



Mark Scheme (Results)

Summer 2026

Pearson Edexcel International GCSE Mathematics A
(Modular)

4WM2H/01R

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme.

Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

- **Types of mark**

- M marks: method marks
- A marks: accuracy marks
- B marks: unconditional accuracy marks (independent of M marks)

- **Abbreviations**

- cao – correct answer only
- ft – follow through
- isw – ignore subsequent working
- SC - special case
- oe – or equivalent (and appropriate)
- dep – dependent
- indep – independent
- awrt – answer which rounds to
- eeoo – each error or omission

- **No working**

If no working is shown then correct answers normally score full marks

If no working is shown then incorrect (even though nearly correct) answers score no marks.

- **With working**

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If it is clear from the working that the “correct” answer has been obtained from incorrect working, award 0 marks.

If a candidate misreads a number from the question. Eg. Uses 252 instead of 255; method marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review. If there is a choice of methods shown, mark the method that leads to the answer on the answer line; where no answer is given on the answer line, award the lowest mark from the methods shown.

If there is no answer on the answer line then check the working for an obvious answer.

- **Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. Incorrect cancelling of a fraction that would otherwise be correct.

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

- **Parts of questions**

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded to another.

International GCSE Maths				
Values in quotation marks must come from a correct method previously seen unless clearly stated otherwise.				
Q	Working	Answer	Mark	Notes
1 (i)		$2 \times 3 \times 5$	1	B1 oe ie allow in any order allow dot notation for multiplication 2.3.5
(ii)		$2^4 \times 3^8 \times 5^8$		B2ft ft their (i) fully correct oe ie in any order allow $2^4.3^8.5^8$ B1ft their (i) for an expression in the form $2^a \times 3^b \times 5^c$ with 2 of a, b, c correct or B1 for $(AB =) 2^3 \times 3^7 \times 5^7$ oe (may be embedded in 30AB ie 30 $(2^3 \times 3^7 \times 5^7)$)
				Total 3 marks

2	(a)	$25 \div 4 (= 6.25)$ oe or $4 \div 25 (= 0.16)$ oe or $\frac{DF}{7} = \frac{25}{4}$ oe or $\frac{DF}{25} = \frac{7}{4}$ oe		2	M1 for the scale factor (which could be in an equation) or use of side ratios in an equation
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	43.75		A1 oe eg $\frac{175}{4}$ or $43\frac{3}{4}$ allow 43.8 oe dep on M1
	(b)	$60 \div [6.25]$ oe or $60 \times [0.16]$ oe or $\frac{BC}{60} = \frac{4}{25}$ oe or $\frac{BC}{60} = \frac{7}{[43.75]}$ oe or $\frac{BC}{4} = \frac{60}{25}$ oe or $\frac{BC}{7} = \frac{60}{[43.75]}$ oe		2	M1 ft ie. [6.25] is their SF from (a) (which could be in an equation) or use of side ratios in an equation ft their answer to (a) ie [43.75] is their answer to (a)
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	9.6		A1 oe eg $\frac{48}{5}$ or $9\frac{3}{5}$
					Total 4 marks

3 (a)	Two number lines are shown. Both have tick marks from -5 to 5. The top line has a solid blue dot at 1 and a blue arrow pointing to the left. The bottom line has a blue bracket at 1 and a blue arrow pointing to the left.	Closed circle at $x = 1$ and a line with an arrow to the left	1	B1 for a closed circle at $x = 1$ and a line with an arrow of any length to the left Allow] for a closed circle Allow a line without an arrow if it reaches -3
(b)		$-3 \leq y < 2$	2	B2 for $-3 \leq y < 2$ oe or accept $y \geq -3, y < 2$ both seen (B1 Accept $[-3, 2)$ or $2 > y \geq -3$ for one end of the inequality correct eg $-3 \leq y$ or $y \geq -3$ or $y < 2$ or $2 > y$ or $(-3, 2)$ or $[-3, 2]$) Allow any letter in place of y eg x
(c)	$4n > 8 - 17$ oe or $n + \frac{17}{4} > \frac{8}{4}$ oe or $(n =) -\frac{9}{4}$ oe or $n < -\frac{9}{4}$ oe		2	M1 for correct first step or for rearranging to $-\frac{9}{4}$
	Correct answer scores full marks (unless from obvious incorrect working)	$n > -\frac{9}{4}$		A1 oe eg $n > -2.25$ Must see $n > -\frac{9}{4}$ oe on the answer line, if there is nothing on the answer line it must be in their last line of working
				Total 5 marks

