GCSE
MATHEMATICS
8300/1F

Foundation Tier Paper 1 Non-Calculator

Mark scheme

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Version: Final 1.0

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 Examiner.

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 $a \leqslant$ 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.

Q	Answer	Mark	Comments
1(a)	20	B1	

Q	Answer	Mark	Comments
1(b)	9	B1	

Q	Answer	Mark	Comments
1(c)	14 and 29	B1	either order

Q	Answer	Mark	Comments
1(d)	15	B1	

Q	Answer	Mark	Comments
2(a)	[54, 58]	B1	may be seen on diagram but answer line takes precedence
	Additional Guidance		
	Answer in a different unit		B0

Q	Answer	Mark	Comments
2(b)	[48, 52]	B1	may be seen on diagram but answer line takes precedence
	Additional Guidance		
	Ignore other angles measured		

Q	Answer	Mark	Comments
2(c)	15	B1	

Q	Answer	Mark	Comments
2(d)	7 cm by 3 cm rectangle drawn	B1	
	Additional Guidance		
	Mark intention		
	Allow a 7 cm by 3 cm rectangle drawn that does not use the given side		

Q	Answer	Mark	Comments
3(a)	12 or +12	B1	

Q	Answer	Mark	Comments
3(b)	−30	B1	

Q	Answer	Mark	Comments
3(c)	64 or +64	B1	

Q	Answer	Mark	Comments
3(d)	1000	B1	

Q	Answer	Mark	Comments
4	$\frac{3}{5}$	B2	B1 $\frac{18}{30}$ or $\frac{9}{15}$ or $\frac{6}{10}$ or 3 out of 5 oe fraction, decimal or percentage or their fraction fully simplified
	Additional Guidance		
	$\frac{30}{18} = \frac{5}{3}$ $\frac{1.8}{3(.0)}$		B1 B1

Q	Answer	Mark	Comments
5	24 ÷ 2 or 12 or 24 × 5 or 120 or 820 or 7 – 1.5(0) or 5.5(0)	M1	oe
	5 × 24 ÷ 2 or 60 or 2.1(0) or 210(p)	M1	oe implies M2
	7 – 1.5(0) + 5 × 24 ÷ 2 or 8.2(0) – 2.1(0) or 6.1 or 610	M1dep	oe full method to find total cost dep on M2
	6.10 or 610p	A1	SC3 65.5(0) or 6550(p) or 27.62 or 2762(p) or 7.9(0) or 790(p)
	Additional Guidance		
	SC3 65.5(0) from 60 + 5.50 working in mixed units		
	SC3 27.62 from 5 calculators and 1 pen		
	SC3 7.9(0) from doubling the cost of a pen instead of halving		
	Condone (£)6.10p		M1M1M1A1
	Allow mixed units for up to M3 eg 5.50 + 60		M1M1M1

