GCSE
Mathematics

Paper 2 Foundation Tier

Mark scheme

8300
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Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
[a, b)	Accept values $a \leq$ value $< b$
3.14 …	Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

Instructions on marking will be given but usually marks are not awarded to students who show no working.

Questions which do not ask students to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Continental notation

Accept a comma used instead of a decimal point (for example, in measurements or currency), provided that it is clear to the examiner that the student intended it to be a decimal point.

Question	Answer	Mark	Comments
1	135	B1	
2	2	B1	
3	$\frac{3}{100}$	B1	
4	$A = 2B$	B1	
5a	y^2	B1	
5b	$4a + 11$	B2	B1 for each term
	Additional Guidance		
	$4a$ or 11 or $4a + 11$ seen and answer eg $15a$		B1
	$4a + 11$ seen and then 'solves'		B1
	11 and –11 seen (without $4a$ seen)		B0

Question	Answer	Mark	Comments
6	Linear scale starting at 0 and increasing in 1s on vertical axis Vertical axis labelled frequency or f or number Title given or horizontal axis labelled (types of) bird(s) Bars labelled with four bird names (allow R, S, W, L) Four bars with equal widths Equal gaps or no gaps between four bars All heights correct	B3	Bar chart could be horizontal B3 for all criteria met B2 for 5 or 6 criteria met B1 for 3 or 4 criteria met correct or ft their increasing scale
	Additional Guidance		
	Mark intention throughout		
	If grid is blank, allow axes to be transposed		
	If axes and labels do not match the orientation of the bar chart then only the marks for crtieria 3 (must be a title), 5, 6 and 7 may be awarded		B1 max
	All values not needed for axis scale eg 0 can be implied but spacing must be linear		
	Scale of 2 units per square does not meet the first criterion		
	Allow words after 'Number' on axis label eg 'Number seen', 'Number of birds'. Also allow eg Amount of birds		
	Title must include the word bird		
	Condone different gap between the vertical axis and the first bar with other gaps equal or no other gaps		
	If no axis scale, bars with heights 2, 5, 3, 1 meet heights criterion		
	Points only or vertical lines can score the marks for criteria 1, 2, 3, 4 and 7		B2 max

Question	Answer	Mark	Comments
7	**Alternative method 1**		
	£2 + £1 + 50p + 20p + 20p + 5p + 2p or (£)3.97 or £1 + 50p + 2p + 1p or (£)1.53 or £2 + £1 + 50p + 20p + 20p + 5p + 2p + £1 + 50p + 2p + 1p or (£)5.5(0) or £2 + £1 + 50p + 20p + 20p + 5p + 2p – £1 – 50p – 2p – 1p or (£)2.44	M1	Accept incorrect or missing units Totals either set of coins or Totals all coins or Works out difference
	(their 3.97 + their 1.53) ÷ 2 or their (£) 5.5(0) ÷ 2 or (£)2.75 or (their 3.97 – their 1.53) ÷ 2 or their (£) 2.44 ÷ 2 or (£)1.22	M1dep	oe Accept incorrect or missing units
	£1, 20p and 2p	A1	oe eg £1.00, £0.20, £0.02 Correct units must be given
	Alternative method 2		
	Moves 3 coins from Eve to Ola and correctly evaluates one set of coins	M1	Accept incorrect or missing units
	Moves a different set of 3 coins from Eve to Ola and correctly evaluates both sets of coins	M1dep	Accept incorrect or missing units
	£1, 20p and 2p	A1	oe eg £1.00, £0.20, £0.02 Correct units must be given
	Additional Guidance		
	Answer of 1, 20, 2 with some or all units incorrect or missing		M1M1A0
	Do not accept eg £0.20p		A0

Question	Answer	Mark	Comments
8	12.5(0) + 12.5(0) ÷ 2 or 12.5(0) + 6.25 or 12.5(0) × 1.5 or 18.75	M1	oe Cost of 2 suits
	9.75 × 4 or $9.75 \times \frac{2}{3} \times 6$ or 6.5(0) × 6 or 39(.00)	M1	oe eg 9.75 × 6 – 9.75 × 2 or 58.5(0) – 19.5 Cost of 6 dresses
	their 18.75 + their 39(.00)	M1dep	dep on at least M1 awarded Must be adding their suit(s) and their dress(es) May be implied by final answer
	57.75	A1	Accept £57.75p
	Additional Guidance		
	6.25 + 9.75 × 6		M0M0M0dep
	6.25 + 39		M0M1M1dep
	12.50 × 2 + 39		M0M1M1dep
	18.75 + 9.75 × 2		M1M0M1dep