4	400 ÷ (2 + 3) (= 80) oe or $400 \times \frac{2}{2+3}$ (= 160) oe	M2 for $400 \times \frac{3}{2+3}$ (= 240)		5	M1
	3 × “80” (= 240) oe or 400 – (2 × “80”) (= 240) oe or 400 – “160” (= 240)				M1 for a complete method for the amount Sarah gives to Charity B
	375 ÷ (1 + 2) (= 125) oe	M2 for $375 \times \frac{2}{3}$ (= 250)			M1
	2 × “125” (= 250) oe or 375 – “125” (= 250)				M1 for a complete method for the amount Dej gives to Charity B
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>		10		A1
					Total 5 marks

5	$5^{\text{th}} (\text{card/number}) = 8$ or $1^{\text{st}} (\text{card/number}) = 1$ or $8 - 7 (= 1)$		4	M1 8 may be written in or by the 5^{th} card or 1 for the first card indicated
	$31 - (1 + 3 + 7 + 8 + 8) (= 4)$ oe or $31 - 27 (= 4)$ oe or $1 + 3 + x + 7 + 8 + 8 = 31$ oe or 1 3 4 7 8 8			M1 dep on 1 and 8 found
	$\frac{[\text{their } 4] + 7}{2}$ oe or $2 + 3.5$ oe or $7 - ((7 - [\text{their } 4]) \div 2)$ oe or $7 - 1.5$ oe or $4 + ((7 - [\text{their } 4]) \div 2)$ oe or $4 + 1.5$ oe			M1 indep provided $3 \leq [\text{their } 4] \leq 7$
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	5.5		A1 cao oe eg $\frac{11}{2}$ or $5\frac{1}{2}$ provided 1, 4 and 8 have been correctly found
				Total 4 marks

6	(a)		0.00004	1	B1
	(b)	$12 \times 10^{158+72}$ or $2 \times 6 \times 10^{230}$ or 12×10^{230} or oe eg 120×10^{229} or 0.12×10^{232} 1.2×10^n where $n \neq 231$		2	M1
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	1.2×10^{231}		A1
					Total 3 marks

7	$1 + 0.04 (= 1.04)$ oe or $x + 0.04x = 36\,400$ oe or $100(\%) + 4(\%) (= 104(\%))$ oe or $\frac{36\,400}{104} (= 350)$ oe		3	M1 Do not accept $(1 + 4\%)$ unless it leads to a correct answer
	$36\,400 \div "1.04"$ oe or $36\,400 \div \frac{"104"}{100}$ oe or $36\,400 \times \frac{100}{"104"}$ oe or $"350" \times 100$ or $36\,400 - (4 \times "350")$ oe			M1
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	35 000		A1
				Total 3 marks

8	$15 \times 58 (= 870)$ or $35 \times 72 (= 2520)$		3	M1 for the method to find the weight of at least 1 bag
	$"2520" + "870" (= "3390")$			M1 for summing the weights (may be embedded in a complete method)
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	67.8		A1 oe eg $\frac{339}{5}$ or $67\frac{4}{5}$
				Total 3 marks