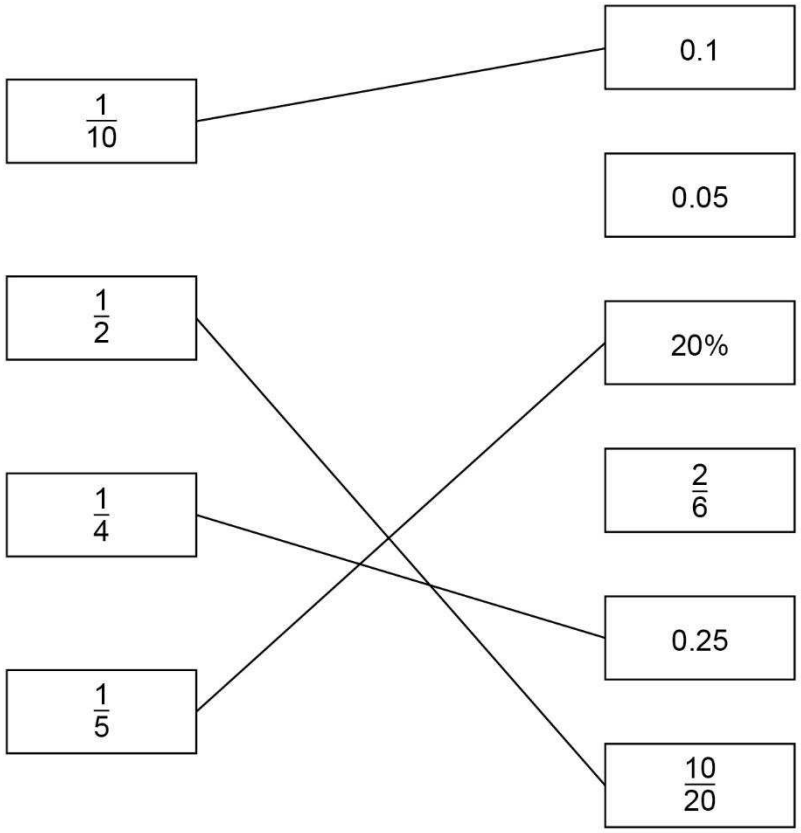
Q	Answer	Mark	Comments
6(a)	$\frac{17}{5}$	B1	oe improper fraction
	Additional Guidance		
	Ignore attempts to simplify after correct answer seen		

Q	Answer	Mark	Comments
6(b)	$\frac{19}{100}$	B1	oe fraction
	Additional Guidance		
	Ignore attempts to simplify after correct answer seen		

Q	Answer	Mark	Comments
7	(R =) 16 (days) or 4 (symbols) or (Sn =) 10 (days) or 2.5 (symbols) or (C =) 18 (days) or 4.5 (symbols) or (total =) 44 (days) or 11 (symbols) or evidence of addition with answer of 11 (symbols) or 55 ÷ 4 or 13.75 (symbols)	M1	
	55 – their 16 – their 10 – their 18 or 55 – 44 (= 11) or 2 values for Sun and Fog with a total of 11 or their 13.75 – 11 or 2.75	M1dep	oe at least one of 16, 10, 18 correct may be on diagram
	6 and 5 or Sun = 1 full and 1 half symbol or Fog = 1 full and 1 quarter symbol	A1	either order, may be on diagram
	Sun = 1 full and 1 half symbol and Fog = 1 full and 1 quarter symbol	A1ft	ft their 11 days (must be an odd number) where Sun is one more than Fog
	Additional Guidance		
	Mark intention for drawings, quarter and half symbol any orientation or angle. Must be attempt at correct size		
	11 with no working seen or their symbols totalling 11 quarters		M1M1

Q	Answer	Mark	Comments
8(a)	5 × 4 or 20	M1	oe
	18	A1	

Q	Answer	Mark	Comments
8(b)	–40 + 10 or –30 or –40 = 5P – 10 or $P = \frac{T+W}{5}$	M1	
	their –30 ÷ 5	M1dep	
	–6	A1	SC2 –10 with –50 seen
	Additional Guidance		
	Embedded answer of –6		M1M1A0
	SC2 –10 with –50 seen for –40 + 10 = –50 and then ÷ 5		
	–40 = 5P – 10 may use a different letter or symbol for P but not T or W		

Q	Answer	Mark	Comments
9	All 3 correct matches	B3	B1 for each correct match
	Additional Guidance		
	Matching to more than one box on the right is choice for that match		
			B3

Q	Answer	Mark	Comments
10	(A =) 26	B1	may be implied by correct answer
	(B =) 10	B1	may be implied by correct answer
	260	B1ft	ft their A × their B if at least B1 awarded SC2 400 or 52 SC1 55
	Additional Guidance		
	SC2 400 from A = 40 and B = 10		
	SC2 52 from A = 26 and B = 2		
	SC1 55 from 8 × 3 + 2 × 21 – (15 – 4)		
	Answer 260 with no incorrect values seen for A and B		B1B1B1

Q	Answer	Mark	Comments
11	4.5 × 7 or 45 × 7 or digits 315	M1	oe
	31.5(0) or $31\frac{1}{2}$	A1	