Question	Answer	Mark	Comments
9	**Alternative method 1**		
	18 – 4 or 14 seen	M1	oe eg 4 + 14 = 18
	39 – 2 × their 14 or 39 – 28 or 11	M1dep	oe eg 14, 14, 11
	15	A1	
	Alternative method 2		
	39 + 3 × 4 or 39 + 12 or 51	M1	
	their 51 – 2 × 18 or their 51 – 36	M1dep	
	15	A1	
	Additional Guidance		
	14 may be implied by eg twins = 28 (but not just 28 seen)		M1

10	Fully correct table	B4	B1 for each correct decision in a row
	Additional Guidance		

	Must be true	Cannot be true	Might be true
The triangle is equilateral			✓
The triangle has at least one other acute angle	✓		
The triangle is right-angled			✓
The other two angles are each less than 60°		✓	

Mark intention if crosses used eg if a cross is the only mark in a row assume that is the answer	
More than one tick in a row is choice for that decision	B0 for that row

Question	Answer	Mark	Comments
11	7	B1	
12	19.5	B1	
13a	752 951 or 752951 or 752,951	B1	Allow commas even if positioning incorrect eg 75,2951 or 752'951 B1
	Additional Guidance		
	752.951		B0
13b	20 000 and 400 and 10 and 800 000 and Yes	B3ft	ft correct decision for their answer to (a) oe decision eg it is sensible B2 20 000 and 400 and 10 B1 20 000 or 400 or 10
	Additional Guidance		
	800 000 (and Yes) with no other values		B0
	If answer to (a) is 800 000 to 1sf then the correct ft decision in (b) is Yes eg1 (a) 770 000 (b) decision should be Yes eg2 (a) 1762 (b) decision should be No eg3 (a) 752.951 (b) allow decision to be Yes or No		

Question	Answer	Mark	Comments
14a	**Alternative method 1**		
	Two of the three totals correct (2016 =) 136 (2015 =) 143 (2014 =) 132 or 17 + 64 + 50 + 5 and 9 + 72 + 61 + 1 and 19 + 58 + 53 + 2	M1	Totals may be seen by table Correct totals may be implied by means (2016 → 34, 2015 → 35.75, 2014 → 33) Addition signs must be shown for horizontal addition but may be implied by a column of numbers in their working
	136 and 143 and 132 and 2015 or 34 and 35.75 and 33 and 2015	A1	Totals may be seen by table
	Alternative method 2		
	8 and –8 and –11 and 4 or –7 and –10 and 14 and 8 and –1 or 11	M1	Difference between 2016 and 2015 Difference between 2015 and 2014 Differences may be seen in table
	–7 and 11 and 2015	A1	Differences may be seen in table
	Additional Guidance		
	Differences may have consistently opposite signs for either comparison		
	Ignore totals for quarters shown		
	Allow Year 2 for 2015		
	136 and 143 and 132, answer 143		M1A0
	136 and 143 and 132, answer 143 in 2015		M1A1
14b	Quarter 2	B1	

Question	Answer	Mark	Comments
15	**Alternative method 1**		
	80 × 0.55 or 44 or 120 × 0.7 or 84	M1	oe
	80 × 0.55 + 120 × 0.7 or 44 + 84 or 128	M1dep	Correct method for both
	(80 + 120) × 0.65 or 130 or their 128 ÷ (80 + 120) × 100 or their 128 ÷ 2 or 64	M1	65% of total marks available or their total score for Riya as a percentage of full marks
	128 and 130 and No or 64 and No	A1	oe eg No, she needed 130 but was 2 marks short oe eg 0.64 and 0.65 and No
	Alternative method 2 – marks not scored		
	80 × 0.45 or 36 or 120 × 0.3 or 36	M1	oe
	80 × 0.45 + 120 × 0.3 or 36 + 36 or 72	M1dep	Correct method for both
	(80 + 120) × 0.35 or 70 or their 72 ÷ (80 + 120) × 100 or their 72 ÷ 2	M1	35% of total marks available or their total score for Riya as a percentage of full marks
	72 and 70 and No or 36 and 35 and No	A1	oe eg No, she failed by 2 marks oe eg 0.36 and 0.35 and No

