.1**.

Fig. 20.1



(a)

(i) The downward slope of the spirometer trace in **Fig. 20.1** is due to oxygen consumption.

The subject exhales the same volume of air as they inhale.

State why the trace slopes downwards.

.....

.....

..... **[1]**

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Question 2 · A level Paper 1 · June 2024 · Q20(a)(iii) · 2 marks

(iii) Using **Fig. 20.1**, compare the breathing pattern between 0–120 s and 120–240 s.

.....

.....

.....

.....

..... **[2]**

Turn over

Question 3 · information from earlier in the question

17 Some students investigated the effect of time on the growth of bacterial populations.

The students prepared a large flask of bacterial culture.

They divided this large culture into a number of smaller flasks each containing 50 cm^3 of bacterial culture.

They then incubated the smaller flasks at 20 °C for up to 48 h.

Every 4 h the students removed one of the flasks and counted the bacteria.

The students recorded the total number of bacteria and the number of viable bacteria in each flask.

(a) When growing bacteria in culture, it is important that aseptic techniques are used.

(i) State why it is important that the technique used for culturing microorganisms be aseptic.

.....

..... **[1]**

Questions, mark schemes and examiners' report extracts © OCR.

(b) When counting the number of bacteria, the students performed serial dilutions on samples removed from each small flask. In each serial dilution, the students removed 0.1 cm^3 and added it to 9.9 cm^3 of water.

To estimate the total number of bacteria, the students used a light microscope to count the number of bacterial cells in a 0.01 cm^3 sample of the final serial dilution.

To estimate the number of viable bacteria, the students spread 0.1 cm^3 of the final serial dilution on an agar plate and counted the number of colonies that had grown after 24 h.

(i) The students shook each flask before they removed the samples for counting.

Suggest why the students shook the flasks.

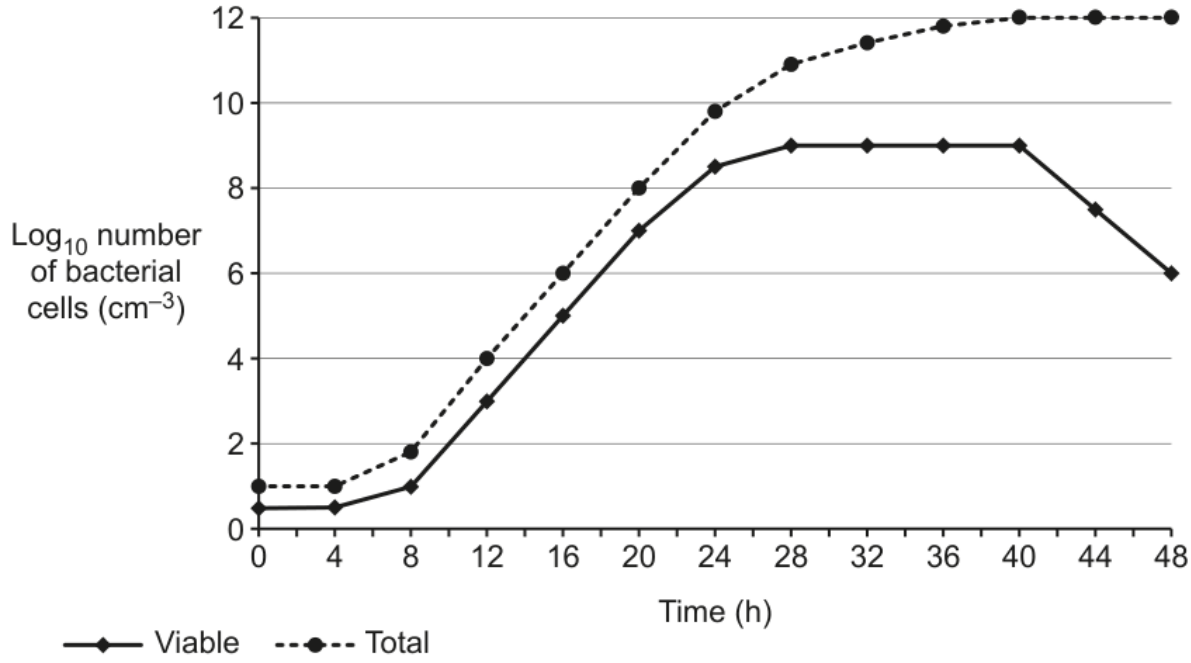
.....

..... **[1]**

Questions, mark schemes and examiners' report extracts © OCR.

Question 3 · A level Paper 2 · June 2022 · Q17(c)(i) · 2 marks

(c) The graph shows the students' results.



(i) Explain, with reference to the graph, why the students used a logarithmic scale on the *y*-axis.

.....

.....

.....

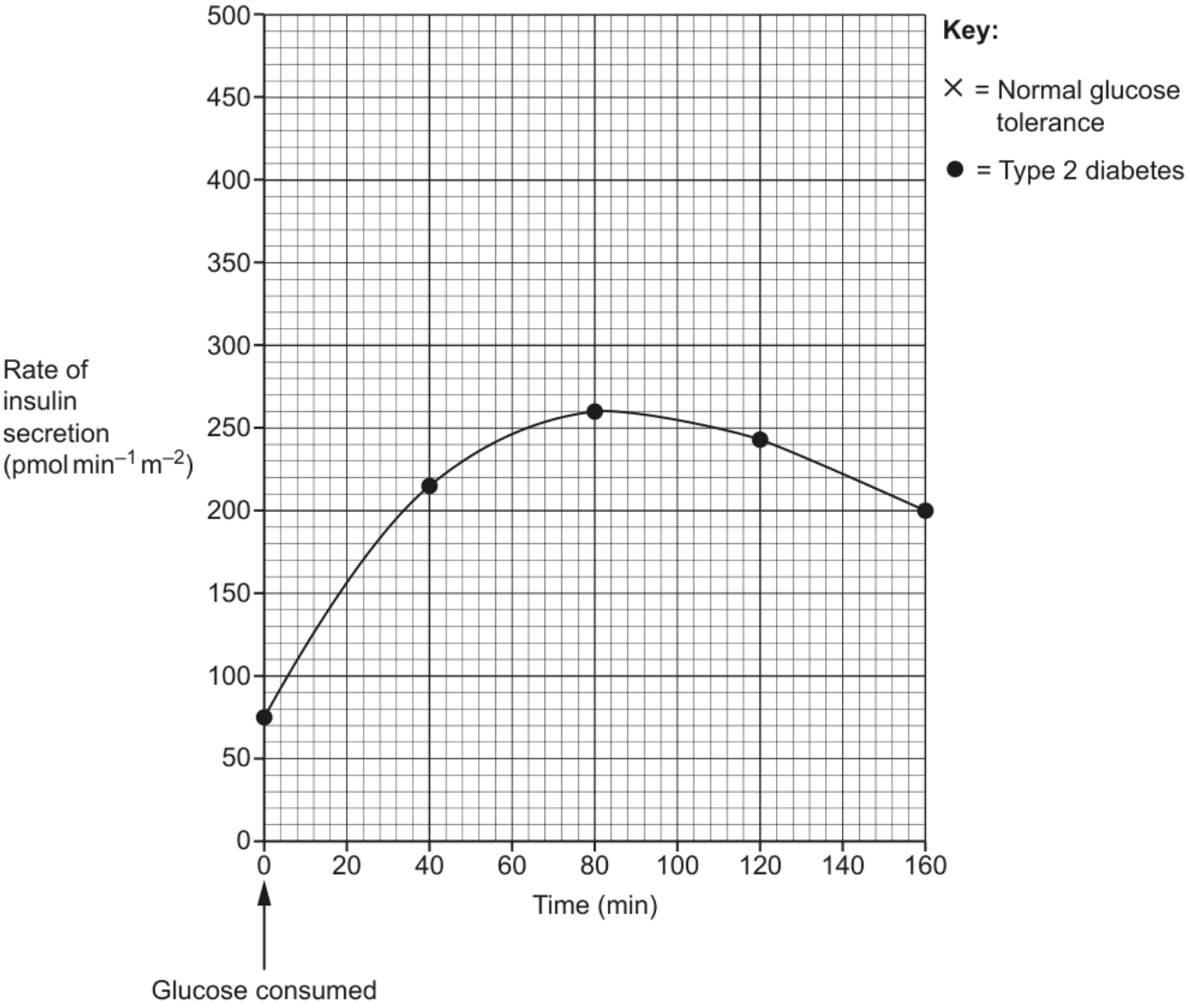
.....