9	eg $\begin{array}{r} 4x + 3y = 21 \\ - 4x - 2y = 10 \\ \hline \end{array}$ (Subtracting $3y - - 2y = 21 - 10$ or $5y = 11$) or $4\left(\frac{5+y}{2}\right) + 3y = 21$ or $2\left(\frac{21-3y}{4}\right) - y = 5$ or $5y = 11$	eg $\begin{array}{r} 4x + 3y = 21 \\ + 6x - 3y = 15 \\ \hline \end{array}$ (Adding $4x + 6x = 21 + 15$ or $10x = 36$) or $4x + 3(2x - 5) = 21$ or $2x - \left(\frac{21-4x}{3}\right) = 5$ or $10x = 36$		3	M1 for a correct method to eliminate x or y : coefficients of x or y the same and correct operator to eliminate selected variable (condone any one arithmetic error in multiplication) or for correctly writing x or y in terms of the other variable and correctly substituting (condone missing brackets) NB: the mark is for the method and not for the result of the method. However, if the correct result of the method is seen, the mark can be awarded
	$4x + 3 \times "2.2" = 21$ or $2x - "2.2" = 5$ or $x = \frac{5 + "2.2"}{2}$ or $x = \frac{21 - 3 \times "2.2"}{4}$	$4 \times "3.6" + 3y = 21$ or $2 \times "3.6" - y = 5$ or $y = 2 \times "3.6" - 5$ or $y = \frac{21 - 4 \times "3.6"}{3}$			M1 dep on first M1 for a correct method to find the other variable by substitution of found variable into one equation or for repeating above method to find second variable.
	<i>Working required</i>		$x = 3.6$ $y = 2.2$		A1 oe dep on M1 eg $x = \frac{18}{5}$, $y = \frac{11}{5}$
	Total 3 marks				

10	$0.06 \times 5000 (= 300)$ oe or $1.06 \times 5000 (= 5300)$ oe (NB Accept $\left(1 + \frac{6}{100}\right)$ oe for 1.06 but not $(1 + 6\%)$)		3	M1 for finding 6% or 106% of 5000	M2 for $1.06^3 \times 5000$ oe or $1.06^4 \times 5000$ oe (= 6312(.3848))
	$0.06 \times \text{"5300"} (= 318)$ oe and $\text{"5300"} + \text{"318"} (= 5618)$ and $0.06 \times \text{"5618"} (= 337.08)$ or $\text{"300"} + \text{"318"} + \text{"337.08"} (= 955.08)$			M1 (dep)	
	Correct answer scores full marks (unless from obvious incorrect working)	5955		A1 Allow 5955 – 5956 (if you see the correct answer and then 5000 is subtracted to give 955 – 956 then award full marks 955 – 956 with no working gains 2 marks) SCB2 for $(500 \times 1.06^3) = 595\dots$ [misread] If no marks awarded SCB1 for (not necessarily the answer) $5000 \times 1.06^n \quad n \neq 3$ or $5000 \times 0.06 \times 3 (= 900)$ or $5000 \times 0.18 (= 900)$ or $5000 \times 1.18 (= 5900)$ or $5000 \times 0.94 (= 4700)$ or $5000 \times 0.94^3 (= 4152\dots\dots)$ or $5000 \times 0.82 (= 4100)$	
				Total 3 marks	

11	$\pi \times 10^2 \times h = 5341$ oe or $\pi \times 10^2 (= 100\pi = 314(.159...))$ oe or $2 \times \pi \times 10^2 (= 200\pi = 628(.318...))$ oe		4	M1	for correct equation with the volume or for the area of the top/bottom surface (may be embedded in the total surface area expression but not from the volume formula)
	$(h =) \frac{5341}{\pi \times 10^2} \left(= \frac{5341}{100\pi} = 17 \right)$ oe			M1	for correct method for the height (implies the first method mark)
	$2 \times \pi \times 10 \times \frac{5341}{\pi \times 10^2}$ oe or $2 \times \pi \times 10 \times "17" (= 340\pi = 1068(.141...))$ oe			M1	for method for the curved surface area (may be embedded in the expression for the total surface area)
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	1697		A1	Allow 1695.5 – 1697.2 SCB3 for 1381.5 to 1383 or 440π (curve surface + 1 circle) or 540π (total area in terms of π)
				Total 4 marks	