Alternative methods 3 and 4 and additional guidance continue on the next two pages

Question	Answer	Mark	Comments
15 cont	**Alternative method 3**		
	80 × 0.55 or 44	M1	oe
	(80 + 120) × 0.65 or 130	M1	65% of total marks available
	their 130 – their 44 or 86 and 120 × 0.7 or 84 or their 130 – their 44 or 86 and their 86 ÷ 120 × 100 or 71.6... or 72	M1dep	dep on M1M1
	86 and 84 and No or 71.6... or 72 and 70 and No	A1	oe eg No, she needed 2 more marks on B oe eg No, she needed 1.6% more on B
	Alternative method 4		
	120 × 0.7 or 84	M1	oe
	(80 + 120) × 0.65 or 130	M1	65% of total marks available
	their 130 – their 84 or 46 and 80 × 0.55 or 44 or their 130 – their 84 or 46 and their 46 ÷ 80 × 100 or 57.5	M1dep	dep on M1M1
	46 and 44 and No or 57.5 and 55 and No	A1	oe eg No, she needed 2 more marks on A oe eg No, she needed 2.5% more on A

Additional guidance continues on the next page

Question	Answer	Mark	Comments

15 cont	**Additional Guidance**	
	Build up steps for percentages must be correct or have fully correct method shown for any incorrect steps eg1 50% = 40, 5% = 16, section A = 56 eg2 50% = 40, 5% = 80 × 0.05 = 16, section A = 56	M0 M1
	Ignore % signs given with marks eg 44%	
	128 and she needs 2 more marks implies No	M1M1M1A1
	55 + 70 = 125 125 → 62.5% and No	M0M0 M1A0
	Allow misread of 55% of 120 and 70% of 80 for method marks	max M3

16	$2 \times \pi \times 37$ or $\pi \times 74$ or 8×37 or 296	M1	Accept [3.14, 3.142] for π
	[232, 233] or 74π	A1	May be implied by eg 74π + ...
	[528, 529] or $74\pi + 296$	A1	
	Additional Guidance		
	$360 - 37 \times 8$		M1A0A0
	37×8 or 296 seen and then eg halved or doubled		M1

Question	Answer	Mark	Comments
17a	**Alternative method 1**		
	$1.8 \times -40 + 32$ or -72	M1	oe eg $1.8(-40) + 32$
	$1.8 \times -40 + 32 = -40$ or $1.8 \times -40 = -72$ and $-72 + 32 = -40$	A1	oe eg $1.8(-40) + 32 = -40$ Full working must be seen oe eg $1.8 \times -40 = -72$ and $-40 - 32 = -72$
	Alternative method 2		
	$\frac{-40-32}{1.8}$ or -72	M1	
	$\frac{-40-32}{1.8} = -40$ or $-40 - 32 = -72$ and $-72 \div 1.8 = -40$	A1	Full working must be seen oe eg $-40 - 32 = -72$ and $-40 \times 1.8 = -72$
	Alternative method 3		
	$F = 1.8F + 32$ and $F - 1.8F = 32$ or $0.8F = -32$	M1	Forms equation in one variable and collects terms correctly using any letter oe eg $1.8F - F = -32$ or $-0.8F = 32$
	$(F=) -32 \div 0.8$ and $F = -40$	A1	Full working must be seen oe eg $(F=) 32 \div -0.8$ and $F = -40$
	Additional Guidance		
	Ignore units		
	72 does not imply M1		
	Only $-72 + 32 = -40$		M1A0

Question	Answer	Mark	Comments
17b	No and 5 or No and correctly evaluated counter example	B1	
	Additional Guidance		
	No, anything between –17°C and 0°C is positive in Fahrenheit		B1
	No, anything between 0°F and 32°F is negative in Celsius		B1
	Unless the range from –17°C to 0°C is given, then the counter example must be evaluated correctly		
	No because 1.8 × –15 is –27, and 32 – 27 = 4		B0
	Any temperature in Celsius between $-17\frac{7}{9}$ °C and 0°C can be used as a counter-example eg1 1.8 × –10 + 32 = 14 so No eg2 1.8 × –1 + 32 = 30.2 so No		 B1 B1
	No because 14°F is –10°C		B1
	Accept No because –10 = 14		B1
	No because –15 is positive in Fahrenheit		B0

