GCSE
Mathematics

Paper 3 Foundation Tier

Mark scheme

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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	1000	B1	
2	$\frac{2}{6}$	B1	
3	0.215	B1	
4	capacity	B1	

Question	Answer	Mark	Comments
5	**Alternative method 1 of 5**		
	1.7(0) ÷ 2.5 or 0.68 or 170 ÷ 2.5 or 68	M1	oe 0.51 or 51 implies M1
	their 0.68 × 3.25 or their 68 × 3.25 or 221	M1dep	oe
	2.21	A1	
	Alternative method 2 of 5		
	2.5 ÷ 1.7(0) or 1.47… or 2.5 ÷ 170 or 0.0147…	M1	oe
	3.25 ÷ their 1.47… or 3.25 ÷ their 0.0147… or 221	M1dep	oe
	2.21	A1	
	Alternative method 3 of 5		
	3.25 ÷ 2.5 or 1.3	M1	oe
	their 1.3 × 1.7(0) or 3.25 × 1.7(0) ÷ 2.5	M1dep	oe
	2.21	A1	

Alternative method 4 continues on the next page

Question	Answer	Mark	Comments
5 cont	**Alternative method 4 of 5**		
	2.5 ÷ 3.25 or 0.769… or 0.77	M1	oe
	1.7(0) ÷ their 0.769… or 1.7(0) ÷ their 0.77	M1dep	oe
	2.21	A1	
	Alternative method 5 of 5		
	1.7(0) ÷ 10 or 0.17 **and** 3.25 ÷ 0.25 or 13	M1	oe
	their 0.17 × their 13 or 1.7(0) ÷ 10 × their 13	M1dep	oe
	2.21	A1	
	Additional Guidance		
	Condone 2.21p unless the £ sign has been crossed out		M1M1A1
	(£)0.51 or 51(p) is the cost of the extra 0.75 kg of carrots This implies the first M1 on Alt 1 and achieves the second M1 if added to 1.7(0) or 170		
	Accept work in grams rather than kilograms		
	Do not allow a misread of 3.25 kg		

Question	Answer	Mark	Comments
6a	BHS RHS BHP RHP BCS RCS BCP RCP	B2	B1 for four additional correct combinations with no errors or repetitions or five additional correct combinations with at most one error or repetition or six or seven additional correct combinations with at most two errors or repetitions
	Additional Guidance		
	Do not allow repetition of BHS for B2		
	Ingredients may be written as full words		
	Accept letters or words in any order eg BPC for BCP		
	Do not accept tree diagrams without combinations listed		
6b	$\frac{2}{8}$ or $\frac{1}{4}$	B1ft	ft their (a) with at least three additional combinations, at least one of which contains cheese and pickle ignore further working if attempting to simplify
	Additional Guidance		
	$\frac{2}{8}$ or $\frac{1}{4}$ is B1, if not $\frac{2}{8}$ or $\frac{1}{4}$ refer to (a) for possible ft		
	BHS, BHS, BHP, BCS, BCP, RHS, RHP, RCS and RCP in (a) with answer $\frac{2}{9}$		B1ft
	Answer given only as decimal or percentage		B0

Question	Answer	Mark	Comments
7a	Right-angled triangle ABC drawn with *A* at (–3, –2) and *B* at (1, –2) and *C* at (–3, 4) or (1, 4)	B3	B2 for *A*, *B* and *C* correctly plotted with no triangle drawn or *A* and *B* correctly plotted and a right-angled triangle drawn with *A* and *B* at two of the vertices or *C* plotted on the line $y = 4$ and a right-angled triangle drawn with *C* at one of the vertices or *A* and *B* correctly plotted with *C* plotted at $(k, 4)$ with $k \neq -3$ or 1 and triangle *ABC* drawn B1 for *A* and *B* correctly plotted or *C* plotted on the line $y = 4$ or a right-angled triangle drawn
	Additional Guidance		
	Condone incorrect or omitted labelling		

7b	**Alternative method 1**		
	$\frac{1}{2}$ × their base × their height	M1	
	12	A1ft	ft their triangle
	Alternative method 2		
	Evidence of counting squares seen	M1	
	12	A1ft	ft their triangle