12		$x \leq 0$	1	B1oe allow < in place of $\leq$ Accept $0 \geq x$ oe Accept $-4 \leq x \leq 0$ oe
		$2x + 5y \leq 12$	1	B1oe allow < in place of $\leq$ Accept $y \leq -\frac{2}{5}x + \frac{12}{5}$ oe
		$y \geq -x$	1	B1oe allow > in place of $\geq$ Accept $x \geq -y$ oe or $-x \leq y$ oe or $y + x \geq 0$ oe
				If no marks have been awarded then SCB2 for identifying the outside region eg $x \geq 0$ and $2x + 5y \geq 12$ and $y \leq -x$ oe Allow < in place of $\leq$ Allow > in place of $\geq$
				Total 3 marks

13	(a)	heights 8,35,52,58,60 at 130, 140, 150, 160, 170 respectively		2	M1	for at least 4 points plotted correctly at the end of the interval or for all points plotted consistently within each interval of the associated frequency table at the correct height
		NB A histogram/bar chart type graph scores zero marks unless a CF diagram is drawn over their histogram/bar chart)	Correct cf graph		A1	for fully correct plotting with points joined accept curve or line segments accept curve that is not joined at (120, 0)
	(b)	If the answer is given in the range then award the mark – unless from obvious incorrect working	138	1	B1ft	Allow 137 – 139 or ft for an ascending graph going from the y axis at 30
	(c)	If the answer is given in the range then award the mark – unless from obvious incorrect working	132	1	B1ft	Allow 131 – 134 ft for an ascending graph going from the y axis at 15
	(d)	[55, 57] or their value from a correct method		2	M1ft	ft for an ascending graph for a line going up from the x-axis at 155 to the line and across to the y-axis or for a mark on the line at the correct point or for a correct reading from the vertical scale eg 55 to 57.
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	3 or 4 or 5		A1ft	Allow 3 or 4 or 5 Must be an integer ft for an ascending graph for their integer value.
					Total 6 marks	

14	(a) (i)		43	1	B1	cao
	(a)(ii)	We will allow the symbol $\angle$ for angle	Correct reason	1	B1	dep on previous B1 <u>Angles</u> in the <u>same segment</u>
	(b)	$(AOD =) 2 \times 43 (= 86)$		2	M1	ft answer from (a)(i)
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	274		A1	dep on M1 ft provided the answer is between 180 and 360 degrees
						Total 4 marks

15	3 and 13		2	M1 for identifying 3 and 13 (and 9 only) (condone 9 also indicated in list)
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	10		A1
				Total 2 marks

16	$m = kr^2$ oe	$km = r^2$ oe	3	M1 (NB. Not for $m = r^2$) Constant of proportionality must be a symbol such as k Condone use of $\propto$ for method mark eg $m \propto kr^2$	M2 for $180 = k \times 6^2$ oe or $180 \times k = 6^2$ oe
	$180 = k \times 6^2$ or $180 = k \times 36$ or $k = 5$	$180 \times k = 6^2$ or $180 \times k = 36$ or $k = \frac{1}{5}$ oe		M1 for substitution of m and r into a correct formula Condone use of $\propto$ for method mark eg $180 \propto k \times 6^2$	
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>			$m = 5r^2$	A1 oe eg $m = 5 \times r^2$; $m = \frac{r^2}{0.2}$ etc Award 3 marks if answer is $m = kr^2$ on the answer line and $k = 5$ clearly given in the body of working. Award 3 marks if answer is $r = \sqrt{\frac{m}{5}}$ and $m = 5r^2$ oe is given in working otherwise $r = \sqrt{\frac{m}{5}}$ gains M2 SCB2 if M0 scored then award B2 for $m \propto 5r^2$
				Total 3 marks	

