



GCSE MATHEMATICS 8300/1F

Foundation Tier

Paper 1 Non-Calculator

Shadow paper based on June 2023 paper

Mark scheme

June 2023

Version: 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.

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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 $a \leq \text{value} < b$
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)	36	B1	

Q	Answer	Mark	Comments
1(c)	27 and 18	B1	either order

Q	Answer	Mark	Comments
1(d)	7	B1	

Q	Answer	Mark	Comments
2(a)	[49, 53]	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)	[20, 24]	B1	may be seen on diagram but answer line takes precedence

Q	Answer	Mark	Comments
2(c)	16.5 or $16\frac{1}{2}$	B1	

Q	Answer	Mark	Comments
2(d)	7 cm by 4 cm rectangle drawn	B1	
	Additional Guidance		
	Mark intention		
	Allow a 7 cm by 4 cm rectangle drawn that does not use the given side		

Q	Answer	Mark	Comments
3(a)	10 or +10	B1	

Q	Answer	Mark	Comments
3(b)	-24	B1	

Q	Answer	Mark	Comments
3(c)	16 or +16	B1	

Q	Answer	Mark	Comments
3(d)	8 or +8	B1	

Q	Answer	Mark	Comments	
4	$\frac{3}{10}$	B2	B1 $\frac{12}{40}$ or $\frac{6}{20}$ or 3 out of 10 oe fraction, decimal or percentage or their fraction fully simplified	
	Additional Guidance			
	$\frac{12}{40} = \frac{10}{3}$ $\frac{1.2}{4}$		B1 B1	

Q	Answer	Mark	Comments	
5	$12 \div 2$ or 6 or 12×3 or 36 or 40.9(0) or $4.9(0) - 1.4(0)$ or 3.5(0)	M1	oe	
	$3 \times 12 \div 2$ or 6×3 or 18 or 19.4(0)	M1	oe implies M2	
	$4.9(0) - 1.4(0) + 3 \times 12 \div 2$ or $40.9(0) - 19.4(0)$ or 21.5	M1dep	oe full method to find total cost dep on M2	
	21.50 or 2150p	A1	SC3 16.5(0) or 75.5(0) or 7550(p)	
	Additional Guidance			
	SC3 16.50 from 3 regular popcorn tub and 1 cinema ticket			
	SC3 75.5(0) from doubling the cost of a cinema ticket instead of halving			
Condone (£)21.50p			M1M1M1A1	

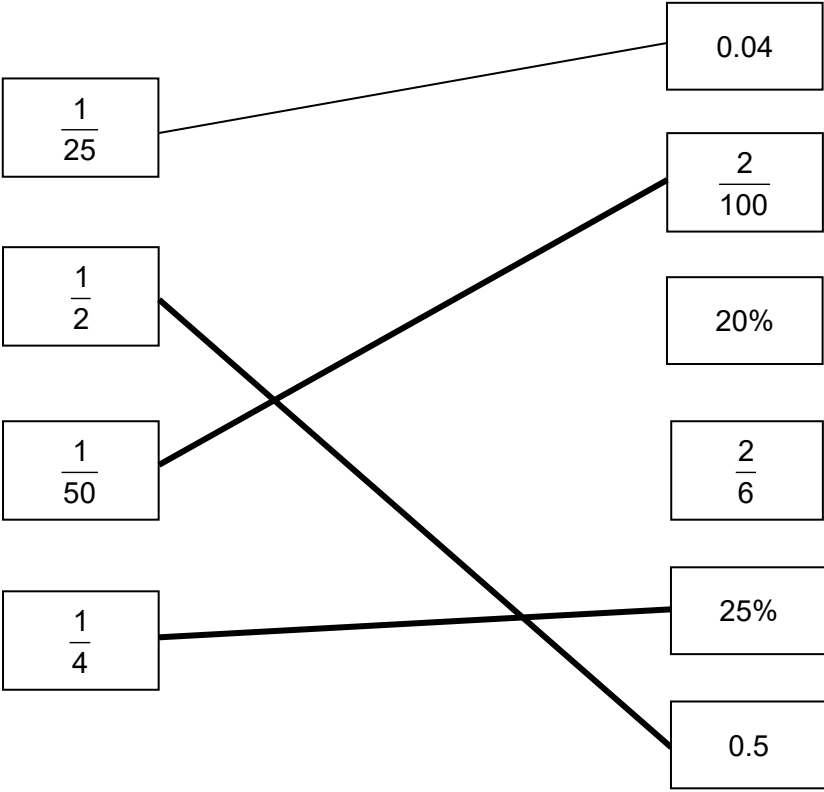
Q	Answer	Mark	Comments
6(a)	$\frac{17}{7}$	B1	oe improper fraction
	Additional Guidance		
	Ignore attempts to simplify after correct answer seen		