Question	Answer	Mark	Comments
8a	**Alternative method 1**		
	× 7 in first box and –2 in second box and q in Output	B2	B1 for any two correct accept $q = 7r - 2$ in Output
	Alternative method 2		
	$-\frac{2}{7}$ in first box and × 7 in second box and q in Output	B2	B1 for any two correct accept $q = 7r - 2$ in Output
	Additional Guidance		
	Do not accept $7r - 2$ alone in Output		
	Accept $= q$ in Output		
	Condone 7 × in first box		
8b	$3(x + 5)$	B1	oe $3x + 15$ Accept $y = 3(x + 5)$ or $y = 3x + 15$
	Additional Guidance		
	Ignore further work if attempting to solve eg $3x + 15 = 0$, $x = -5$		B1
	Do not ignore further work if attempting to simplify eg $3x + 15 = 18x$		B0
	$(y =) x + 5 \times 3$		B0
	Do not accept $(x + 5)3$ or $3 \times (x + 5)$ or $(x + 5) \times 3$ or $x3 + 15$		B0

Question	Answer	Mark	Comments
9	**Alternative method 1**		
	10 × 20 or 200 and 15 × 12 or 180 and 25 × 6 or 150	M1	
	10 × 20 + 15 × 12 + 25 × 6 or their 200 + their 180 + their 150 or 530	M1dep	
	580 – their 530 or 50 (eggs)	M1dep	
	54 – (10 + 15 + 25) or 54 – 50 (boxes) or 4 (more boxes) or 1 (+) 2 (+) 1	M1	
	11 boxes of 20 17 boxes of 12 26 boxes of 6	A1	

Alternative method 2 continues on the next page

Question	Answer	Mark	Comments
9 cont	**Alternative method 2**		
	11 boxes of 20 17 boxes of 12 26 boxes of 6	B5	B4 for 11 boxes of 20 16 boxes of 12 28 boxes of 6 or 11 boxes of 20 15 boxes of 12 30 boxes of 6 B3 for 580 eggs placed in boxes with two of these conditions satisfied at least 10 boxes of 20 eggs at least 15 boxes of 12 eggs at least 25 boxes of 6 eggs B2 for 580 eggs placed in boxes with one of the three conditions satisfied and at least one of each box B1 for all three conditions satisfied with 54 boxes but a total number of eggs not equal to 580
	Additional Guidance		
	Fourth M1 mark may be awarded at any stage		
	10 + 15 + 25 = 50 is a total of boxes and does not score M1M1M1		
	1 (extra) boxes of 20 2 (extra) boxes of 12 1 (extra) boxes of 6		M1M1M1M1A1
	220, 204 and 156 (eggs) on answer line with 11, 17 and 26 (boxes) seen in working		B5
	Condone number of eggs on answer line if number of boxes seen in working eg 220, 240 and 120 (eggs) on answer line with 11, 20 and 20 (boxes) seen in working		B3

Question	Answer	Mark	Comments
10	Correct evaluation of the sum of three multiples of 10 where the sum is not a multiple of three and No eg 10 (+) 20 (+) 40 = 70 and No or Correct evaluation of the sum of three multiples of 10 and she is only correct if the total is a multiple of 30	B2	B1 for correct evaluation of the sum of three multiples of 10 eg 10 (+) 20 (+) 40 (=) 70 10 (+) 20 (+) 30 (=) 60
	Additional Guidance		
	Ignore incorrect evaluations alongside a correct evaluation		
	The multiples do not have to be different		
	eg 20 (+) 20 (+) 30 = 70 so she is not correct		B2
	eg 10 (+) 10 (+) 10 = 30 or 3 × 10 = 30		B1

Question	Answer	Mark	Comments
11	A in two sections	B1	
	B and C have equal number of sections and 12 sections labelled using only A, B, C or D	B1	P(B) = P(C) ≠ 0
	D in twice as many sections as A	B1	
	Additional Guidance		
	2As, 3Bs, 3Cs, 4Ds		B1B1B1
	2As, 5Bs, 5Cs B and C have equal number of sections and 12 sections labelled using only A, B, C or D		B1B1B0
	2As, 4Bs, 4Cs, 2Ds		B1B1B0
	2As, 2Bs, 4Cs, 4Ds		B1B0B1
	2As, 4Ds		B1B0B1
	2As, 4Bs, 4Cs only 10 sections labelled		B1B0B0
	2As, 3Bs, 4Cs, 3Ds		B1B0B0
	1A, 2Bs, 2Cs, 7Ds		B0B1B0
	1A, 2Bs, 2Cs, 3Ds only 8 sections labelled		B0B0B0
12a	10	B1	
12b	35	B1	
12c	–5	B1	