Q	Answer	Mark	Comments
12	100	B1	

Q	Answer	Mark	Comments	
	Alternative method 1 – using the given scale			
13	(O) $20 \div 5$ or (A) $8 \div 2$ or 4 or (O) $5 \div 20$ or (A) $2 \div 8$ or $\frac{1}{4}$	M1	oe	
	their 4×3 or $3 \div$ their $\frac{1}{4}$ or their $4 \times$ their $(5 + 3 + 2) - 20 - 8$ or 12	M1dep	$20 - 8$ implies M2 may be on diagram	
	Correct width bar, in the correct position, drawn to height of 12	A1	mark intention, ignore any shading	
	Alternative method 2 – using squares			
	(O) $10 \div 5$ or (A) $4 \div 2$ or 2 (squares)	M1		
	their 2×3 or 6 (squares)	M1dep	$10 - 4$ implies M2 may be on diagram	
	Correct width bar, in the correct position, drawn to height of 12	A1	mark intention, ignore any shading	
	Additional Guidance			
	$(20 + 8) \div (5 + 2)$ $(10 + 4) \div (5 + 2)$			M1 M1

Q	Answer	Mark	Comments
14	Valid statement about proportion	B1	eg there were more members than guests
	Valid statement about average	B1	eg the average number of hours was greater for the members
	Valid statement about spread	B1	eg the visiting times of the guests were more spread out
	Additional Guidance		
	Condone irrelevant statements with correct statements but do not award a correct statement with a contradictory statement		
	Accept non-members for guests		
	Proportion statements		
	There were more members	B1	
	They were mostly members / More than half were members	B1	
	There were 28% more members than guests	B1	
	Fewer guests (than members)	B1	
	The members were 64%, the guests were (only) 36%	B1	
	The members were 64, the guests were (only) 36	B0	
	The difference is 28%	B0	
	There were 32% more members (calculation error)	B0	
	Members visit the gym more often	B0	
	There were 64% members	B0	

Question 14 Additional Guidance continues on the next page

14 cont	**Average statements**	
	The members had a greater mean	B1
	The members visited for 1.5 (hours) more (on average)	B1
	The members visited for longer (on average) (than the guests)	B1
	Overall the members spent longer (in the gym) (on average)	B1
	The members' mean was 4 (hours) and the guests' was 2.5 (hours)	B1
	The members' was 4 and the guests' was 2.5 (no mention of average)	B0
	The difference in mean hours is 1.5	B0
	Spread statements	
	The members' times were more consistent	B1
	The guests' times varied more	B1
	The guests had a greater range	B1
	The range of the guests was 2 (hours) more	B1
	Members' range was 6 (hours), guests' (range) was 8 (hours)	B1
	Members were 6, guests were 8 (ambiguous)	B0
	Members visited for 6 hours, guests for 8 hours (referencing mean)	B0
	The difference in range is 2 hours	B0
	The range of the guests is high	B0

Q	Answer	Mark	Comments
15	2×3 or 6 or 4×5 or 20 or 14 or 0.3	M1	oe
	(their 20 – their 6) ÷ their 20 or $1 - \frac{6}{20}$ or $\frac{14}{20}$ or $1 - 0.3$ or 0.7 or 30(%)	M1dep	
	70	A1	SC2 44.4 or better SC1 $\frac{4}{9}$ or $\frac{8}{18}$
	Additional Guidance		
	SC1 $\frac{4}{9}$ or $\frac{8}{18}$ use of perimeter without conversion to a percentage SC2 44.4 use of perimeter converted to a percentage		
	Up to M2 may be awarded for correct work seen in multiple attempts even if not subsequently used		
	Ignore any units		

Q	Answer	Mark	Comments
16	60 ÷ 20 or 3 or 20 ÷ 60 or $\frac{1}{3}$ or 18 ÷ 20 or 0.9 or 20 ÷ 18 or 1.1(1…) or 20 + 20 + 20	M1	oe
	their 3 × 18 or 18 ÷ their $\frac{1}{3}$ or their 0.9 × 60 or 60 ÷ their 1.1(1...) or 18 + 18 + 18	M1dep	oe full method to get to answer
	54	A1	
	Additional Guidance		
	Up to M2 may be awarded for multiple attempts if no answer chosen		
	For up to M2 ignore any units		