Q	Answer	Mark	Comments
6(b)	$\frac{23}{100}$	B1	oe fraction
	Additional Guidance		
	Ignore attempts to simplify after correct answer seen		

Q	Answer	Mark	Comments	
7	(White =) 32 (cars) or 4 (symbols) or (Black =) 20 (cars) or 2.5 (symbols) or (Blue =) 16 (cars) or 2 (symbols) or (Other =) 12 (cars) or 1.5 (symbols) or (total =) 80 (cars) or 10 (symbols) or evidence of addition with answer of 10 (symbols) or $100 \div 8$ or 12.5 (symbols)	M1		
	100 – their 32 – their 20 – their 16 – their 12 or $100 - 80 (= 20)$ or 2 values for Red and Silver with a total of 20 or their $12.5 - 10$ or 2.5	M1dep	oe at least one of 32, 20, 16, 12 correct may be on diagram	
	8 and 12 or Silver = 1 full symbol or Red = 1 full and 1 half symbol	A1	either order, may be on diagram	
	Silver = 1 full symbol and Red = 1 full and 1 half symbol	A1ft	ft their 20 days (must be an even number) where Red is four more than Silver	
	Additional Guidance			
	Mark intention for drawings, quarter and half symbol any orientation or angle. Must be attempt at correct size			
	20 with no working seen or their symbols totalling 10 quarters			M1M1

Q	Answer	Mark	Comments
8(a)	2×10 or 20	M1	oe
	12	A1	

Q	Answer	Mark	Comments	
8(b)	$-22 + 16$ or -6 or $-22 = 2A - 16$ or $A = \frac{T+B}{2}$	M1		
	their $-6 \div 2$	M1dep		
	-3	A1		
	Additional Guidance			
	Embedded answer of -3			M1M1A0
	$-22 = 2A - 16$ may use a different letter or symbol for A but not T or B			

Q	Answer	Mark	Comments
9	All 3 correct matches	B3	B1 for each correct match
	Additional Guidance		
	To score, a box on the left must be joined to just the correct box on the right.		
			B3
Two lines from a left-hand box is choice		B0	

Q	Answer	Mark	Comments
10	(A =) 30	B1	may be implied by correct answer
	(B =) 8	B1	may be implied by correct answer
	240	B1ft	SC2 ($96 \times 8 =$) 768 SC2 ($-6 \times 30 =$) -180 SC1 ($12 \times 2 + 6 \times 11 - (10 - 7) =$) 87
	Additional Guidance		
	Answer 240 with no incorrect values seen for A and B		B1B1B1

Q	Answer	Mark	Comments
11	$18 \div 4.5$	M1	oe
	4	A1	

Q	Answer	Mark	Comments
12	100	B1	

Q	Answer	Mark	Comments
	Alternative method 1 – using the given scale		
13	(O) $16 \div 4$ or (A) $8 \div 2$ or 4 or (O) $4 \div 16$ 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 $(4 + 2 + 3) - 16 - 8$ or 12	M1dep	16 – 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
	Alternative method 2 – using squares		
	(O) $8 \div 4$ or (A) $4 \div 2$ or 2 (squares)	M1	
	their 2×3 or 6 (squares)	M1dep	8 – 2 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		
(16 + 8) ÷ (4 + 2) (8 + 4) ÷ (4 + 2)		M1 M1	