Question	Answer	Mark	Comments
13	**Alternative method 1**		
	0.9^2 or 0.81	M1	oe
	4.86	A1	
	48 600	B1ft	ft their 4.86 × 10 000 correctly evaluated their 4.86 cannot be 0.9
	Alternative method 2		
	90 (cm)	B1	
	(their 90)^2 or 8100	M1	oe
	48 600	A1ft	ft (their 90)^2 × 6 correctly evaluated
	Additional Guidance		
	In Alt 1, award the B1ft if their answer clearly comes from multiplying a value by 10 000, but not from 0.9 × 10 000 = 9000		
	0.9 m = 9 cm 9 × 9 = 81 (9 is their 90) 81 × 6 = 486		B0 M1 A1ft
	No conversion shown 9 × 9 = 81 (9 is their 90) 81 × 6 = 486		B0 M1 A1ft
	0.9 × 0.9 = 0.81 and 0.81 × 0.9 = 0.729		M0
	0.9 × 0.9 = 0.81 and 0.81 × 0.9 = 0.729 (0.729 × 10 000) = 7290		M0A0 B1ft

Question	Answer	Mark	Comments
14	1700 × 0.04 or 68 or 1700 × 1.04 or 1768 or 4(%) × 3 or 12(%)	M1	oe
	1700 × 0.04 × 3 or their 68 × 3 or (their 1768 – 1700) × 3 or 1700 × (their 12 ÷ 100) or 1700 × (1 + their 12 ÷ 100) (– 1700) or 1904 (– 1700)	M1dep	oe
	204	A1	
	Additional Guidance		
	Answer of 1904 with or without 204 seen in working		M1M1A0
	1700 × 3 = 5100 and their 5100 × 0.04		M1M1
	Condone 1700 × 1.04^3 or an answer of 212.26(…) or 212.27 or 1912.26(…) or 1912.27 for the first method mark		M1M0A0
	680 = 4% and 680 × 3 implies 4(%) × 3 for the first M1 mark only 680 is not their 68 for the second method mark		

15a	[6.9, 7.1] (cm)	B1	
	[345, 355]	B1ft	ft their [6.9, 7.1] × 50
	Additional Guidance		
	[345, 355] without sight of [6.9, 7.1]		B1B1

Question	Answer	Mark	Comments
15b	*R* marked [3.9, 4.1] cm due South of *P*	B2	B1 for *R* marked [3.9, 4.1] cm from *P* or *R* marked due South of *P* or 4 (cm) seen
16	**Alternative method 1 of 6**		
	$64 \times \frac{3}{8}$ or 24 or $78 \times \frac{7}{13}$ or 42 or $6 \times 78 \times \frac{7}{13}$ or 252	M1	oe $64 \times \frac{5}{8}$ or 40 or $78 \times \frac{6}{13}$ or 36 or $6 \times 78 \times \frac{6}{13}$ or 216
	$64 \times \frac{3}{8} + 6 \times 78 \times \frac{7}{13}$ or their 24 + their 252 or 276	M1dep	oe $64 \times \frac{5}{8} + 6 \times 78 \times \frac{6}{13}$ or their 40 + their 216 or 256
	64 + 6 × 78 or 64 + 468 or 532	M1	
	their 532 ÷ 2 or 266	M1dep	dep on 3rd method mark only
	266 and 276 and Yes or 266 and 256 and Yes	A1	

Alternative method 2 continues on the next page

Question	Answer	Mark	Comments
16 cont	**Alternative method 2 of 6**		
	$64 \times \frac{3}{8}$ or 24 or $78 \times \frac{7}{13}$ or 42 or $6 \times 78 \times \frac{7}{13}$ or 252	M1	oe $64 \times \frac{5}{8}$ or 40 or $78 \times \frac{6}{13}$ or 36 or $6 \times 78 \times \frac{6}{13}$ or 216
	$64 \times \frac{3}{8} + 6 \times 78 \times \frac{7}{13}$ or their 24 + their 252 or 276	M1dep	oe $64 \times \frac{5}{8} + 6 \times 78 \times \frac{6}{13}$ or their 40 + their 216 or 256
	64 + 6 × 78 or 64 + 468 or 532	M1	
	their 532 – their 276	M1dep	dep on M1M1M1 their 532 – their 256
	256 and 276 and Yes	A1	