..... **[2]**

Questions, mark schemes and examiners' report extracts © OCR.

Question 4 · A level Paper 3 · June 2024 · Q5(c) · 2 marks

(c) The graph shows the changes in the rate of insulin secretion in a person with type 2 diabetes after consuming glucose.



The table shows the changes in the rate of insulin secretion in a person with normal glucose tolerance after consuming glucose.

Time (min)	Rate of insulin secretion (pmol min^{-1} m^{-2})
0	60
40	460
80	365
120	299
160	190

Plot the data from the table **on the graph and** draw a line of best fit. **[2]**

Questions, mark schemes and examiners' report extracts © OCR.

Question 5 · information from earlier in the question

1 The cells in beetroot contain a red pigment called betalain. The plasma membrane of the beetroot cell is impermeable to betalain.

A group of students set out to investigate how temperature affects the structure and permeability of the plasma membrane of beetroot cells. The method they used is shown below.

- Cut some pieces of beetroot.
- Place them in a flask containing 100 cm^3 of distilled water.
- Stand this flask in a water bath and increase the temperature at 10 °C intervals.
- Take a sample of water from the flask 5 minutes after each new temperature is reached.
- Measure the absorbance of the water samples taken using a blue filter in the colorimeter.

(a) A second group of students made improvements to this method. One of the improvements they made was to carry out two further trials at each temperature.

Suggest **two** further improvements they could have made **and** give a reason for the improvements you have suggested.

Improvement and reason 1

.....

.....

.....

Improvement and reason 2

.....

.....

.....

[4]

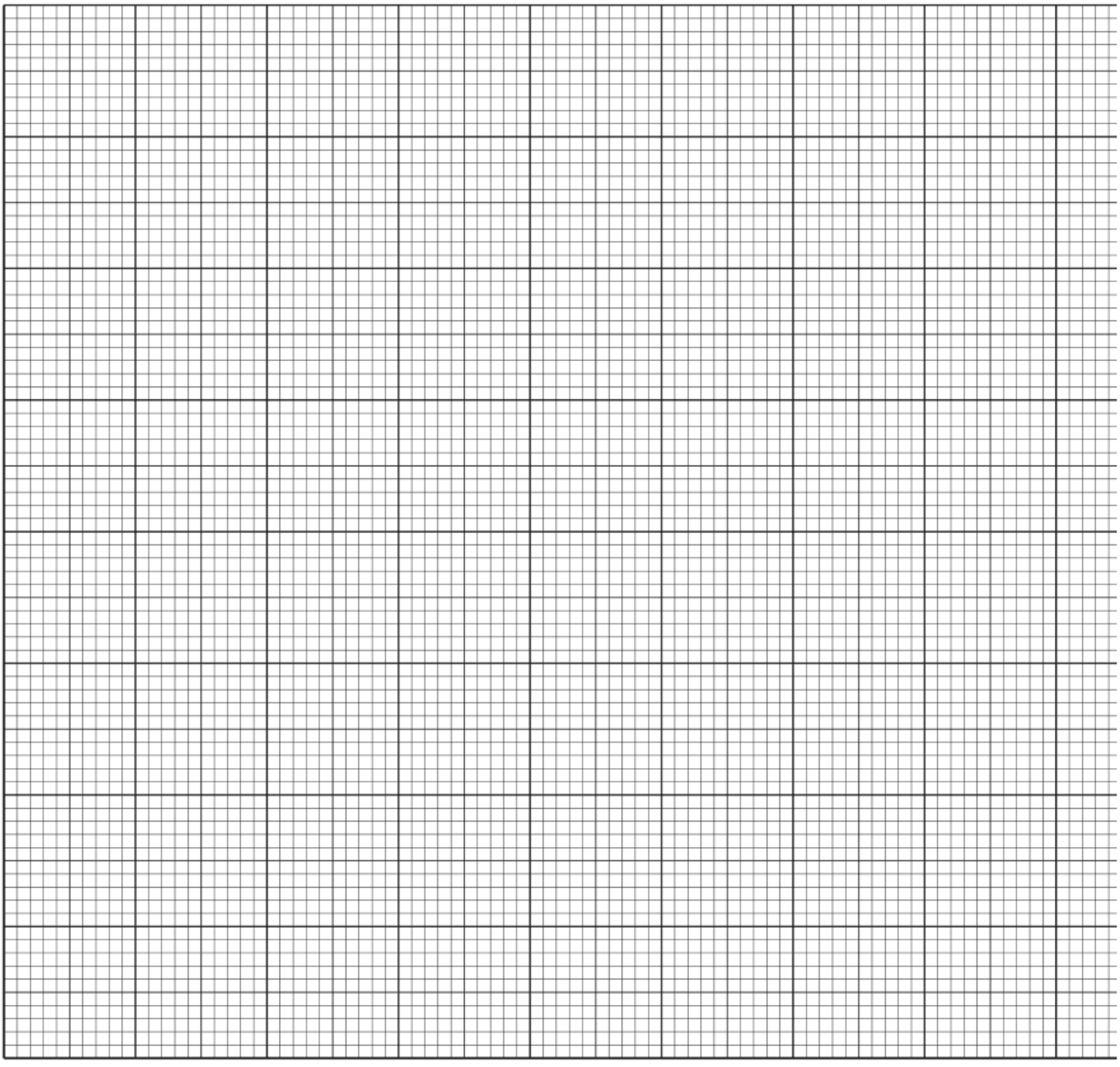
Questions, mark schemes and examiners' report extracts © OCR.

Question 5 · AS Paper 2 · June 2022 · Q1(c)(i) · 3 marks

(c) (i) The table shows the results obtained by the second group of students.

Temperature (°C)	Absorbance (%)			
	Trial 1	Trial 2	Trial 3	Mean
10	0	0	0	0.0
20	0	0	0	0.0
30	2	3	2	2.3
40	6	5	7	6.0
50	9	7	7	7.7
60	46	45	47	46.0
70	78	78	80	78.7

Plot a graph of the results from the table on the grid.



[3]

Questions, mark schemes and examiners' report extracts © OCR.

(c) One student's results are shown in **Table 17.2**.

The results have been rounded to the nearest 5%.

Positive values represent increased growth and negative values represent decreased growth.

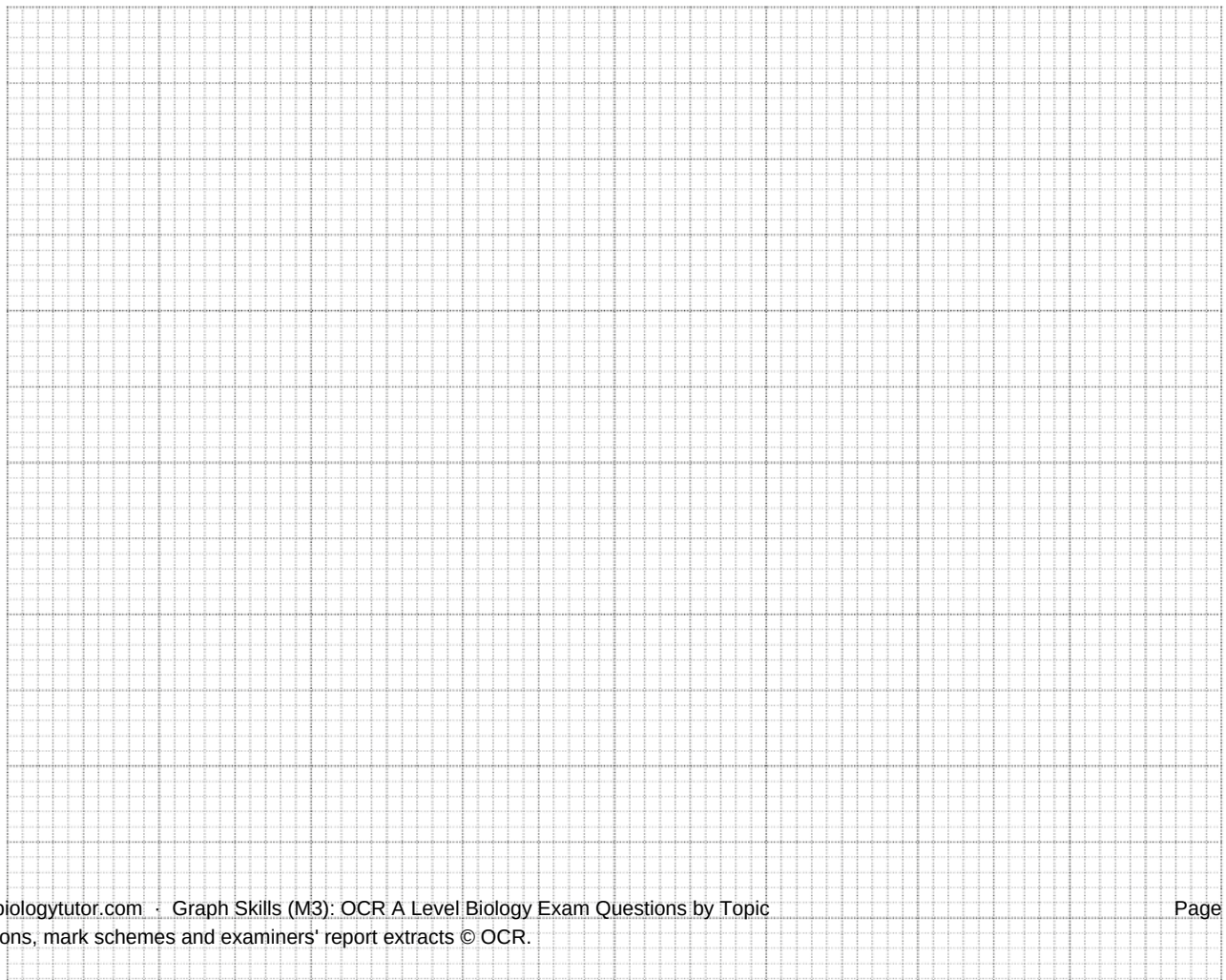
The concentration of IAA was measured in parts per million (ppm).