17	$(fg(x)=) (2x+1)^2 - 5$ oe or $(gf(x)=) 2(x^2 - 5) + 1$ oe		4	M1 for finding an expression for $fg(x)$ or $gf(x)$
	$(2x+1)^2 - 5 = 2[2(x^2 - 5) + 1]$ oe or $(2x+1)^2 - 5 = 4(x^2 - 5) + 2$ oe			M1 for a correct equation (where $(fg(x))$ and $(2gf(x))$ are correct initially)
	$4x^2 + 4x + 1 - 5 = 4x^2 - 20 + 2$ oe or $4x = -14$			M1 for correctly expanding brackets in a correct equation
	<i>Working required</i>	-3.5		A1 oe eg $-\frac{7}{2}$ dep on M2
				Total 4 marks

18 (a)		$\begin{pmatrix} -8 \\ 6 \end{pmatrix}$	1	B1 cao
(b)	$\begin{pmatrix} 4 \\ -3 \end{pmatrix} + \begin{pmatrix} 15 \\ -8 \end{pmatrix}$ oe or $\begin{pmatrix} 4 \\ -3 \end{pmatrix} - \begin{pmatrix} -15 \\ 8 \end{pmatrix}$ oe or $\begin{pmatrix} 19 \\ a \end{pmatrix} a \neq -11$ or $\begin{pmatrix} b \\ -11 \end{pmatrix} b \neq 19$ or $\begin{pmatrix} -19 \\ 11 \end{pmatrix}$		2	M1
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	$\begin{pmatrix} 19 \\ -11 \end{pmatrix}$		A1
(c)	$(\pm 15)^2 + 8^2 (= 289)$ oe		2	M1 Condone missing brackets around $(-15)^2$
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	17		A1
				Total 5 marks

19	$4y - 2xy = 3x + 5$ oe		3	M1 for multiplying by the denominator and expanding the bracket in a correct equation
	$4y - 5 = 3x + 2xy$ or $-3x - 2xy = -4y + 5$			M1ft for collecting terms in x on one side and other terms on the other side ft for equations with 2 terms in x and 2 other terms
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	$x = \frac{4y - 5}{3 + 2y}$		A1oe eg $x = \frac{-4y + 5}{-3 - 2y}$ NB for A1 we must see $x = \frac{4y - 5}{3 + 2y}$ oe in working if $\frac{4y - 5}{3 + 2y}$ oe alone is given as an answer
				Total 3 marks

20	$\frac{4}{3} \times \pi \times (2x)^3$ oe or $\frac{2}{3} \times \pi \times (2x)^3$ oe or $\frac{1}{3} \times \pi \times x^2 \times x$ oe		5	M1	for finding an expression for the volume of the sphere or hemisphere or cone in terms of x Condone missing brackets
	$\frac{2}{3} \times \pi \times 8x^3 - \frac{1}{3} \times \pi \times x^3 = \frac{3645}{8} \pi$ oe or $\frac{16}{3} \times \pi \times x^3 - \frac{1}{3} \times \pi \times x^3 = \frac{3645}{8} \pi$ oe or $5 \times \pi \times x^3 = \frac{3645}{8} \pi$ oe or $x^3 = \frac{729}{8}$ oe			M1	for a correct equation with the brackets expanded in terms of x (π may have been cancelled) Allow $\frac{3645}{8} \pi$ (=1431(.388...))
	$(x =) \sqrt[3]{\frac{3645\pi}{\pi \times 8 \times 5}}$ oe $\left(= \sqrt[3]{\frac{729}{8}} = \frac{9}{2} = 4.5 \right)$			M1	dep on previous M1 for rearranging a correct expression for x
	$2 \times \pi \times (2 \times "4.5")^2 (=162\pi)$ oe			M1	for the method for the outer curved surface area of the solid shape (may be embedded in extra working)
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	509		A1	awrt 509 SCB4 for an answer in the range 789-790.2 (the total surface area) SCB4 for an answer in the range 598.5-599.2 (the sum of the cone curved surface and the hemisphere curved surface)
					Total 5 marks