Q	Answer	Mark	Comments	
14	Valid statement about proportion	B1	eg there were more guests than members	
	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 guests		B1	
	They were mostly guests / More than half were guests		B1	
	There were 36% more guests than members		B1	
	Fewer members (than guests)		B1	
	The guests were 68%, the members were (only) 32%		B1	
	The guests were 68, the members were (only) 32		B0	
	The difference is 36%		B0	
There were 32% more guests (calculation error)		B0		
guests visit the ski centre more often		B0		
There were 32% 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 (at the ski centre) (on average)	B1
	The members' mean was 3.5 (hours) and the guests' was 2 (hours)	B1
	The members' was 3.5 and the guests' was 2 (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 1 (hours) more	B1
	Members' range was 3 (hours), guests' (range) was 4 (hours)	B1
	Members were 3, guests were 4 (ambiguous)	B0
	Members visited for 3 hours, guests for 4 hours (referencing mean)	B0
	The difference in range is 1 hour	B0
	The range of the guests is high	B0

Q	Answer	Mark	Comments
15	3×4 or 12 or 5×6 or 30 or 18 or 0.4	M1	oe
	(their 30 – their 12) \div their 30 or $1 - \frac{12}{30}$ or $\frac{18}{30}$ or $1 - 0.4$ or 0.6 or 40(%)	M1dep	
	60	A1	
	Additional Guidance		
	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 ÷ 15 or 4 or 15 ÷ 60 or $\frac{1}{4}$ or 12 ÷ 15 or 0.8 or 15 ÷ 12 or 1.25 or 15 + 15 + 15 + 15	M1	oe	
	their 4 × 12 or 18 ÷ their $\frac{1}{4}$ or their 0.8 × 60 or 60 ÷ their 1.25 or 12 + 12 + 12 + 12	M1dep	oe full method to get to answer	
	48	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 6 and 3 or 10 (parts) or numbers in the ratio 1 : 6 : 3 or (angle sum on a straight line =) 180	M1	oe may be seen in a ratio eg $\frac{1}{6}:1:\frac{3}{6}$ or $\frac{1}{3}:2:1$ numbers can be in any order eg 30, 10, 60
	180 ÷ (1 + 6 + 3) or 18 or $180 \times \frac{3}{10}$	M1dep	oe
	54	A1	
	Alternative method 2 – algebraic		
	x and $6x$ and $3x$ or $10x$ 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 $x + 6x + 3x = 180$ and $180 \div (1 + 6 + 3)$
	54	A1	
	Additional Guidance		
	$x + 6x + 3x = 360$ or $360 \div 10$		M1M0A0
	$\frac{1}{6}x + x + \frac{3}{6}x = 180$ and $180 \div \left(\frac{1}{6} + 1 + \frac{3}{6}\right)$		M1M1
	$\frac{1}{3}x + \frac{6}{3}x + x = 180$ and $180 \div \left(\frac{1}{3} + \frac{6}{3} + 1\right)$		M1M1
	Angle DBC marked as 54 on the diagram with answer line blank		M1M1A1
18 and 54 in working with no or incorrect answer chosen		M1M1A0	

Q	Answer	Mark	Comments
18	All conditions met: <ul style="list-style-type: none"> • 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		
	$2 \times 23 = 46$ (or $23 \times 2 = 46$) is the only fully correct solution	B3	
	Allow 40 to 50 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	$\frac{3}{4} \times 72$ or 54	M1	oe eg $72 \div 4 \times 3$ implied by 126	
	$\frac{1}{6} \times$ their 54 or 9	M1dep	oe eg $54 \div 6$ accept 0.16 or better for $\frac{1}{6}$	
	$\frac{4}{9} \times 72$ or 32	M1	oe eg $72 \div 9 \times 4$ accept 0.44 or better for $\frac{4}{9}$	
	41(.00)	A1	SC2 [54.65, 54.67] or 36 condone incorrect money notation eg 41.0 or 41.00p	
	Additional Guidance			
	SC2 for [54.65, 54.67] is from misreading as Chloe gets £72			
	SC2 for 36 is from $\frac{4}{9}$ of 54 plus $\frac{1}{6}$ of 72			
Do not accept ' $\frac{3}{4}$ of 72' or ' $\frac{1}{6}$ of 54' or ' $\frac{4}{9}$ of 72' 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 (25, [42k, 50k])	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 500	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 28 000) Answer 56 Answer 0.056		B1B1B1 B1B1B0
For two lines of best fit with no answer, take as choice			