Table 17.2

Concentration of IAA (ppm)	% change in length	
	Root	Shoot
1×10^{2}	–100	0
1×10^{1}	–100	+200
1×10^{0}	–75	+140
1×10^{-1}	–45	+70
1×10^{-2}	+25	+30
1×10^{-3}	+65	+10
1×10^{-4}	+70	0
1×10^{-5}	+55	0

21

(i) Plot a graph of the data in **Table 17.2**. **[4]**

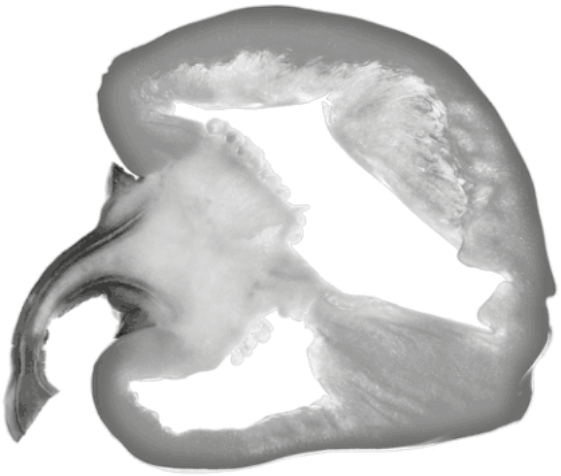


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Question 7 · information from earlier in the question

5 A student investigates water potential in the cells of a bell pepper, *Capsicum annuum*.

A slice of bell pepper is shown in the image.



The student:

- prepares several concentrations of sucrose solution
- cuts pieces of pepper and records the mass of each piece
- places pieces of pepper in each sucrose solution
- removes the pieces after 30 minutes and dries them
- records the mass of each piece.

(a) The student makes sucrose solutions of different concentrations by diluting a stock solution.

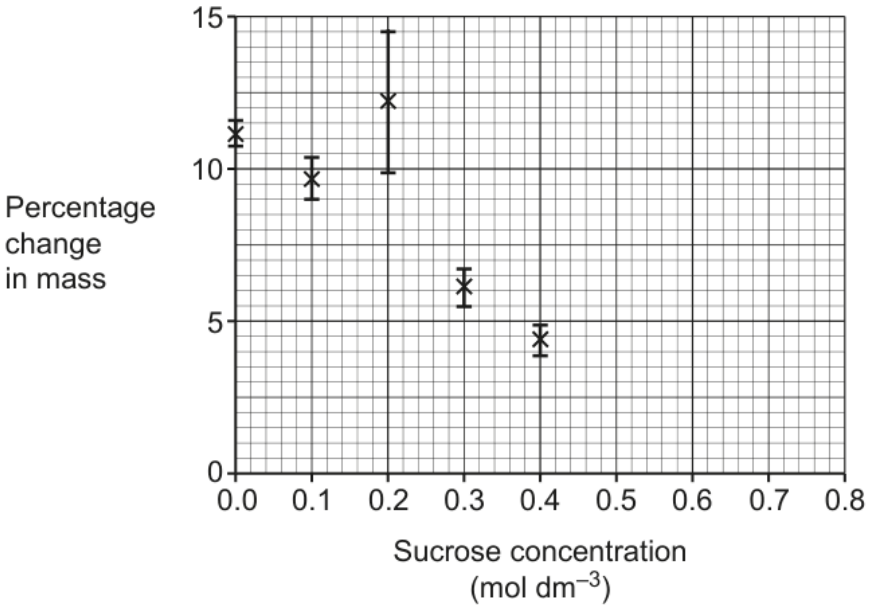
State a piece of equipment, with a higher resolution than a measuring cylinder, that the student should use to transfer solutions during the dilution procedure.

..... **[1]**

Questions, mark schemes and examiners' report extracts © OCR.

Question 7 · A level Paper 3 · June 2025 · Q5(d) · 2 marks

(d) The graph shows the results of the experiment.



Use the graph to estimate the concentration of sucrose solution that has the same water potential as the pepper tissue.

Concentration of sucrose solution = ... mol dm^{-3} **[2]**

Turn over

Questions, mark schemes and examiners' report extracts © OCR.

Question 8 · AS Paper 2 · June 2022 · Q2(a)(ii) · 1 mark

The length of a stag beetle larva was measured at yearly intervals and some of the data plotted onto the graph shown in **Fig. 2.3**.