Alternative method 3 continues on the next page

Question	Answer	Mark	Comments
16 cont	**Alternative method 3 of 6**		
	$64 \times \frac{3}{8}$ or 24 or $78 \times \frac{7}{13}$ or 42 or $6 \times 78 \times \frac{7}{13}$ or 252	M1	oe $64 \times \frac{5}{8}$ or 40 or $78 \times \frac{6}{13}$ or 36 or $6 \times 78 \times \frac{6}{13}$ or 216
	$64 \times \frac{3}{8} + 6 \times 78 \times \frac{7}{13}$ or their 24 + their 252 or 276	M1dep	oe $64 \times \frac{5}{8} + 6 \times 78 \times \frac{6}{13}$ or their 40 + their 216 or 256
	64 ÷ 2 or 32 and (6 × 78) ÷ 2 or 468 ÷ 2 or 234	M1	
	their 32 + their 234 or 266	M1dep	dep on 3rd method mark only
	266 and 276 and Yes or 266 and 256 and Yes	A1	

Alternative method 4 continues on the next page

Question	Answer	Mark	Comments
16 cont	**Alternative method 4 of 6**		
	$64 \times \frac{3}{8}$ or 24 or $78 \times \frac{7}{13}$ or 42 or $6 \times 78 \times \frac{7}{13}$ or 252	M1	oe
	$64 \times \frac{3}{8} + 6 \times 78 \times \frac{7}{13}$ or their 24 + their 252 or 276	M1dep	oe
	64 + 6 × 78 or 64 + 468 or 532	M1	
	their 276 ÷ their 532 or 0.51… or 0.52 or their 532 ÷ their 276 or 1.9… or 1.93	M1dep	oe dep on M1M1M1
	532 and 276 and 0.51… or 0.52 and Yes or 532 and 276 and 1.9… or 1.93 and Yes	A1	

Alternative method 5 continues on the next page

Question	Answer	Mark	Comments
16 cont	**Alternative method 5 of 6**		
	$64 \times \frac{3}{8}$ or 24 or $78 \times \frac{7}{13}$ or 42 or $6 \times 78 \times \frac{7}{13}$ or 252	M1	oe $64 \times \frac{5}{8}$ or 40 or $78 \times \frac{6}{13}$ or 36 or $6 \times 78 \times \frac{6}{13}$ or 216
	$64 \times \frac{3}{8} + 6 \times 78 \times \frac{7}{13}$ or their 24 + their 252 or 276	M1dep	oe $64 \times \frac{5}{8} + 6 \times 78 \times \frac{6}{13}$ or their 40 + their 216 or 256
	their 276 × 2 or 552	M1dep	their 256 × 2 or 512
	64 + 6 × 78 or 64 + 468 or 532	M1	
	532 and 552 and Yes or 532 and 512 and Yes	A1	

Alternative method 6 continues on the next page

Question	Answer	Mark	Comments
16 cont	**Alternative method 6 of 6**		
	$\frac{1}{2} - \frac{3}{8}$ or $\frac{1}{8}$ or $\frac{7}{13} - \frac{1}{2}$ or $\frac{1}{26}$	M1	oe
	64 × their $\frac{1}{8}$ or 8 (under) or 78 × their $\frac{1}{26}$ or 3 (over)	M1dep	oe
	78 × their $\frac{1}{26}$ × 6 or 18 (over)	M1dep	oe
	64 × their $\frac{1}{8}$ or 8 (under) and 78 × their $\frac{1}{26}$ × 6 or 18 (over)	M1dep	oe May be subtracted
	8 under (half) and 18 over (half) and Yes or 10 over (half) and Yes	A1	
	Additional Guidance		
	Condone $\frac{24}{64}$ for 24 or $\frac{42}{468}$ for 42 or $\frac{252}{468}$ for 252 for first method mark		
	276 and 10 over (266) and Yes implies 266 and 276 and Yes		M1M1M1M1A1
	In Alt 2 256 and 276 and Yes		M1M1M1M1A1
	In Alt 4 accept working with unused seats leading to their 256 ÷ their 532 or 0.4… or 0.49 or their 532 ÷ their 256 or 2.07… or 2.08		