Q	Answer	Mark	Comments	
17	**Alternative method 1 – numerical**			
	1 and 5 and 3 or 9 (parts) or numbers in the ratio 1 : 5 : 3 or (angle sum on a straight line =) 180	M1	oe may be seen in a ratio eg $\frac{1}{5} : 1 : \frac{3}{5}$ or $\frac{1}{3} : \frac{5}{3} : 1$ numbers can be in any order eg 30, 10, 50	
	$180 \div (1 + 5 + 3)$ or 20 or $180 \div \frac{9}{5}$	M1dep	oe	
	100	A1		
	Alternative method 2 – algebraic			
	x and $5x$ and $3x$ or $9x$ or (angle sum on a straight line =) 180	M1	oe correct terms with any angle as x any letter, any order may be seen on diagram	
	Correct equation with correct method to solve for one angle	M1dep	eg $x + 5x + 3x = 180$ and $180 \div (1 + 5 + 3)$	
	100	A1		
	Additional Guidance			
	$x + 5x + 3x = 360$ or $360 \div 9$			M1M0A0
	$\frac{1}{5}x + x + \frac{3}{5}x = 180$ and $180 \div \left(\frac{1}{5} + 1 + \frac{3}{5}\right)$			M1M1
	$\frac{1}{3}x + \frac{5}{3}x + x = 180$ and $180 \div \left(\frac{1}{3} + \frac{5}{3} + 1\right)$			M1M1
	Angle EBD marked as 100 on the diagram with answer line blank			M1M1A1
	20 and 100 in working with no or incorrect answer chosen			M1M1A0

Q	Answer	Mark	Comments
18	All conditions met: • first number is prime • second number is prime • correctly evaluated • even answer • answer in range	B3	if their product is incorrectly evaluated or missing, then 'even answer' and 'answer in range' refer to the correct product for their multiplication B2 4 conditions met B1 3 conditions met
	Additional Guidance		
	$2 \times 29 = 58$ (or $29 \times 2 = 58$) is the only fully correct solution		B3
	Allow 50 to 60 inclusive for 'answer in range'		
	Award the best mark from boxes or in working for up to B2		
	The two prime numbers do not have to be different		

Q	Answer	Mark	Comments
19	$\frac{5}{6} \times 96$ or 80	M1	oe eg $96 \div 6 \times 5$ implied by 176
	$\frac{1}{4} \times$ their 80 or 20	M1dep	oe eg $80 \div 4$
	$\frac{2}{3} \times 96$ or 64	M1	oe eg $96 \div 3 \times 2$ accept 0.66 or better for $\frac{2}{3}$
	84(.00)	A1	SC2 100.8(0) or [77.32, 77.34] condone incorrect money notation eg 84.0 or 84.00p
	Additional Guidance		
	SC2 for 100.8(0) is from misreading as Andrew gets £96		
	SC2 for [77.32, 77.34] is from $\frac{2}{3}$ of 80 plus $\frac{1}{4}$ of 96		
	Do not accept '$\frac{5}{6}$ of 96' or '$\frac{1}{4}$ of 80' or '$\frac{2}{3}$ of 96' for M marks unless accompanied by a correct method or value		

Q	Answer	Mark	Comments
20(a)	Strong positive	B1	

Q	Answer	Mark	Comments
20(b)	Straight line of best fit passing through (5, [18k, 24k]) and (23, [42k, 48k]	B1	mark intention of straight line ignore anything beyond gates
	Correct reading $\pm\frac{1}{2}$ square for their straight line of best fit	B1ft	ft their straight line with positive gradient ignore any working lines on the graph condone thousands missing may be implied by correct number of lives for their line
	Correct evaluation of their answer in thousands divided by 2000	B1ft	ft their reading from straight line but must be in thousands condone half a life (or rounded or truncated) if reading is an odd number of thousands
	Additional Guidance		
	(their correct line of best fit would give a reading of 34 000)		
	Answer 17		B1B1B1
	Answer 0.017		B1B1B0
	(Points =) 33 000, answer 16 (within half a square, answer truncated)		B1B1B1
	(Points =) 32 000, answer 16		B1B0B1ft
	For two lines of best fit with no answer, take as choice		