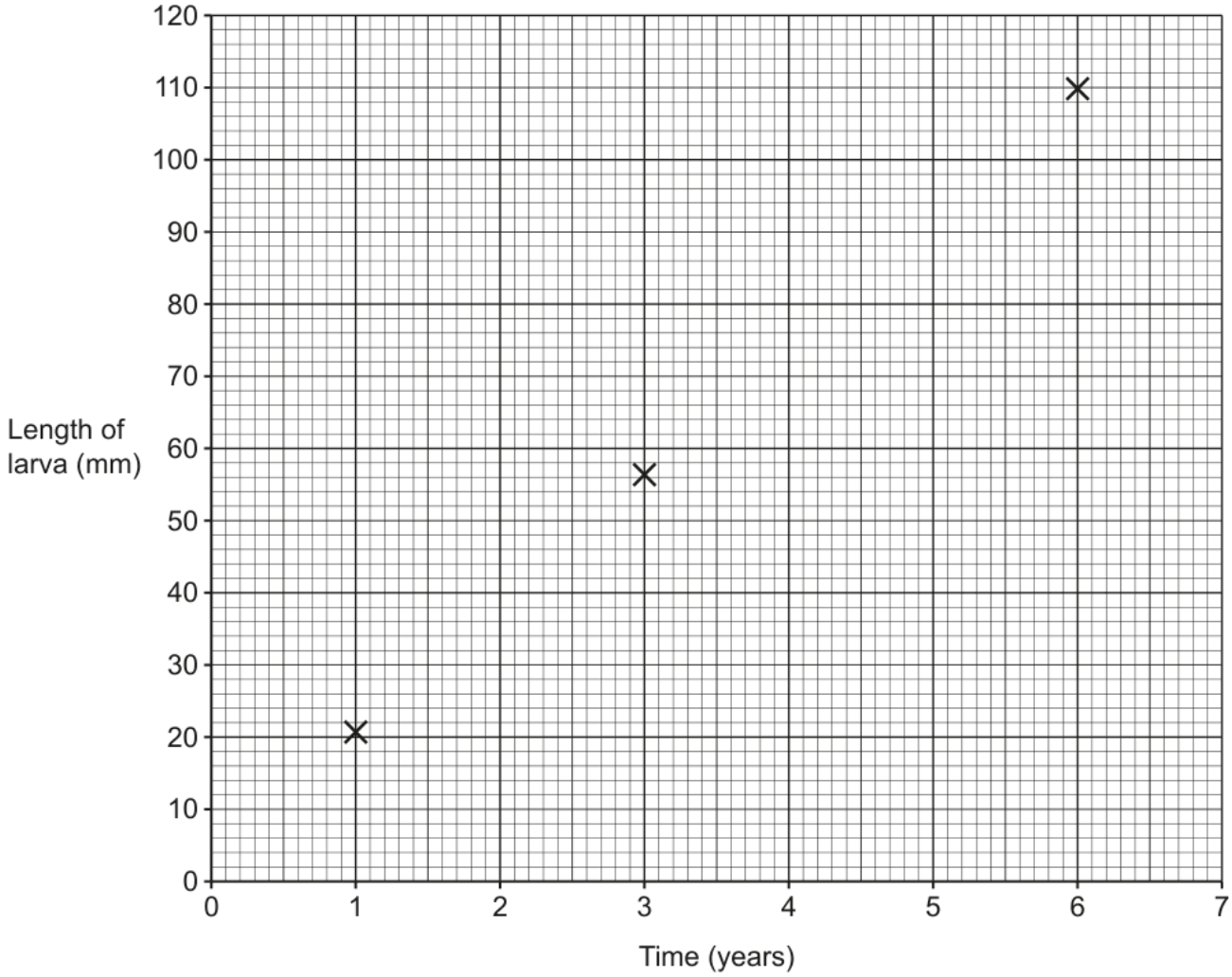


Fig. 2.3

(ii) Assuming that the growth of the larva follows a relationship of y = mx + c, use **Fig. 2.3** to determine the length of the larva at 0 years, when it emerges from the egg.

Length of larva = ... mm **[1]**

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Question 9 · AS Paper 2 · June 2022 · Q2(a)(iii) · 2 marks

(iii) Calculate the growth rate of the larva.

Growth rate = ...mm $year^{-1}$ **[2]**

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(c) A group of students used the following method to investigate osmosis in plant cells.

- Cut pieces of plant material of equal surface area ensuring no skin is present.
- Rinse to remove cell debris.
- Gently pat the plant pieces dry with a paper towel.
- Weigh each piece and record mass.
- Put the plant piece in a 200 cm^3 beaker.
- Cover plant piece with 50 cm^3 of sucrose solution.
- Use sucrose solutions of 0, 0.1, 0.3, 0.5, 0.7 mol dm^{-3}.
- Leave for 24 h.
- Remove the piece of plant material.
- Dry carefully using a paper towel.
- Weigh the plant piece and record the mass.
- Calculate the percentage change in mass for each piece.
- Repeat twice for each sucrose concentration.

The students investigated material from three different plants: carrot, courgette and potato. Their results are shown in Table 16.

Plant	Sucrose concentration / mol dm^{-3}	Percentage change in mass			
		Replicate 1	Replicate 2	Replicate 3	Mean
Carrot	0	+ 6.0	+ 5.8	+ 5.8	+ 5.87
	0.1	+ 4.2	+ 4.1	+ 4.3	+ 4.20
	0.3	+1.5	+1.5	+1.3	+ 1.43
	0.5	– 2.4	– 2.3	– 2.1	– 2.27
	0.7	– 6.3	– 6.1	– 6.3	– 6.23
Courgette	0	+ 7.9	+ 7.8	+ 7.6	+ 7.77
	0.1	+ 5.5	+ 5.5	+ 5.5	+ 5.50
	0.3	+ 1.9	+ 1.8	+ 2.0	+ 1.90
	0.5	– 1.2	– 1.4	– 1.1	– 1.23
	0.7	– 4.3	– 4.4	– 4.1	– 4.27
Potato	0	+ 5.7	+ 5.8	+ 5.7	+ 5.77
	0.1	+ 3.1	+ 2.9	+ 3.0	+ 3.00
	0.3	– 0.3	– 0.4	– 0.6	– 0.43
	0.5	– 2.4	– 2.2	– 2.5	– 2.37
	0.7	– 6.1	– 5.9	– 5.1	– 5.70

Table 16

(i) Explain why it was necessary to calculate **percentage** change in mass.

.....

.....

.....

..... **[2]**

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Question 10 · A level Paper 2 · June 2019 · Q16(c)(iii) · 3 marks

(iii) Use Table 16 to identify which plant cells contained the highest concentration of sucrose.

Justify your conclusion.

.....

.....

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..... **[3]**

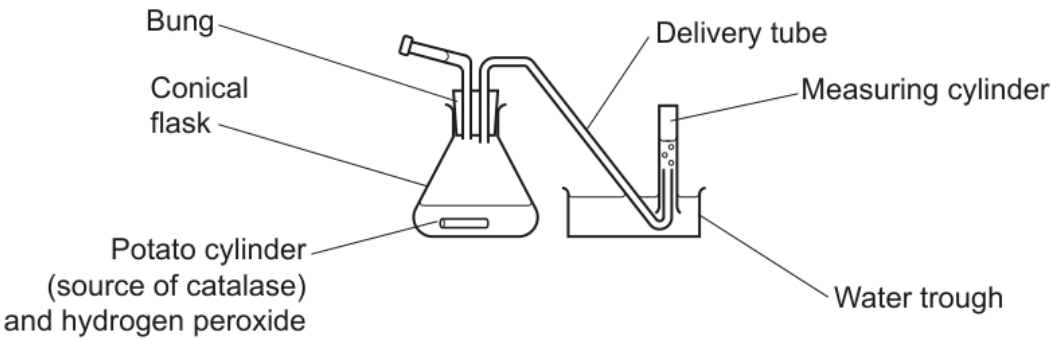
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Question 11 · information from earlier in the question

17 Catalase is found in many tissues. It is an enzyme that breaks down hydrogen peroxide into oxygen and water.

Some students do an experiment to investigate the effect of hydrogen peroxide concentration on the rate of this reaction using the apparatus shown in **Fig. 17.1**.

Fig. 17.1



This is the method the students use.

1. Use a stock solution of 250 cm^3 of 20 a.u. hydrogen peroxide, to make solutions of 8 a.u. and 2 a.u.
2. Cut 15 cylinders of potato of equal diameter, using a cork borer, and use a ruler to ensure that each one is 5 cm long.
3. Set up the apparatus as shown in **Fig. 17.1**.
4. Record the starting position of the water in the measuring cylinder.
5. Place one cylinder of potato into the conical flask.
6. Pour 50 cm^3 of 2 a.u. hydrogen peroxide into the flask, immediately secure the bung and start the stopwatch.
7. Record the volume of gas given off every 30 s for 3 min.
8. Repeat steps 3 to 7 twice.
9. Repeat steps 3 to 8 using 8 a.u. and 20 a.u. hydrogen peroxide.

(a) (i) State the independent variable in this investigation.

..... **[1]**

Questions, mark schemes and examiners' report extracts © OCR.

(b) Some of the students' results are shown in the tables below.

Results for 2 a.u. hydrogen peroxide

Time (s)	Volume of oxygen produced (cm^3)				
	1	2	3	Mean	Standard deviation
30	5	6	5	5.3	0.6
60	9	10	9	9.3	0.6
90	13	14	13	13.3	0.6
120	16	17	18	17.0	1.0
150	19	20	21	20.0	1.0
180	21	22	23	22.0	1.0

Results for 8 a.u. hydrogen peroxide

Time (s)	Volume of oxygen produced (cm^3)				
	1	2	3	Mean	Standard deviation
30	22	23	23	22.7	0.6
60	37	39	38	38.0	1.0
90	49	49	47	48.3	1.2
120	57	58	55	56.7	1.5
150	61	63	59	61.0	2.0
180	64	67	62	64.3	2.5

Results for 20 a.u. hydrogen peroxide

Time (s)	Volume of oxygen produced (cm^3)				
	1	2	3	Mean	Standard deviation
30	57	55	58	56.7	1.5
60	78	74	78	76.7	
90	89	73	88	83.3	9.0
120	95	79	93	89.0	8.7
150	97	81	95	91.0	8.7
180	97	83	96	92.0	7.8

Question 11 · A level Paper 2 · June 2023 · Q17(b)(iii) · 2 marks

(iii) The students calculated the initial rate of reaction over the first 30 s.

Calculate the rate of reaction over the first 30 s for the result at 2 a.u. hydrogen peroxide.

Rate = ...

Unit = ...

[2]

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(iv) Another protease enzyme is HIV1 protease, which is essential for the life cycle of the human immunodeficiency virus (HIV). Inhibition of this protease prevents HIV from maturing.