20 MISREAD Using $\frac{3645}{8}$	$\frac{4}{3} \times \pi \times (2x)^3$ oe or $\frac{2}{3} \times \pi \times (2x)^3$ oe or $\frac{1}{3} \times \pi \times x^2 \times x$ oe		5	M1 for finding an expression for the volume of the sphere or hemisphere or cone in terms of x Condone missing brackets
	$\frac{2}{3} \times \pi \times 8x^3 - \frac{1}{3} \times \pi \times x^3 = \frac{3645}{8}$ oe or $\frac{16}{3} \times \pi \times x^3 - \frac{1}{3} \times \pi \times x^3 = \frac{3645}{8}$ oe or $5 \times \pi \times x^3 = \frac{3645}{8}$ oe or $x^3 = \frac{729}{8\pi}$ (= 29(.005...)) oe			M1 for a correct equation with the brackets expanded in terms of x Allow $\frac{3645}{8}$ (= 455(.625) or 456)
	$(x =) \sqrt[3]{\frac{3645}{\pi \times 8 \times 5}}$ oe $\left(= \sqrt[3]{\frac{729}{8\pi}} = 3.07(252...) \right)$			M1 dep on previous M1 for rearranging a correct expression for x
	$2 \times \pi \times (2 \times "3.07(252...)")^2$ oe			M1 for the method for the outer curved surface area of the solid shape (may be embedded in extra working)
				A0 237(.26...)
			Total 5 marks	

21	eg $(3x-5)^2 = x^2 + 7$ oe or $(3x-5-x)(3x-5+x) = 7$ oe	eg $y^2 = \left(\frac{y+5}{3}\right)^2 + 7$ oe		5	M1 for substitution of $y = 3x - 5$ into $y^2 = x^2 + 7$ to obtain an equation in x only or for substitution of $x = \frac{\pm y \pm 5}{3}$ into $y^2 = x^2 + 7$ to obtain an equation in y only
	eg $8x^2 - 30x + 18 (= 0)$ oe or $4x^2 - 15x + 9 (= 0)$ oe	eg $8y^2 - 10y - 88 (= 0)$ oe or $4y^2 - 5y - 44 (= 0)$ oe			M1 ft dep on previous M1 for multiplying out and collecting terms, forming a 3-term quadratic in any form of $ax^2 + bx + c (= 0)$ where at least 2 coefficients (a or b or c) are correct
	eg $(4x-3)(x-3)(=0)$ or $x = \frac{- -15 \pm \sqrt{(-15)^2 - 4 \times 4 \times 9}}{2 \times 4}$ or $\left(x - \frac{15}{8}\right)^2 - \left(\frac{15}{8}\right)^2 = -\frac{9}{4}$ oe or $x = \frac{3}{4}$ and $x = 3$ oe	eg $(4y+11)(y-4)(=0)$ or $y = \frac{- -5 \pm \sqrt{(-5)^2 - 4 \times 4 \times -44}}{2 \times 4}$ or $\left(y - \frac{5}{8}\right)^2 - \left(\frac{5}{8}\right)^2 = \frac{44}{4}$ oe or $y = -\frac{11}{4}$ and $y = 4$ oe			M1 ft dep on first M1 method to solve their 3-term quadratic using any correct method (allow one sign error and some simplification – allow as far as eg $\frac{15 \pm \sqrt{225 - 144}}{8}$ or $\frac{5 \pm \sqrt{25 + 704}}{8}$ or if factorising allow brackets which expanded give 2 out of 3 terms correct) or correct values for x or correct values for y
	$y = 3 \times \frac{3}{4} - 5 \left(= -\frac{11}{4} \right)$ oe and $y = 3 \times 3 - 5 (= 4)$	$x = \frac{-\frac{11}{4} + 5}{3}$ oe and $x = \frac{4 + 5}{3}$			M1 ft dep on previous M1 for substituting their 2 found values of x or y into one of the two given equations or fully correct values for the other variable (correct labels for x / y) or for one correct pair of values
	<i>Working required</i>		$x = \frac{3}{4}, y = -\frac{11}{4}$ $x = 3, y = 4$		A1 oe dep on M2 for all 4 values (allow coordinates) Accept decimals