Q	Answer	Mark	Comments	
21	**Alternative method 1 – evaluation and division**			
	$(5^2 =)$ 25 or $(3 \times 5^2 =)$ 75 or 600 ÷ 3 or 200 or 600 ÷ 5^2 or 24	M1	oe oe eg $3 \times 200 = 600$ oe eg $25 \times 24 = 600$	
	600 ÷ 3 ÷ 5^2 or 8	M1dep	oe eg $8 \times 75 = 600$	
	3 with M1 awarded and not from incorrect working	A1		
	Alternative method 2 – product of prime factors			
	600 written as a product of factors where at least one factor is prime	M1	eg 2 and 300 or 5 and 120 or 2 and 2 and 150 may be seen on a factor tree or in repeated division allow one strand to be incorrect if a previous value completes the product eg 20×30 followed by $2 \times 10 \times 5 \times 8$ implies $2 \times 10 \times 30$ for M1	
	2 and 2 and 2 and 3 and 5 and 5	M1dep	may be seen on a factor tree or in repeated division	
	3 with M1 awarded and not from incorrect working	A1		
	Additional Guidance			
	$8 \times 3 \times 25 = 600$ and answer 3			M1M1A1
	2^3 on answer line with M2 awarded			M1M1A0
	Answer 3 on answer line with no working			M0M0A0
	Do not allow 600 ÷ 3 × 5^2 for M2 in alt 1 unless recovered, but do allow $\frac{600}{3 \times 5^2}$ or 600 ÷ (3×5^2)			

Q	Answer	Mark	Comments
22	$13x + 22$	B2	B1 $15x + 20$ or $-2x + 2$ or $13x + a$ or $bx + 22$, where a and b can be any numbers
	Additional Guidance		
	Do not ignore further working for B2 eg $13x + 22 = 35x$ eg $13x + 22$, $x = \frac{22}{13}$		B1 B1

Q	Answer	Mark	Comments
23	Any two from: Reference to graph passing through point where $x = 0$ Reference to graph being incorrect for negative x values Reference to the graph stopping before the end of the axes/axis	B2	B1 any one correct reference eg the graph touches the y-axis eg the graph to the left of the y-axis should be below the x-axis eg the graph should go to the ends of the axes

Additional Guidance	
Ignore non-contradictory, irrelevant responses alongside a correct response	
Draws correct graph	B2
Draws graph with one section correct for positive values of x or negative values of x	B1 for that section
'It isn't the graph of $y = \frac{1}{x}$' scores B0, but B1 may still be scored for the other criticism	
'There are no numbers on the axes' scores B0, but B1 may still be scored for the other criticism	
Mark for graph touching y-axis	
You cannot have $x = 0$	B1
The line in the top right should be moved to the right	B1
It says x doesn't = 0 but it (the sketch) does	B1
One line is touching the y-axis	B1
The lines should be symmetrical	B0
You cannot have $y = 0$	B0
One line is touching the y-axis but the other isn't	B0

Question 23 Additional Guidance continues on the next page

23 cont	**Mark for negative values being in the wrong quadrant**	
	There shouldn't be anything in the top-left section	B1
	There should be something in the bottom-left section	B1
	It is the graph of $y = \frac{1}{x^2}$	B1
	It should have rotational symmetry	B1
	It should be symmetrical about $y = x$	B1
	It should be symmetrical about $y = -x$	B1
	It should be symmetrical	B0
	One should be negative	B0
	The bit on the left is wrong	B0
	The negative values are plotted incorrectly	B0
	Reference to the graph stopping before the end of the axes	
	It stops before the end of the axes	B1
	The lines don't go far enough	B1
	The lines need to be higher up	B0