Question	Answer	Mark	Comments
18	**Alternative method 1**		
	6 × 4 or 24 stated or implied as target total of the four cards	M1	Indicating 1, 5, 7 and 11 are the chosen four cards implies M2
	1 + 5 + 7 + 9 + 11 or 33	M1	
	9	A1	
	Alternative method 2		
	1, 5, 7, 9 → (1 + 5 + 7 + 9) ÷ 4 or 1, 5, 7, 11 → (1 + 5 + 7 + 11) ÷ 4 or 1, 5, 9, 11 → (1 + 5 + 9 + 11) ÷ 4 or 1, 7, 9, 11 → (1 + 7 + 9 + 11) ÷ 4 or 5, 7, 9, 11 → (5 + 7 + 9 + 11) ÷ 4	M1	1, 5, 7, 9 → 22 ÷ 4 or 1, 5, 7, 11 → 24 ÷ 4 or 1, 5, 9, 11 → 26 ÷ 4 or 1, 7, 9, 11 → 28 ÷ 4 or 5, 7, 9, 11 → 32 ÷ 4
	1, 5, 7, 9 → 5.5 or 1, 5, 7, 11 → 6 or 1, 5, 9, 11 → 6.5 or 1, 7, 9, 11 → 7 or 5, 7, 9, 11 → 8	A1	
	9	A1	with no error in the mean of 1, 5, 7, 11
	Additional Guidance		
	Use the alternative scheme that awards the better mark		
	33 – 24		M1M1A0
	1 + 5 + 7 + 11 = 28, 28 ÷ 4 = 6, answer 9 (with no other work)		M1A0A0

19a	120 ÷ (1 + 4) or 120 ÷ 5 or 24 or 96	M1	oe
	24 : 96	A1	in order
	Additional Guidance		
	96 : 24		M1A0
	120 ÷ 5 and 120 ÷ 4 is choice unless intention is clear		M0A0
	Further cancelling after 24 : 96 seen eg 1 : 4		M1A0

Question	Answer	Mark	Comments
19b	1.75 : 1 or $1\frac{3}{4}$: 1 or $\frac{7}{4}$: 1	B1	

20	**Alternative method 1**		
	1350 × 0.02 or 27	M1	1350 × 1.02 or 1377 implies M1M1dep
	1350 + their 27 or 1377	M1dep	
	their 1377 × 12 or 16 524	M1	Monthly pay × 12
	47 × 37.5 or 1762.5	M1	May be seen as pay ÷ 47 ÷ 37.5
	9.37… or 9.38	A1	Allow 9.40 with method Accept eg £9.38p but not 9.4
	Alternative method 2		
	1350 × 12 or 16 200	M1	Monthly pay × 12
	their 16 200 × 0.02 or 324	M1dep	
	their 16 200 + their 324 or their 16 200 × 1.02 or 16 524	M1dep	dep on M1M1
	47 × 37.5 or 1762.5	M1	May be seen as pay ÷ 47 ÷ 37.5
	9.37… or 9.38	A1	Allow 9.40 with method Accept eg £9.38p but not 9.4

Alternative methods 3 and 4 and additional guidance continue on the next two pages

Question	Answer	Mark	Comments
20 cont	**Alternative method 3**		
	1350 × 12 or 16 200	M1	
	47 × 37.5 or 1762.5	M1	May be seen as pay ÷ 47 ÷ 37.5
	their 16 200 ÷ their 1762.5 or 9.19... and their 9.19… × 0.02 or 0.18…	M1dep	Increase per hour dep on M1M1
	their 9.19… + their 0.18…	M1dep	dep on M1M1M1
	9.37… or 9.38	A1	Allow 9.40 with method Accept eg £9.38p but not 9.4
	Alternative method 4		
	47 × 37.5 or 1762.5	M1	
	their 1762.5 ÷ 12 or 146.87(5) or 146.88	M1dep	Hours per month
	1350 ÷ their 146.87(5) or 9.19... and their 9.19… × 0.02 or 0.18…	M1dep	Increase per hour
	their 9.19… + their 0.18…	M1dep	
	9.37… or 9.38	A1	Allow 9.40 with method Accept eg £9.38p but not 9.4