Question	Answer	Mark	Comments
17	$x - 3 = \frac{x}{2}$	B1	
18	$5 < x \leq 9$	B1	

19	Valid statement about proportion	B1	eg there were more females than males
	Valid statement about average	B1	eg the average age of the females was higher
	Valid statement about spread	B1	eg the ages of the females were more spread out
	Additional Guidance		
	Condone incorrect values supporting statements		
	Condone irrelevant statements with correct statements		
	Proportion of the audience statements		
	There were more women	B1	
	Are mostly female	B1	
	There were 66% more females than males	B1	
	The proportion of women is high	B1	
	Females are a higher proportion than males	B1	
	Less men than women	B1	
	The men were 17%, the women were 83%	B1	
	The males were 17% which is less than half	B1	
	The males were 17%	B0	
	The difference is 66%	B0	

Additional Guidance continues on the next page

19 cont	Average age statements	
	The women had a higher mean	B1
	Women were 5 years older	B1
	Females were older than the males	B1
	There were more females that were older than the males, this is why the mean age of the females is more	B1
	Most males were younger than the females	B1
	More older women than men	B1
	There are more younger males than females	B1
	There are younger males than females	B0
	Females have a high mean	B0
	Average age 5.4 years difference	B0
	The women's mean age range was higher	B0
	Spread of ages statements	
	The women had a higher range	B1
	More of an age gap in the females than the males	B1
	Females have a higher spread	B1
	Males ages are closer together than females	B1
	Females have a wider age range	B1
	The female age gap was high, the male age gap was low	B1
	Ages were quite close together	B0
	The female age gap was high	B0
	Age range of males is younger than females	B0

Question	Answer	Mark	Comments
20	**Alternative method 1 of 3**		
	98 in the singles non-intersecting part and 34 in the doubles non-intersecting part or $98 + x$ or $34 + x$	M1	
	$98 + x = 2(34 + x)$	M1dep	oe $\frac{1}{2}(98 + x) = 34 + x$
	$98 + x = 68 + 2x$	M1dep	oe $49 + \frac{1}{2}x = 34 + x$
	30	A1	
	Alternative method 2 of 3		
	98 in the singles non-intersecting part and 34 in the doubles non-intersecting part	M1	
	34×2 or 68 or $98 \div 2$ or 49 or $98 - 34$ or 64	M1	second M1 implies M1M1
	98 – their 68 or 2 × (their 49 – 34) or their 64 – 34 or 2 × their 64 – 98	M1	third M1 implies M1M1M1
	30	A1	

Alternative method 3 continues on the next page

Question	Answer	Mark	Comments
20 cont	**Alternative method 3 of 3**		
	One complete trial correctly evaluated eg 98 + 10 = 108 and 34 + 10 = 44 and 108 ÷ 2 = 54 or 44 × 2 = 88 (and No)	M1	oe 108 ÷ 2 = 54 or 44 × 2 = 88 is not required if a second trial is done
	Second complete trial correctly evaluated eg 98 + 20 = 118 and 34 + 20 = 54 and 118 ÷ 2 = 59 or 54 × 2 = 108 (and No)	M1	oe 118 ÷ 2 = 59 or 54 × 2 = 108 is not required if a third trial is done
	Correct trial with both numbers and correctly evaluated 98 + 30 = 128 and 34 + 30 = 64	M1	
	30	A1	
	Additional Guidance		
	Working may be shown on Venn diagram		
	30 shown in intersection in Venn diagram unless contradicted by final answer		M1M1M1A1
	2 × 98 – 2 × 34 – 98 oe		M1M1M1
	98 and 34 correctly positioned in Venn diagram may be replaced by working or have additional working		
	eg 34 in Venn diagram replaced by or with 68		M1M1
	eg 98 in Venn diagram replaced by or with 49		M1M1
	98 and 34 incorrectly positioned in Venn diagram may be recovered by working		

Question	Answer	Mark	Comments
21a	140 ÷ 50 or 2.8 or 140 ÷ 50 × 60 or 168	M1	oe
	2 (hours) 48 (minutes)	A1	258 (minutes) (after midday) implies M1A1
	4.18 (pm)	A1ft	oe ft their time in hours and minutes with M1 awarded
	Additional Guidance		
	140 ÷ 50 or 2.8 = 2 hours 80 minutes = 3 hours 20 minutes, Answer 4.50		M1A0A1ft
	140 ÷ 50 or 2.8 = 2 hours 8 minutes, Answer 3.38		M1A0A1ft
	140 ÷ 50 or 2.8 = 2 hours 80 minutes = 3 hours 20 minutes, Answer 4.5		M1A0A0ft
	140 ÷ 50 or 2.8, Answer 4.10		M1A0A0ft
	2 hours 8 minutes implies attempt at 140 ÷ 50		M1