				Total 5 marks
22	$\sqrt[3]{125} : \sqrt[3]{216} (= 5 : 6)$ oe or $\sqrt[3]{216} : \sqrt[3]{125} (= 6 : 5)$ oe or $\frac{\sqrt[3]{216}}{\sqrt[3]{125}} \left(= \frac{6}{5} \right)$ oe or $\frac{\sqrt[3]{125}}{\sqrt[3]{216}} \left(= \frac{5}{6} \right)$ oe or $L = \frac{\sqrt[3]{216}}{\sqrt[3]{125}} K$ oe or $K = \frac{\sqrt[3]{125}}{\sqrt[3]{216}} L$ oe or $L = \frac{6}{5} K$ oe or $K = \frac{5}{6} L$ oe		5	M1 for correct linear scale factor for K and L . May be given as a fraction or a ratio or a decimal or may be stated eg 5 and 6 or setting up an equation between the lengths of K and L NB Accept 0.83(333...) for $\frac{5}{6}$
	$\sqrt{4} : \sqrt{9} (= 2 : 3)$ oe or $\sqrt{9} : \sqrt{4} (= 3 : 2)$ oe or $\frac{\sqrt{9}}{\sqrt{4}} \left(= \frac{3}{2} \right)$ oe or $\frac{\sqrt{4}}{\sqrt{9}} \left(= \frac{2}{3} \right)$ oe or or $K = \frac{\sqrt{4}}{\sqrt{9}} M$ oe or $M = \frac{\sqrt{9}}{\sqrt{4}} K$ oe or $K = \frac{2}{3} M$ oe or $M = \frac{3}{2} K$ oe			M1 indep for correct linear scale factor for K and M . May be given as a fraction or a ratio or a decimal or may be stated eg 3 and 2 or setting up an equation between the lengths of K and M NB Accept 0.66(666...) for $\frac{2}{3}$
	(K : L =) 10 : 12 oe and (K : M =) 10 : 15 oe or (K : L : M =) 10 : 12 : 15 oe eg 5 : 6 : 7.5 or : 12 : 15 or (L : M =) 12 : 15 oe eg 6 : 7.5 or $L \times \frac{5}{6} = M \times \frac{2}{3}$ oe or $L \times \frac{3}{2} = M \times \frac{6}{5}$ oe			M1 implies the previous M2 for finding two linear scale factor (ratios) where the value for K is equal for a comparison or (K :) L : M scale factor ratio or setting up an equation between the lengths of M and L SCB3 for a student who gains M2 and gives the answer of 20(%)
	eg $\frac{15-12}{12} (= 0.25)$ oe or $\frac{15}{12} (= 1.25)$ oe or $\frac{15}{12} \times 100 (= 125)$ oe or $\frac{15-12}{12} \times 100$ oe			M1 dep on M2 for a correct method to find 0.25 or 1.25 or 125 or for a complete method to find the value of y
	<i>Working required</i>	25		A1 dep on M2
				Total 5 marks

23	$(v) = 30t - 3t^2$			5	M1	for one or two terms correctly differentiated. Allow $30t - 3t^2 + \text{constant}$
	$(a =) 30 - 6t$	$(30t - 3t^2 = 0)$ $t = 0 \text{ and } t = 10$	$-3[(t - 5)^2 - 25](= 0)$ or $(t - 5)^2 - 25(= 0)$		M1	fit from previous M1 provided a 2 term quadratic has been obtained
	$(t =) \frac{30}{6} (= 5)$	$\frac{0 + 10}{2} (= 5)$	May give $t = \pm 5$ but it must be clear that they reject -5 (could be by continuing with only $+5$)		M1	For clearing showing a correct calculation for the value of t or for obtaining $t = 5$ If $t = \pm 5$ given, then to be awarded this mark they must reject -5 (eg could be by continuing only with $+5$)
	$(v =) 30 \times "5" - 3 \times "5"{}^2$				M1	for substitution into the velocity formula
	<i>Working required</i>			75	A1	dep on M2
					Total 5 marks	