In 1995, saquinavir was the first HIV1 protease inhibitor drug to be approved by the US Food and Drug Administration (FDA).

The data in Fig. 1.3 show the number of acquired immune deficiency syndrome (AIDS) diagnoses and deaths between 1981 and 2007 in the US.

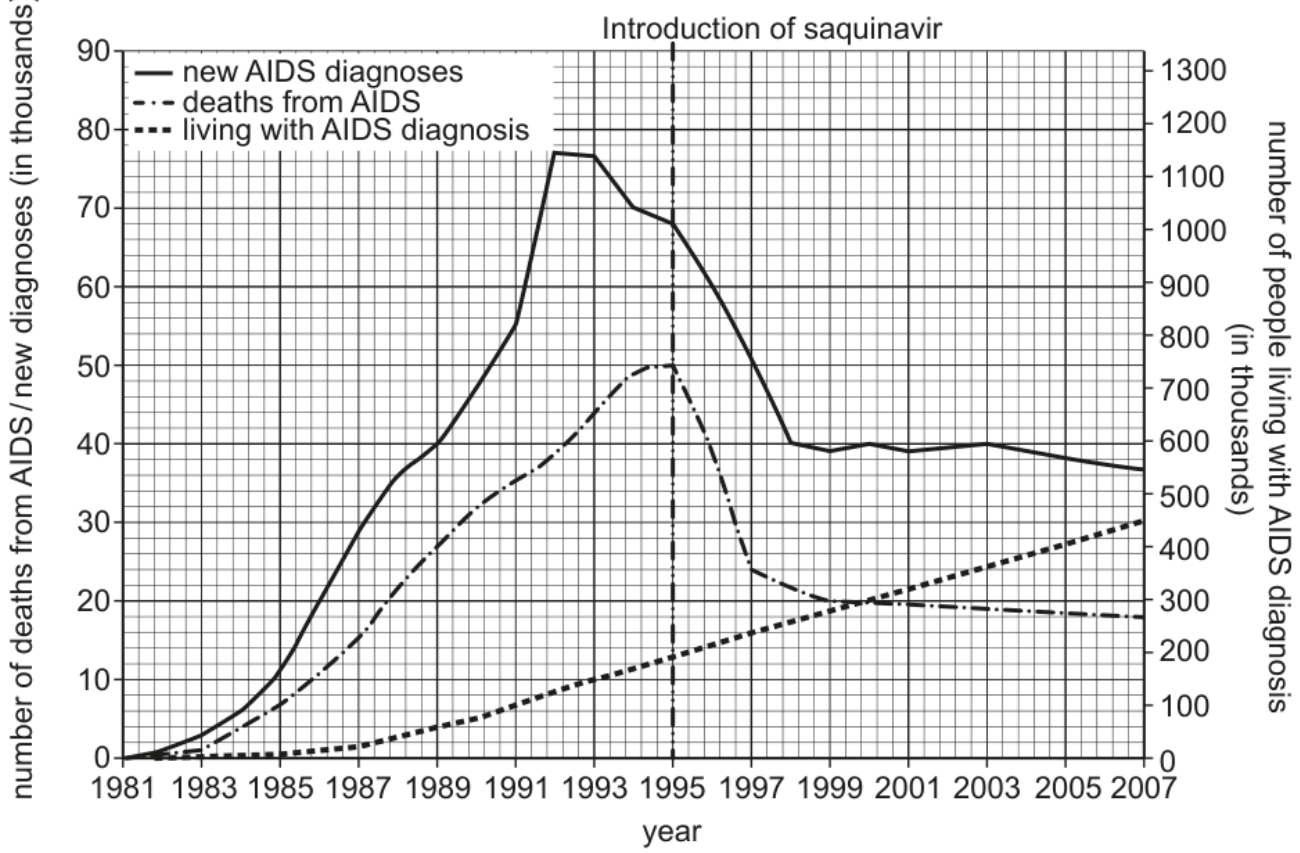


Fig. 1.3

Calculate the rate of decrease in deaths from AIDS between 1995 and 1998.

Give your answer to **two significant figures**.

Show your working.

Answer ..... Units ..... **[2]**

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Question 13 · AS Paper 2 · June 2018 · Q1(b)(v) · 2 marks

(v) A student looking at the data in Fig. 1.3 made the following conclusion:

> "The decrease in deaths from AIDS after 1995 is because of the use of saquinavir by HIV patients."

Suggest why this conclusion may be invalid based on the data in Fig. 1.3.

.....

.....

.....

.....

..... **[2]**

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Question 14 · A level Paper 2 · June 2022 · Q18(a)(i) · 2 marks

18 The Maasai Mara is a grassland ecosystem in east Africa with a large range of wildlife.

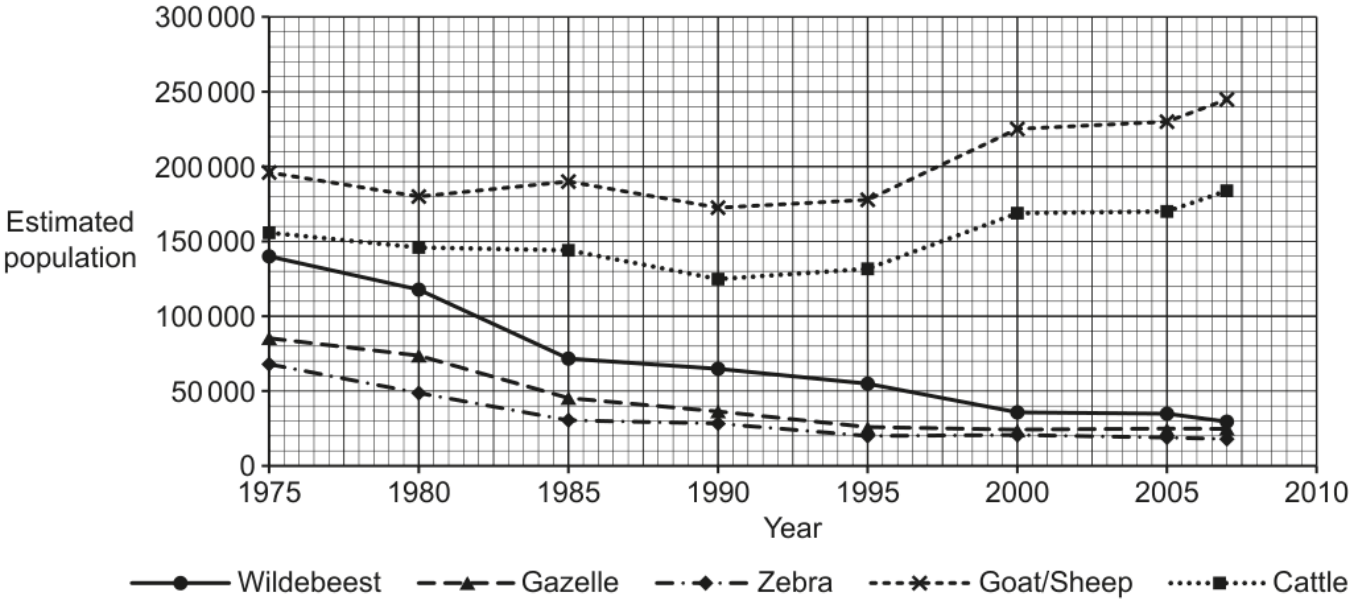
The human population in the area is increasing.

An increasing human population can affect the biodiversity of an area.

(a) The wildlife present in the Maasai Mara includes several large mammals, such as gazelle, zebra and wildebeest.

Domestic animals, such as cattle, sheep and goats, are farmed by humans to provide food.

The graph below shows the population of some large mammals in the Maasai Mara between 1975 and 2007.



(i) Calculate the rate of change in wildebeest population between 1975 and 2007.