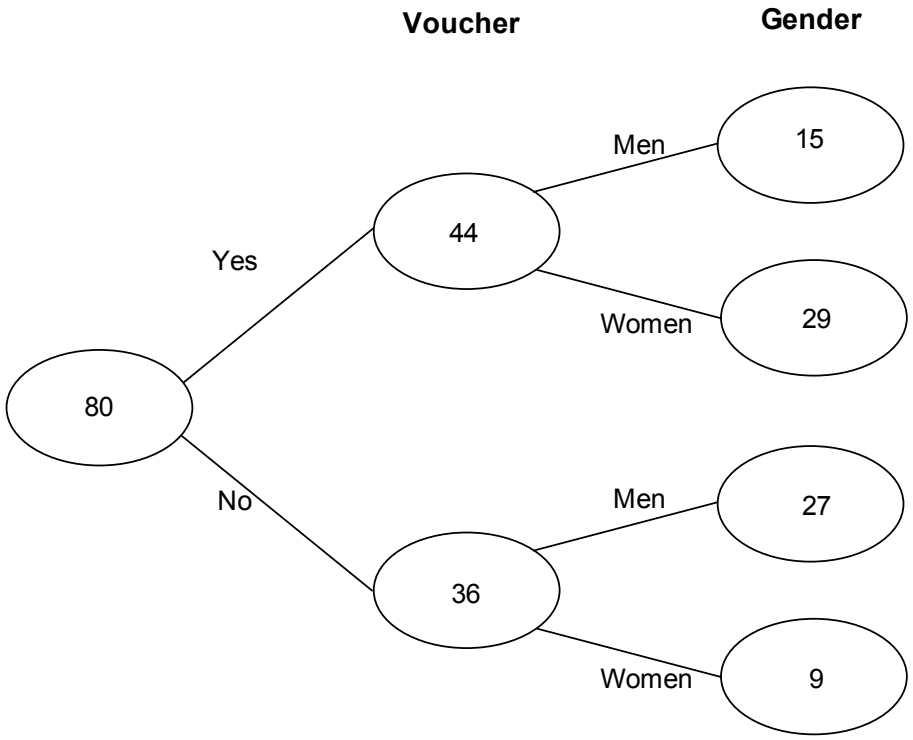
Question	Answer	Mark	Comments
21b	Valid statement	B1ft	eg the arrival time will be later it will be later time will be more ft their time in (a) eg it will be after 4.18pm
	Additional Guidance		
	It will be delayed	B1	
	The arrival time will be increased	B1	
	He will reach there late	B1	
	The time will go up	B1	
	It will go up	B1	
	The journey will take longer so the arrival time is later	B1	
	Take longer	B0	
	Longer	B0	
	Slower (restating question)	B0	
	You won't get there as quick	B0	
	Time will be longer	B0	
	Journey will be longer	B0	
	'Longer' is referring to a time period rather than an arrival time		

Question	Answer	Mark	Comments
22	**Alternative method 1 of 2**		
	PAB = 51 or *PAD* = 51 or *APC* = 180 – 51 or *APC* = 129	M1	
	ABP = 180 – 51 – their 51 or *ABP* = 180 – 102 or *ABP* = 78 or *ADC* = 180 – their 51 – their 51 *ADC* = 180 – 102 *ADC* = 78	M1dep	*PAB* = 51 and *PAD* = 51 or *BAD* = 102
	BCD = 180 – their 78 or *BCD* = 360 – their 129 – their 51 – their 78 or *BCD* = 360 – 258 or *BCD* = 102 or 4*x* = 180 – their 78 or 4*x* = 360 – their 129 – their 51 – their 78 or 4*x* = 360 – 258 or 4*x* = 102 or 102 ÷ 4	M1dep	oe eg *BCD* = (360 – 2 × their 78) ÷ 2 or 4*x* = (360 – 2 × their 78) ÷ 2
	25.5	A1	