24	(a)		$a = -3$ $b = 90$	2	B2 for $a = -3$ and $b = 90$ (B1 for $a = -3$ or $b = 90$) SCB1 for $a = 3$ and $b = -90$ SCB1 for $a = 3$ and $b = 270$
	(b)		$\left(\frac{1}{2}p, q+5\right)$	2	B2 for $\left(\frac{1}{2}p, q+5\right)$ oe B1 for $\left(\frac{1}{2}p, Y\right)$ or $(X, q+5)$ or $\left(q+5, \frac{1}{2}p\right)$ Allow Q for q and P for p
					Total 4 marks

25	$(d =) 3$		6	M1 May be embedded in S_n or S_{2n} or an expression in the form $3n \pm \dots$ oe or an expression in the form $a + (n - 1)3$ oe	
	$(S_{2n} =) \frac{2n}{2} [2(k + 2) + (2n - 1)3] (= n(2k + 6n + 1))$ oe or $(S_{2n} =) \frac{2n}{2} [2a + (2n - 1)3] (= n(2a + 6n - 3))$ oe			M1	M2 for $d = 2a$ oe or $d = 2(k + 2)$ oe
	$\frac{2n}{2} [2(k + 2) + (2n - 1)3] = 4 \times \frac{n}{2} [2(k + 2) + (n - 1)3]$ oe or $n(2k + 6n + 1) = 4 \times \frac{n}{2} (2k + 3n + 1)$ oe or $n(2k + 6n + 1) = n(4k + 6n + 2)$ oe or $\frac{2n}{2} [2a + (2n - 1)3] = 4 \times \frac{n}{2} [2a + (n - 1)3]$ oe or $n(2a + 6n - 3) = 4 \times \frac{n}{2} (2a + 3n - 3)$ oe or $n(2a + 6n - 3) = n(4a + 6n - 6)$ oe			M1 dep on M2 for using $S_{2n} = 4 \times S_n$ oe S_{2n} and S_n must be correct initially	
	$k = -0.5$ or $a = 1.5$			A1 dep on M3 oe	
	$-0.5 + 2 + (100 - 1)3$ oe or $1.5 + (100 - 1)3$ oe			M1 for substituting the correct value of $d = 3$ and $k = -0.5$ or $a = 1.5$	
	<i>Working required</i>	298.5		A1 dep on M3 oe eg $\frac{597}{2}$	
				Total 6 marks	

25 ALT	eg $n = 1$ $(S_2 =) k + 2 + k + 5 (= 2k + 7)$ oe or $(S_2 =) a + a + 3 (= 2a + 3)$ oe	eg $n = 2$ $(S_4 =) k + 2 + k + 5 + k + 8 + k + 11 (= 4k + 26)$ oe or $(S_4 =) a + a + 3 + a + 6 + a + 9 (= 4a + 18)$ oe		6	M1
	$(4 \times S_1 =) 4 \times (k + 2)$ oe or $(4 \times S_1 =) 4 \times a$ oe	$(4 \times S_2 =) 4 \times (k + 2 + k + 5) (= 8k + 28)$ oe or $(4 \times S_2 =) 4 \times (a + a + 3) (= 8a + 12)$ oe			M1
	$2k + 7 = 4 \times (k + 2)$ oe or $2a + 3 = 4 \times a$ oe	$4k + 26 = 8k + 28$ oe or $4a + 18 = 8a + 12$ oe			M1 dep on M2 for using $S_2 = 4 \times S_1$ oe or $S_4 = 4 \times S_2$ oe NB S_2 and S_1 or S_4 and S_2 must be correct initially
	$k = -0.5$ or $a = 1.5$				A1 dep on M3 oe
	$-0.5 + 2 + (100 - 1)3$ oe or $1.5 + (100 - 1)3$ oe				M1 for substituting the correct value of $d = 3$ and $k = -0.5$ or $a = 1.5$
	<i>Working required</i>		298.5		A1 dep on M3 oe eg $\frac{597}{2}$
					Total 6 marks