Q	Answer	Mark	Comments
24	**Alternative method 1 – algebra based on Sunita's age**		
	5×3 or 15	M1	may be implied by their algebraic total of the three ages being divided by 3
	$x - 1$ or $2x$ or $4x - 1$	M1	oe expressions any letter throughout
	x + their $(x - 1)$ + their $2x$ = their 15 or $4x - 1$ = their 15	M1dep	oe equation eg $\frac{x + x - 1 + 2x}{3} = 5$ dep on M1M1
	$(x =)$ 4	M1dep	correct solution to their equation if the solution has a decimal part allow truncation or rounding to the nearest whole number
	8	A1	
	Alternative method 2 – algebra based on Joel's age		
	5×3 or 15	M1	may be implied by their algebraic total of the three ages being divided by 3
	$\frac{y}{2}$ or $\frac{y}{2} - 1$ or $2y - 1$	M1	oe expressions any letter throughout $2y - 1$ must not come from $y + y - 1$
	y + their $\frac{y}{2}$ + their $(\frac{y}{2} - 1)$ = their 15	M1dep	oe equation eg $\frac{y + \frac{y}{2} + \frac{y}{2} - 1}{3} = 5$ dep on M1M1
	$2y$ + their y + their $(y - 2) = 2 \times$ their 15 or $4y - 2 = 30$ or $2y - 1 = 15$	M1dep	their equation with no denominator
	8	A1	

Question 24 continues on the next page

24 cont	**Alternative method 3 – trial and improvement**		
	5×3 or 15	M1	may be implied by their total of the three ages being divided by 3
	Trial of three numbers which fit the criteria, with either their sum correctly evaluated or their sum divided by 3	M1	eg $2 + 1 + 4 = 7$ or $(2 + 1 + 4) \div 3$ condone missing brackets
	Second trial of three numbers which fit the criteria, with either their sum correctly evaluated or their sum divided by 3	M1dep	dep on previous M1 eg $3 + 2 + 6 = 11$ or $(3 + 2 + 6) \div 3$ condone missing brackets
	4, 3 and 8 selected as their final combination	M1dep	any order implies M4
	8	A1	
	Additional Guidance		
	Up to M4 may be awarded for correct work seen in multiple attempts even if not subsequently used		
	Correct expressions, but the sum of the three ages is equated to 5 eg $4x - 1 = 5$		M0M1M0M0A0
	In alt 1, the correct value of x or the correct age for Joel for their two terms for Beth and Joel, with one correct, implies the first 4 marks eg x and $x + 1$ and $2x$, with $x = 3.5$ or answer 7		M1M1M1M1A0
	In alt 2, the correct value of y for their two terms for Sunita and Beth, with one correct, implies the first 4 marks eg y and $\frac{y}{2}$ and $(\frac{y}{2} + 1)$, with $y = 7$ or answer 7		M1M1M1M1A0
	In alt 1 and alt 2, condone missing brackets in equations if not recovered for up to M1M1M1 eg $x + x - 1 + 2x \div 3 = 5$ not recovered		M1M1M1M0A0

Q	Answer	Mark	Comments
25	$\frac{7}{3}$	M1	oe improper fraction
	$\times\frac{5}{4}$ or $\times 1.25$ or 7×5 and 3×4 or $\frac{7\times5}{3\times5} \div \frac{4\times3}{3\times5}$ or $\frac{35}{15} \div \frac{12}{15}$	M1	oe if seen in a grid, must be selected
	$\frac{35}{12}$	A1	oe improper fraction
	$2\frac{11}{12}$	A1ft	oe mixed number ft their improper fraction correctly converted to a mixed number if at least M1 awarded
	Additional Guidance		
	Ignore attempts to simplify after mixed number seen		
	$\frac{8}{3}\times\frac{5}{4}=\frac{40}{12}$, answer $3\frac{4}{12}$		M0M1A0A1ft