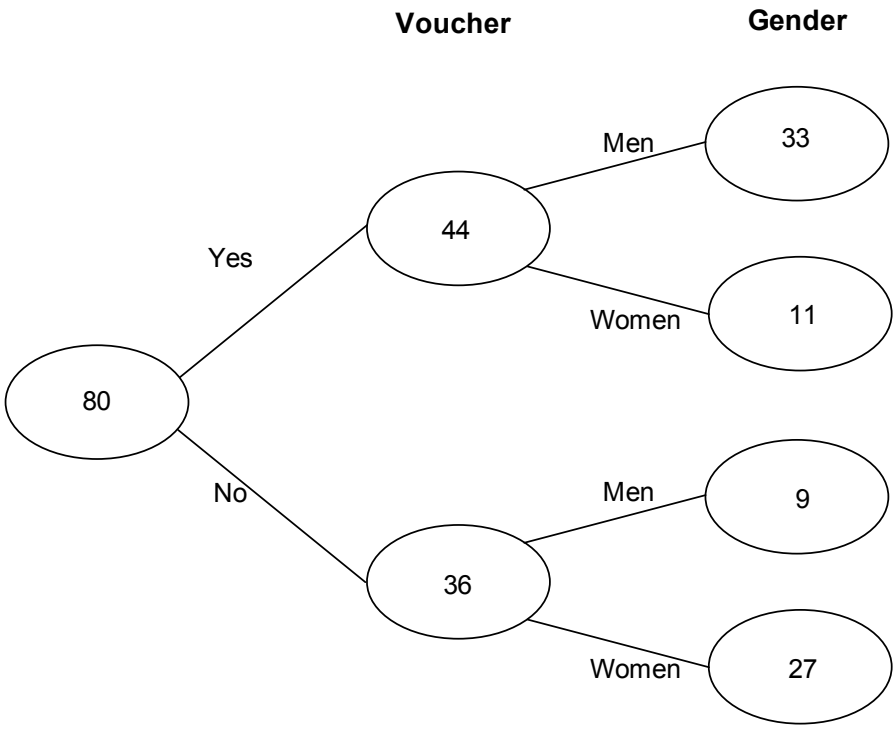
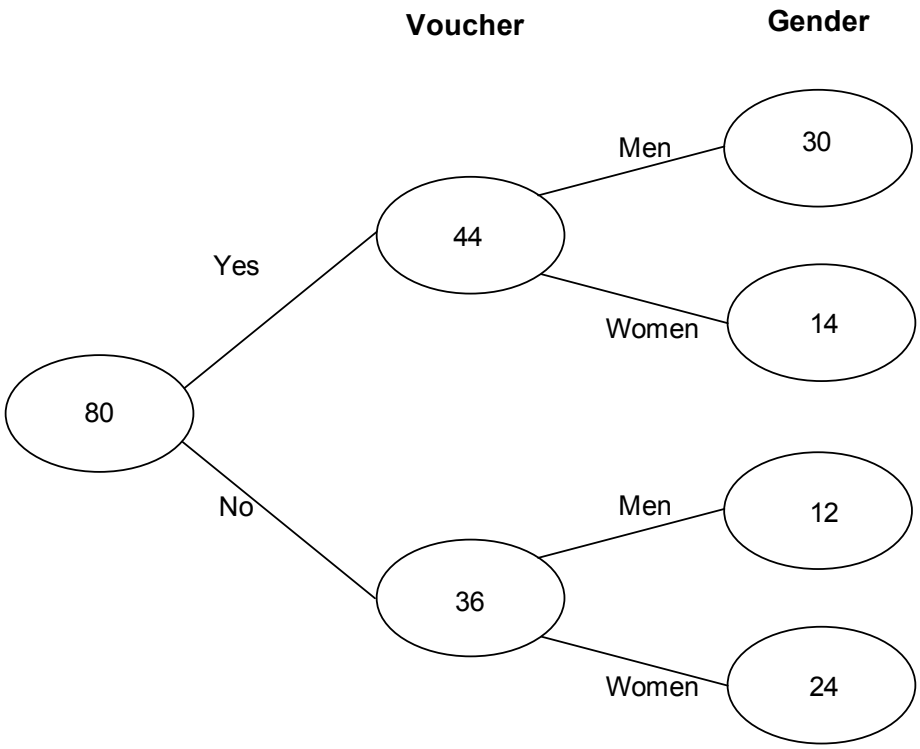
Alternative method 2 continues on the next page