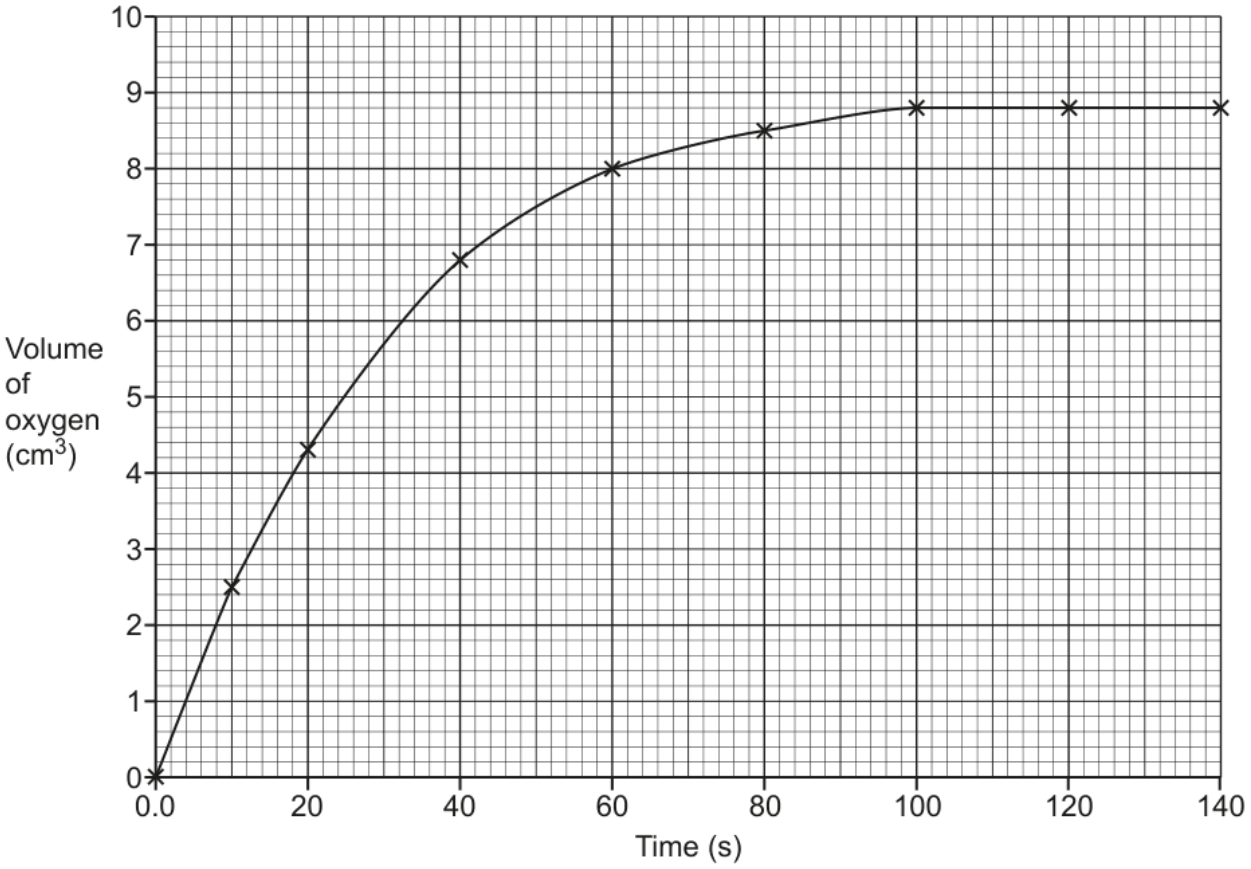
Rate = ... animals per year **[2]**

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Question 15 · AS Paper 1 · June 2024 · Q25(a) · 2 marks

25 A student investigates the rate of catalase activity as it breaks down hydrogen peroxide into oxygen and water.

The volume of oxygen released was recorded over a period of 140 seconds. The results are shown in the graph.



(a) Use the graph to calculate the rate of reaction at **50** seconds.

Give your answer to **2** significant figures.

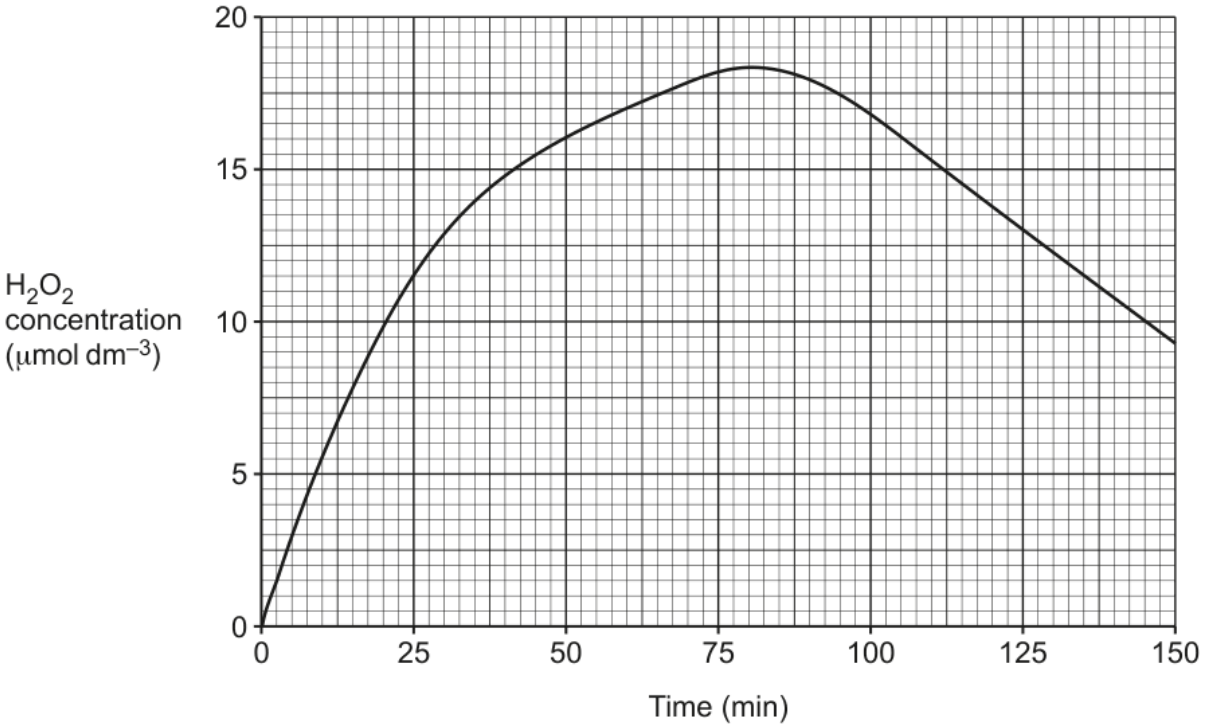
Rate = ... $cm^3 s^{-1}$ **[2]**

Turn over

Questions, mark schemes and examiners' report extracts © OCR.

Question 16 · A level Paper 3 · June 2025 · Q7(b)(ii) · 3 marks

(ii) The graph shows the change in hydrogen peroxide concentration in a neutrophil during an oxidative burst.



Use the graph to calculate the **initial rate** of increase of H_2O_2 concentration in the neutrophil during an oxidative burst.

Rate = ... Units ..... **[3]**

Turn over

Questions, mark schemes and examiners' report extracts © OCR.

Question 17 · information from earlier in the question

(b) Hydrogen peroxide is a highly reactive chemical.

Catalase is an intracellular enzyme that catalyses the breakdown of hydrogen peroxide.

(i) Explain why it is important that catalase is able to break down hydrogen peroxide very quickly.

.....

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.....