Additional guidance continues on the next page

Question	Answer	Mark	Comments

20 cont	**Additional Guidance**	
	Build up steps for 2% or 102% must be correct or have fully correct method shown for any incorrect steps eg1 1% = 135, 2% = 270, monthly pay = 1620 eg2 1% = 135, 2% = 2 × 135 = 270, monthly pay = 1620 eg3 1% = 1350 ÷ 100 = 135, 2% = 270, monthly pay = 1620	 M0M0dep M0M0dep M1M1dep
	If correct methods or values are seen ignore choice of methods	
	27 or 16 200 or 1762.5	at least M1
	1377 or 324	at least M1M1
	16 524	at least M1M1M1
	1377 ÷ 4 = 344.25 344.25 ÷ 37.5 = 9.18 (unless other correct values seen elsewhere in working)	M1M1dep M0M0A0

21a	<table><tr><td>K</td><td>L</td><td>M</td></tr><tr><td>84</td><td>54</td><td>62</td></tr><tr><td>0.42</td><td>0.27</td><td>0.31</td></tr></table>	B2	oe B1 0.27 oe for relative frequency of L or 0.31 oe for relative frequency of M or B1ft ft their 62 ÷ 200 for relative frequency of M
	Additional Guidance		
	<table><tr><td>K</td><td>L</td><td>M</td></tr><tr><td>84</td><td>54</td><td>68</td></tr><tr><td>0.42</td><td>0.2</td><td>0.34</td></tr></table>		B1ft

Question	Answer	Mark	Comments
21b	**Alternative method 1**		
	500 × 0.42 or $84 \times \frac{500}{200}$ or 84 × 2 + 84 ÷ 2 or 168 + 42	M1	oe
	210	A1	
	Alternative method 2		
	300 × 0.42 + 84 or 126 + 84	M1	oe
	210	A1	
	Additional Guidance		
	$\frac{210}{500}$		M1A0
	Embedded answer eg 210 ÷ 500 = 0.42, answer 0.42		M1A0
	Misread of working out L or M (must see method) eg L: 500 × their 0.27 or $54 \times \frac{500}{200}$ eg M: 500 × their 0.31 or their $62 \times \frac{500}{200}$		M1A0
	Build up steps must be correct or have fully correct method shown for any incorrect steps eg1 200 = 84, 400 = 164, 100 = 42, Answer 206 eg2 200 = 84, 400 = 84 × 2 = 164, 100 = 42, Answer 206		M0A0 M1A0

Question	Answer	Mark	Comments
22	64 000 000 ÷ 95 000 or 673.(…) or 674 or $\frac{12\ 800}{19}$ or 82 000 000 ÷ 140 000 or 585.(…) or 586 or $\frac{4100}{7}$	M1	oe population ÷ area Accept a pair of consistent divisions eg 64 ÷ 95 or 0.673… or 0.674 and 82 ÷ 140 or 0.585… or 0.586
	673.(…) or 674 or 670 and 585.(…) or 586 or 590 or $\frac{89\ 600}{133}$ and $\frac{77\ 900}{133}$	A1	Correct comparable values from consistent divisions eg 0.674 and 0.586 Accept 700 with division seen for UK Accept 600 with division seen for Germany
	Comparable values and correct conclusion	A1ft	eg 673 and 585 and greater for UK 0.673 and 0.585 and greater for UK ft M1A0 and comparable values Ignore further work
	Additional Guidance		
	Comparable values means both must be in the same form eg fractions with common denominators		
	64 000 000 ÷ 95 000 = 67.4 82 000 000 ÷ 140 000 = 5857 Germany is higher	M1 A0 A1ft	
	Ignore subtraction of results		
	673 and 585 and UK has more people per square mile	M1A1A1ft	
	673 and 585 and Germany has more space for their population	M1A1A1ft	
	673 and 585 and UK's population is less spread out	M1A1A1ft	
	673 and 585 and UK is more than Germany	M1A1A1ft	
	673 and 585 and UK is 78 more than Germany (ignore further work)	M1A1A1ft	

Additional guidance continues on the next page

Question	Answer	Mark	Comments
22 cont	673 and 585 and the difference is 88		M1A1A0ft
	673 and 585 and UK population is bigger		M1A1A0ft
	673 and 586 and UK		M1A1A0ft
	673 and 585 and Germany has more space		M1A1A0ft
	673 > 585 (unless links to countries in working)		M1A1A0ft
	$\frac{12\ 800}{19}$ and $\frac{4100}{7}$ and UK is greater (fractions not comparable)		M1A0A0ft
23	Number of televisions sold	B1	