Question	Answer	Mark	Comments
22 cont	**Alternative method 2 of 2**		
	$ABC = 180 - 3x - x$ or $ABC = 180 - 4x$ or $APC = 180 - 51$ or $APC = 129$	M1	
	$PAB = 2x$ or $APB = 2x$ or $2x = 51$	M1dep	
	$51 \div 2$	M1dep	
	25.5	A1	
	Additional Guidance		
	Angles must be labelled or shown on the diagram		

Question	Answer	Mark	Comments
23	Lists three from 3, 9, 27, 81, 243, 729 or lists three from 1, 4, 9, 16, …, 225, 256, 289 or correctly evaluating a power of 3 + a square number or correctly evaluating 268 – a power of 3 or correctly evaluating 268 – a square number	M1	eg 27 + 25 = 52 or $3^3 + 5^2 = 52$ eg 268 – 27 = 241 eg 268 – 49 = 219
	243 + 25 or $3^5 + 5^2$	A1	oe Addition sign must be seen in working or on answer line
	Additional Guidance		
	3^5, 5^2 or 3^5 and 5^2 on answer line		M1A0
	268 – 243 = 25		M1A0
	243, 25 or 243 and 25 on answer line		M1A0
	Beware of $5^3 + 5^2$		
24	$y = \frac{k}{x}$	B1	
25	72 N	B1	

Question	Answer	Mark	Comments
26a	80	B1	
	44 and 36	B1ft	ft their 80 – 44
	27 and 9	B1ft	ft their 36 ÷ 4 × 3 and ft their 36 ÷ 4
	15 and 29	B1ft	ft 42 – their 27 and ft 38 – their 9 Total on ft must be 44
	Additional Guidance		
			B1B1B1B1
	Mark diagram only, do not allow misread		
	Values may be rounded up or down to whole numbers provided the total is correct		
	Penalise the use of relative frequencies on the first occurrence only		
	If relative frequencies are shown the denominator must be 80 and not simplified eg $\frac{3}{4}$ and $\frac{1}{4}$ is B0		

Additional Guidance continues on the next page

26a cont		B1B1B0B1ft
		B1B1B0B1ft

Question	Answer	Mark	Comments
26b	85% or 0.85	M1	
	27.2 ÷ 0.85 or 27.2 ÷ 85 (× 100) or 0.32	M1dep	
	32(.00)	A1	Correct money notation Allow £32.00p
	Additional Guidance		
	32.0		M1M1A0

27a	**Alternative method 1**			
	$v - u = at$	$-at = u - v$	M1	
	$t = \frac{v-u}{a}$	$t = \frac{u-v}{-a}$	A1	oe
	Alternative method 2			
	$\frac{v}{a} = \frac{u}{a} + t$		M1	
	$t = \frac{v}{a} - \frac{u}{a}$		A1	oe
	Additional Guidance			
	$t = (v - u) \div a$			M1A1
	$v - u = at$ and $t = v - u \div a$			M1A0
	$\frac{v-u}{a}$ or $\frac{u-v}{-a}$ or $\frac{v}{a} - \frac{u}{a}$			M1A0
	$a = \frac{v-u}{t}$ with or without working			M1A0
	$t = v - u \div a$			M0A0
	$t = \frac{v+u}{a}$			M0A0

Question	Answer	Mark	Comments
27b	(Speed) m/s or ms^{-1} (Acceleration) m/s^2 or ms^{-2} or m/s/s	B2	B1 for one correct or two mutually consistent units eg km/h and km/h^2 Accept mps for m/s and mps^2 for m/s^2
	Additional Guidance		
	Allow units given in words eg metres per second metres per second squared or metres per second per second		
	m/s^{-1} (speed)		B0
	m/s^{-2} (acceleration)		B0
28	$x^2 - 8x - 8x + 64$	M1	allow one error or omission terms may be seen in a grid
	$x^2 - 16x + 64$	A1	Ignore fw eg if attempting to solve Do not ignore fw if attempting to simplify
	Additional Guidance		
	$x^2 - 16x$ (+ k) $k \neq 64$		M1A0
	$x^2 - 8x + 64$		M1A0
	$x^2 - 16x + 64 = -15x^3 + 64$		M1A0
	$x^2 - 8x + 8x + 64$ (one error)		M1A0
	$x^2 + 8x + 8x + 64$ (one error)		M1A0
	$x^2 - 6x + 8x + 64$ (two errors)		M0A0
	$x^2 + 64$ (two errors)		M0A0