..... **[2]**

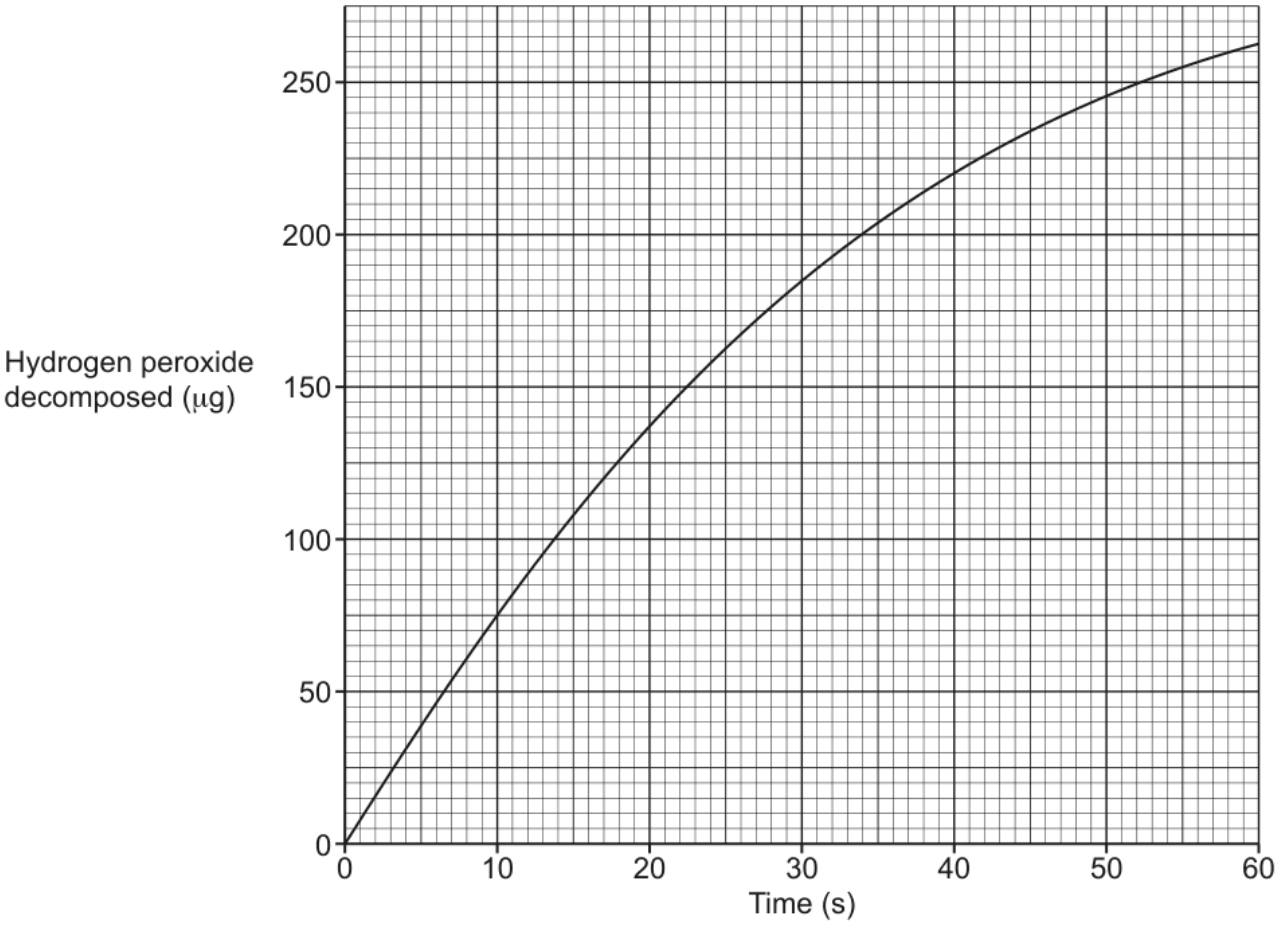
Turn over

Questions, mark schemes and examiners' report extracts © OCR.

Question 17 · A level Paper 1 · June 2024 · Q21(b)(ii) · 3 marks

(ii) **Fig. 21.1** is a graph of decomposition of hydrogen peroxide against time for catalase.

Fig. 21.1



Calculate the rate of the enzyme catalysed reaction **at 30 s**.

Rate = ... Units = ... **[3]**

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Mark schemes

Question 1 · A level Paper 2 · June 2024 · Q19(b)(i) · 2 marks

19	(b)	(i)	**FIRST CHECK ON ANSWER LINE** **If answer = 85 or 84.9 (%) award 2 marks** *correct reading from graph and subtraction* 3440 − 520 = 2920 ✓ *correct calculation* 2880 / 3400 x 100 = 84.7 ✓	2	2.2

ALLOW any answer in the range 82 to 86
ALLOW 1 mark for 80 or if correct answer given to more than 3 significant figures
IGNORE sign

If answer is incorrect, **ALLOW** 1 mark for **either** of the following:

correct answer to…
3380–3600 − 500–600 =

or

candidate's values substituted into the following equation
change / original x 100 = correctly processed answer

Question 2 · A level Paper 1 · June 2024 · Q20(a)(iii) · 2 marks

20	(a)	(iii)	*At 120-240s* deeper / AW , breaths ✓ amplitude / tidal volume , becomes more variable ✓ same / similar , (calculated) breathing rate ✓	**max 2**

ALLOW ora MPs 1 and 2 for 0-120s
ALLOW greater tidal volume

ALLOW breaths per minute for breathing rate

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Question 3 · A level Paper 2 · June 2022 · Q17(c)(i) · 2 marks

(c)	(i)	*idea that* differences in numbers would be too big to represent on paper ✓ two figures quoted in support ✓	**2**	2.8

ALLOW so the scale can fit on the paper

ALLOW e.g. total count at 0 h is 10 but at 40 h is $1x10^{12}$

Question 4 · A level Paper 3 · June 2024 · Q5(c) · 2 marks

5	(c)	all 5 data points plotted correctly (± half a square) ✓ (smooth) line of best fit ✓	**2**

smooth continuous curve starting at point 1 and finishing at point 5 going through all 5 points
ALLOW if goes between points 3 and 4 or misses either point 3 or point 4
DO NOT ALLOW ruled lines between points

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Question 5 · AS Paper 2 · June 2022 · Q1(c)(i) · 3 marks

1	(c)	(i)	**1** linear scales using half of grid or more **AND** *x* axis labelled temperature (°C) **AND** *y* axis labelled (mean) absorbance (%) ✓ **2** points plotted correctly for mean absorbance ✓ **3** all points joined with curved line ✓	**3**

AO 2.4	**1 ALLOW** solidus before unit (instead of brackets) **2 ALLOW** to **±1** small square **2 IGNORE** figures plotted from trial 1, 2 or 3 **2 DO NOT ALLOW** bars **3 DO NOT ALLOW** ruled lines between points **3 ALLOW** one data point outside of curved line of best fit **3 IGNORE** line extended beyond first or last point **3 ALLOW ECF** for data plot from trial 1, 2 or 3

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Question 6 · A level Paper 1 · June 2023 · Q17(c)(i) · 4 marks

17	**(c)**	**(i)**		**4**	**2.8**

MP1 = correct axis labels **and** appropriate correct scale and plotted points should occupy at least 50% ✓

MP2 16 plots mostly correct for **both** roots and shoots ✓

MP3 appropriate lines for roots and shoots ✓

MP4 appropriate key for root and shoot lines correctly labelled ✓

Should be a line graph
Bar chart max 2 for **MP1** and **MP4** if correct

MP1 ALLOW x axis in middle or at bottom / y axis in middle or left-aligned
MP1 x axis = concentration of IAA (ppm) and y axis = % change in length
MP1 DO NOT ALLOW incorrect scale on x axis...decreasing size i.e. 10^2 to 10^{-5}

Concentration of IAA (ppm)	% change in length	
	Root	Shoot
1 x10^2	-100	0
1 x10^1	-100	+200
1 x10^0	-75	+140
1 x10^{-1}	-45	+70
1 x10^{-2}	+25	+30
1 x10^{-3}	+65	+10
1 x10^{-4}	+70	0
1 x10^{-5}	+55	0

MP2 look at overall shapes for guidance
No MP2 if any plots missing

MP3 DO NOT ALLOW double lines, lines missing the plot points by more than 1 square or extrapolation

ECF MP3 if plots wrong or missing e.g. if only root data plotted allow a correct line

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Question 7 · A level Paper 3 · June 2025 · Q5(d) · 2 marks

5	(d)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 0.65 (mol dm^{-3}) award two marks**	**2**	2.4

ALLOW any answer in the range **0.60 to 0.70**, to 1 or 2 significant figures

ALLOW 1 mark for correct answer in the range to more than 2 significant figures

If answer incorrect, **ALLOW one mark** for evidence of extrapolating data points to find the intercept with the x-axis, using a straight line.