Q	Answer	Mark	Comments
21	Alternative method 1 – evaluation and division		
	(3 ² =) 9 or (5 × 3 ² =) 45 or 360 ÷ 5 or 72 or 360 ÷ 3 ² or 40	M1	oe oe eg 5 × 72 = 360 oe eg 9 × 40 = 360
	360 ÷ 5 ÷ 3 ² or 8	M1dep	oe eg 8 × 45 = 360
	3 with M1 awarded and not from incorrect working	A1	
	Alternative method 2 – product of prime factors		
	360 written as a product of factors where at least one factor is prime	M1	eg 2 and 180 or 3 and 120 or 2 and 2 and 90 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 10 × 36 followed by 2 × 5 × 6 × 8 implies 2 × 5 × 36 for M1
	2 and 2 and 2 and 3 and 3 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 × 9 × 5 = 360 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 360 ÷ 5 × 3 ² for M2 in alt 1 unless recovered, but do allow $\frac{360}{5 \times 3^2}$ or 360 ÷ (5 × 3 ²)		

Q	Answer	Mark	Comments
22	$7x + 18$	B2	B1 $10x + 12$ or $-3x + 6$ or $7x + a$ or $bx + 18$, where a and b can be any numbers
	Additional Guidance		
	Do not ignore further working for B2 eg $7x + 18 = 25x$ eg $7x + 18, x = \frac{18}{7}$	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 Wenjie’s age		
	35 × 3 or 105	M1	may be implied by their algebraic total of the three ages being divided by 3
	$x + 5$ or $3x$ or $5x + 5$	M1	oe expressions any letter throughout
	$x + \text{their } (x + 5) + \text{their } 3x = \text{their } 105$ or $5x + 5 = \text{their } 105$	M1dep	oe equation, eg $\frac{x+x+5+3x}{3} = 35$ dep on M1M1
	$(x =) 20$	M1dep	correct solution to their equation if the solution has a decimal part allow truncation or rounding to the nearest whole number
	60	A1	
	Alternative method 2 – algebra based on Conor’s age		
	35 × 3 or 105	M1	may be implied by their algebraic total of the three ages being divided by 3
	$\frac{y}{3}$ or $\frac{y}{3} + 5$ or $\frac{5y}{3} + 5$	M1	oe expressions any letter throughout
	$y + \text{their } \frac{y}{3} + \text{their } \left(\frac{y}{3} + 5\right) = \text{their } 105$	M1dep	oe equation eg $\frac{y + \frac{y}{3} + \frac{y}{3} + 5}{3} = 35$ dep on M1M1
	$3y + \text{their } y + \text{their } (y + 15) = 3 \times \text{their } 105$ or $5y + 15 = 315$ or $5y = 300$	M1dep	their equation with no denominator
	60	A1	

Question 24 continues on the next page

24 cont	Alternative method 3 – trial and improvement		
	35 × 3 or 105	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 $1 + 6 + 3 = 10$ or $(1 + 6 + 3) \div 3$ 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 $2 + 7 + 6 = 15$ or $(2 + 7 + 6) \div 3$ condone missing brackets
	20, 25 and 60 selected as their final combination	M1dep	any order implies M4
	60	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 35 eg $5x + 5 = 35$		M0M1M0M0A0
	In alt 1, the correct value of x or the correct age for Conor for their two terms for Megan and Conor, with one correct, implies the first 4 marks eg x and $x - 5$ and $3x$, with $x = 22$ or answer 66		M1M1M1M1A0
	In alt 2, the correct value of y for their two terms for Wenjie and Megan, with one correct, implies the first 4 marks eg y and $\frac{y}{3}$ and $\left(\frac{y}{3} - 5\right)$, with $y = 66$ or answer 66		M1M1M1M1A0
	In alt 1 and alt 2, condone missing brackets in equations if not recovered for up to M1M1M1 eg $x + x + 5 + 3x \div 3 = 35$ not recovered		M1M1M1M0A0

Q	Answer	Mark	Comments	
25	$\frac{13}{4}$	M1	oe improper fraction	
	$\times \frac{5}{2}$ or $\times 2.5$ or 13×5 and 4×2 or $\frac{13 \times 5}{4 \times 5} \div \frac{2 \times 4}{5 \times 4}$ or $\frac{65}{20} \div \frac{8}{20}$	M1	oe if seen in a grid, must be selected	
	$\frac{65}{8}$	A1	oe improper fraction	
	$8\frac{1}{8}$	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			
	$\frac{15}{4} \times \frac{5}{2} = \frac{75}{8}$, answer $9\frac{3}{8}$			MOM1A0A1ft