Question	Answer	Mark	Comments
24	Enlargement	B1	
	Scale factor $(\times)\frac{1}{3}$	B1	
	Centre (5, 1)	B1	
	Additional Guidance		
	Enlarge $(\times)\frac{1}{3}$ (5, 1)		B1B1B1
	Reduction or makes bigger or unenlargement or increase or negative enlargement		1st B0
	Any other transformation mentioned or implied such as reflection, rotation or translation loses the mark for enlargement eg enlarged and moved up 4 or enlarged and $\begin{pmatrix}-2\\2\end{pmatrix}$		1st B0
	Do not accept ÷ 3 for scale factor		2nd B0
25(a)	Correct product using a point on the curve or correct division using a point on the curve	B1	eg 2 × 12 (= 24) or 3 × 8 (= 24) or 5 × 4.8 (= 24) or 6 × 4 (= 24) or 10 × 2.4 (= 24) or 24 ÷ 2 = 12 or 24 ÷ 6 = 4
	Additional Guidance		
	1 × 24 (= 24)		B0
	12 + 12 (= 24)		B0
	3 × 4 × 2 = 24		B0
	For multiplication, 24 does not have to be shown		
	Ignore any units seen		
	Ignore any lines on the graph		
	8 × 3 = 24 and 12 + 12 = 24 (choice)		B0
	area 6 and length 4 and volume 24		B0

Question	Answer	Mark	Comments
25(b)	**Alternative method 1**		
	Reading from 5 on the graph to give [4.7, 4.9]	M1	
	$\frac{1}{2} \times 6 \times h = [4.7, 4.9]$ or $[4.7, 4.9] \div (\frac{1}{2} \times 6)$	M1dep	oe
	[1.56, 1.64]	A1	
	Alternative method 2		
	$24 \div 5$ or 4.8 or $\frac{1}{2} \times 6 \times h$ or $\frac{1}{2} \times 6 \times h \times 5$	M1	oe
	$\frac{1}{2} \times 6 \times h = 24 \div 5$ or $24 \div 5 \div (\frac{1}{2} \times 6)$ or $\frac{1}{2} \times 6 \times h \times 5 = 24$ or $15h = 24$ or $24 \div (\frac{1}{2} \times 6 \times 5)$ or $24 \div 15$	M1dep	oe
	1.6	A1	
	Additional Guidance		

Question	Answer	Mark	Comments
26a	$\frac{3}{4} \times \frac{3}{4} \times 15$ or $\frac{3}{4} \times 15$ or 11.25 and $\frac{3}{4}$ × their 11.25	M1	oe
	8.4(375) or 8.44 or 8.438 or $\frac{135}{16}$ or $8\frac{7}{16}$	A1	
	Additional Guidance		
	8.43 or 8.437		M1A1
	8.4 seen, answer 8		M1A1
	$\frac{3}{4}$ of 11.25 (unless correctly evaluated)		M0
	$\frac{3}{4}$ × 8.4375, answer 6.328 (further work)		M1A0
	11.25 + 8.4375, answer 19.6875 (further work)		M1A0

Question	Answer	Mark	Comments
26b	**Alternative method 1**		
	Ticks second box and [7.425, 7.5375] or Ticks second box and correctly evaluates $\frac{2}{3}$ × their 11.25	B2ft	ft correct box ticked for comparing with their answer to (a) B1ft [7.425, 7.5375] with no or incorrect decision or Correctly evaluates $\frac{2}{3}$ × their 11.25 with no or incorrect decision
	Alternative method 2		
	Ticks second box and valid comparison	B2	eg $\frac{8}{12}$ and $\frac{9}{12}$ 0.66… or 0.67 and 0.75 66.(...)% or 67% and 75% $\frac{9}{16}$ and $\frac{8}{16}$ clear diagrams showing $\frac{2}{3}$ and $\frac{3}{4}$ B1 Ticks second box and incomplete comparison eg $\frac{8}{12}$ and $\frac{3}{4}$ two thirds is less than three quarters $\frac{3}{4} \times \frac{3}{4} = \frac{9}{16}$ and $\frac{3}{4} \times \frac{2}{3} = \frac{6}{12}$ or Valid comparison (that would score B2) with no or incorrect decision