Question 8 · AS Paper 2 · June 2022 · Q2(a)(ii) · 1 mark

(a)	**(ii)**	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 3 award 1 mark** 3 ✓

1	AO 2.2	**ALLOW** answer given on **Fig. 2.1** **ALLOW** an answer anywhere between 2 and 4

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(a)	(iii)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 18 (mm year^{-1}) award 2 marks** $\frac{110 - 21}{6 - 1}$ **OR** $\frac{89}{5}$ ✓ 18 ✓	2

AO 2.2

ALLOW data from **any pair of years** to calculate growth rate (change in *y* axis ÷ change in *x* axis). E.g. working & answer **OR** correct answer alone for **2 marks**

year	0	1	3
1	$\frac{21 - 3}{1}$ = 18.0		
3	$\frac{56 - 3}{3}$ = 17.7	$\frac{56 - 21}{2}$ = 17.5	
6	$\frac{110 - 3}{6}$ = 17.8	$\frac{110 - 21}{5}$ = 17.8	$\frac{110 - 56}{3}$ =18.0

ALLOW answer given to 3 significant figures as shown (**2 marks**) If answer given to more than 3 sig. fig. **max 1 mark**

ALLOW ECF from candidate's 2(a)(ii) figure for year 0

ALLOW calculations from variant *y* axis readings as shown:

year	length (mm)
0	2 or 4
1	20.5
3	56.5
6	109.5

e.g. (yrs 6 and 1) 110 – 20.5 = 89.5 and 89.5 ÷ 5 = 17.9 **OR**
109.5 – 21 = 88.5 and 88.5 ÷ 5 = 17.7
109.5 – 20.5 = 89 and 89 ÷ 5 = 17.8

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Question 10 · A level Paper 2 · June 2019 · Q16(c)(iii) · 3 marks

(iii)	1	courgette / carrot or courgette ✓	3 max
	2	0(%) mass change / *idea of* intercept , between 0.3 and 0.5 (mol dm^{-3}) ✓	
	3	(courgette associated with) highest concentration at which there is no mass change ✓	
	4	(courgette has) highest mass gain at 0 mol dm^{-3} / least mass loss at 0.7 mol dm^{-3} ✓	
	5	change / AW , at , 0.3 (mol dm^{-3}) higher than carrot / 0.5 (mol dm^{-3}) lower than carrot ✓	
	6	AVP calculated linear extrapolation (0.421) ✓	

2 ALLOW (isotonic) sucrose concentration is between 0.3 and 0.5 (mol dm^{-3})

4 ALLOW units anywhere in answer

5 ALLOW 0 change is closer to 0.5 than carrot



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Question 11 · A level Paper 2 · June 2023 · Q17(b)(iii) · 2 marks

(iii)	**FIRST CHECK ON ANSWER LINE** **If answer = 0.2 or 0.18 cm^3 s^{-1} award 2 marks** 5.3/30 **or** 5.3/0.5 ✓ ≤ 3 s.f. and correct units ✓	**2**

2.8	*Max 1 if no or incorrect unit given* **ALLOW 2 marks** if answer is 11 or 10.6 or 10 (cm^3 min^{-1}) or 0.177 (cm^3 s^{-1}) **ALLOW** unit written as cm^3/min or cm^3/s

Question 12 · AS Paper 2 · June 2018 · Q1(b)(iv) · 2 marks

1(b)(iv)	**EITHER** **1** 9300 / 9700 ✓ **2** deaths year $^{-1}$ or deaths per year or deaths / year ✓ **OR** **3** 9.3 / 9.7 ✓ **4** thousand deaths year $^{-1}$ or thousand deaths per year or thousand deaths / year ✓	2

Correct answer to 2 s.f. **with** correct matching units = **2 marks**

ALLOW mark for unit even if no or wrong figure given
ALLOW minus sign with number or 'fewer' with unit
ALLOW from AIDS / of AIDS in unit

ALLOW mp 3 so long as the **word thousand** appears afterwards or in the units (even if the unit is wrong in another respect)
DO NOT ALLOW '*9.3 1000 deaths per year*' for mp3 (but gets mp 4)

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Question 13 · AS Paper 2 · June 2018 · Q1(b)(v) · 2 marks

1(b)(v)	*(answers must relate to **data** on graph)* **1** decrease in new diagnoses, from 1992 / already / began before 1995 ✓ **2** peak / plateau, in deaths, from 1994 / already / began before 1995 ✓ **3** no change in / same, (rate of) increase in people living with AIDS, before / after, 1995 ✓

Question	Answer
2 max	**ALLOW** when, saquinavir / drug / medicine, was introduced for '1995' in mps **1**, **2** and **3** **ALLOW** new diagnoses decrease at same time as deaths **ALLOW** from / since / after, 1993 (instead of 1992)

Mark	Guidance

Question 14 · A level Paper 2 · June 2022 · Q18(a)(i) · 2 marks

18	**(a)**	**(i)**	**FIRST CHECK ON ANSWER LINE** **If answer = −3400 award 2 marks** $\frac{110\,000}{32}$ ✓ (correct answer) as whole number with minus sign ✓
			Please refer to the marking instructions on page 4 of th

2	2.6	*Max 1 if no '−' sign.* **ALLOW** −3440 / −3438 / −3000 / −3437.5 **ALLOW** 1 mark for −3437

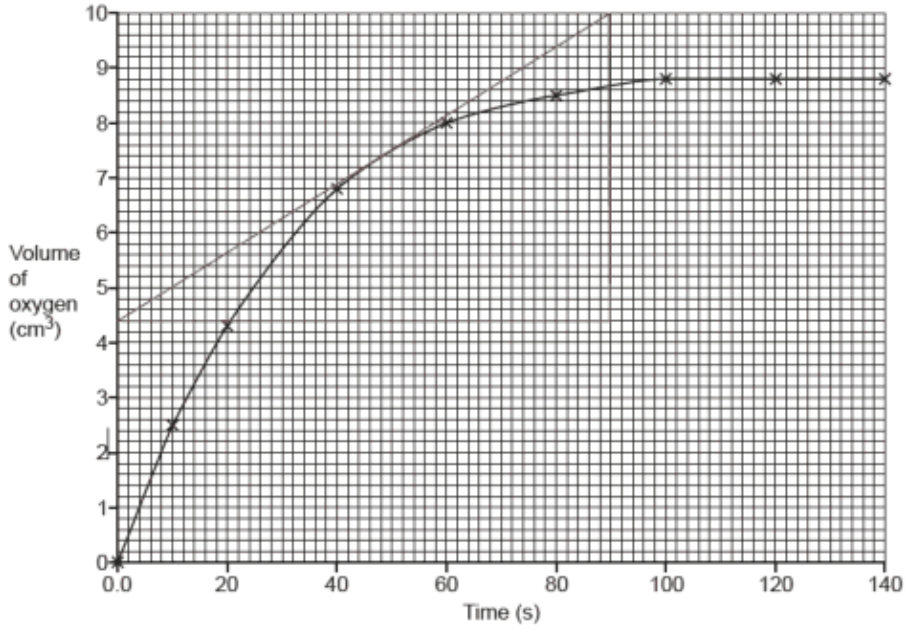
his mark scheme for guidance on how to mark this question.

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Question 15 · AS Paper 1 · June 2024 · Q25(a) · 2 marks

25	(a)	**FIRST CHECK ON ANSWER LINE** **If answer = 0.062, award 2 marks** ✓✓ tangent drawn and is straight , meets the curve at 50s , can be any length **OR** difference/change/Δ in volume / Δy / dy , ÷ , difference/change/Δ in time / Δx / dx **OR** calculation showing , difference / change , in volume ÷ , difference / change , in time **OR** correct answer to incorrect sig fig e.g. 5.6 / 90 = 0.0622 $cm^3\ s^{-1}$ ✓	**2**

DO NOT ALLOW interpolation alone
ALLOW range 0.057-0.063 **for 2 marks**



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Question 16 · A level Paper 3 · June 2025 · Q7(b)(ii) · 3 marks

7	(b)	(ii)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 0.6 µmol dm^{-3} min^{-1} award three marks** ruled tangent following the trajectory of the initial curve from 0 ✓ correct calculation using the tangent (e.g. 14 µmol dm^{-3} / 25 min = 0.56 µmol dm^{-3} min^{-1}) ✓ units = µmol dm^{-3} min^{-1} ✓	**3**	2.8

ALLOW any value in the range **0.50 to 0.80**
ALLOW any number of significant figures

If answer incorrect, **ALLOW one mark** for evidence of using a tangent from time 0.
DO NOT ALLOW if 2 tangents have been drawn and one does not go to 0

If answer incorrect, **ALLOW one mark** for units of µmol dm^{-3} min^{-1}
DO NOT CREDIT: µmol dm^{-3} / min

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21	**(b)**	**(ii)**	**FIRST CHECK ANSWER ON ANSWER LINE** **If answer = 3.7 ± 0.6 award 2 marks** ✓✓ drawn tangent at t = 30 s figures from tangent e.g. 170 (µg) ÷ 46 (s) **Unit =** µg s^{-1} ✓	**3**

Max 2 if answer given to more than 3 significant figures

If answer incorrect

One mark for

tangent drawn with **straight** line that meets the curve at 30s and can be any length

OR

calculation showing difference in volume ÷ difference in time (from tangent / triangle)

ALLOW µg / s

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