Additional guidance continues on the next page

Question	Answer	Mark	Comments

26b cont	**Additional Guidance**	
	In Alt 1 only follow through their answer to (a) for the comparison, the working for $\frac{2}{3}$ of their 11.25 must be correct	
	(a) answer 6.5 (b) Ticks first box and 7.5 seen	B2ft
	Accept 0.66... or 0.67 for $\frac{2}{3}$	
	Using 0.6 for $\frac{2}{3}$	B0

27	**Alternative method 1**		
	$12x - 8$	M1	May be seen in a grid
	their $12x - 2x = -5$ + their 8 or $10x = 3$ or their $-8 + 5 = 2x$ – their $12x$ or $-3 = -10x$	M1	Collecting two terms in x and two constant terms correctly oe eg $10x - 3 = 0$
	0.3 or $\frac{3}{10}$	A1ft	ft M1M0 or M0M1 with exactly one error
	Alternative method 2		
	$\frac{x}{2} - \frac{5}{4}$	M1	
	$3x$ – their $\frac{x}{2}$ = their $-\frac{5}{4}$ + 2 or $\frac{5}{2}x = \frac{3}{4}$ or -2 + their $\frac{5}{4}$ = their $\frac{x}{2} - 3x$ or $-\frac{3}{4} = -\frac{5}{2}x$	M1	Collecting two terms in x and two constant terms correctly oe eg $\frac{5}{2}x - \frac{3}{4} = 0$
	0.3 or $\frac{3}{10}$	A1ft	ft M1M0 or M0M1 with exactly one error

Additional guidance continues on the next page

Question	Answer	Mark	Comments

27 cont	**Additional Guidance**	
	$12x - 2 = 2x - 5$ $10x = -3$ $x = -0.3$	M0 M1 A1ft
	$12x - 8 = 2x - 5$ $10x = -5$ $x = \frac{-5}{10}$	M1 M0 A1ft
	$12x - 8 = 2x - 5$ $14x = 3$ $x = \frac{3}{14}$	M1 M0 A1ft
	$12x - 8 = 2x - 5$ $14x = -13$ $x = -\frac{13}{14}$ (two errors)	M1 M0 A0ft
	$12x - 8 = 8x - 20$	M1M0A0
	Any ft answer must be exact or rounded or truncated to at least 2 dp	
	The last two marks can be implied without the collection of terms seen eg $12x - 6 = 2x - 5$ and answer 0.1	M0M1A1ft
	Collecting terms before the bracket has been expanded	Zero

28	3 6 9 … or 23 + 12 or $1.5n^2$…	M1	
	35	A1	
	Additional Guidance		
	Answer line blank with 35 as next term in sequence		M1A1
	Answer line has attempt at term to term rule or *n*th term but 35 seen		M1A0
	35 seen on dotted line in sequence but a different answer given eg 50		M1A0

Question	Answer	Mark	Comments
29	$\tan x = \frac{3}{7}$ or $\tan^{-1}\frac{3}{7}$ or $\sin x = \frac{3(\sin 90)}{\sqrt{3^2+7^2}}$ or $\sin x = \frac{3(\sin 90)}{\sqrt{58}}$ or $\cos x = \frac{7}{\sqrt{3^2+7^2}}$ or $\cos x = \frac{7}{\sqrt{58}}$ or $90 - \tan^{-1}\frac{7}{3}$ or 90 – [66.7, 66.81] or 90 – 67	M1	oe eg $\cos x = \frac{7^2 + \left(\sqrt{7^2+3^2}\right)^2 - 3^2}{2\times\sqrt{3^2+7^2}\times 7}$ Any letter
	[23, 23.3]	A1	

Additional Guidance

$\tan = \frac{3}{7}$ or $\tan\frac{3}{7}$ or $\tan^{-1} = \frac{3}{7}$ (unless recovered)	M0
Answer [23, 23.3] (possibly coming from scale drawing)	M1A1
If using sine rule must rearrange to $\sin x =$ for M1	
If using cosine rule must rearrange to $\cos x =$ for M1	
Allow [0.42, 0.43] for $\frac{3}{7}$	
Allow 2.33… for $\frac{7}{3}$	
Allow [7.6, 7.62] for $\sqrt{3^2+7^2}$	