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# GCSE MATHEMATICS 8300/3F

Foundation Tier

Paper 3 Calculator

Shadow paper based on June 2022 paper

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**Mark scheme**

June 2022

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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.

<b>M</b>	Method marks are awarded for a correct method which could lead to a correct answer.
<b>A</b>	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>B</b>	Marks awarded independent of method.
<b>ft</b>	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
<b>SC</b>	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
<b>M dep</b>	A method mark dependent on a previous method mark being awarded.
<b>B dep</b>	A mark that can only be awarded if a previous independent mark has been awarded.
<b>oe</b>	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
<b>[a, b]</b>	Accept values between a and b inclusive.
<b>[a, b)</b>	Accept values $a \leq \text{value} < b$
<b>3.14 ...</b>	Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416
<b>Use of brackets</b>	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	75%	B1	

Q	Answer	Mark	Comments
2	6	B1	

Q	Answer	Mark	Comments
3	$\frac{9}{100}$	B1	

Q	Answer	Mark	Comments
4	$15e$	B1	

Q	Answer	Mark	Comments	
5(a)	kilograms or grams or pounds	B1	allow abbreviations eg kg, g, lb	
	kilometres or miles	B1	allow abbreviations eg km, m	
	<b>Additional Guidance</b>			
	Mark intention eg condone incorrect spellings			
	Ignore any numbers with correct units			

Q	Answer	Mark	Comments	
5(b)	40 + 50 or 90 or 1 (h) + 30 (m) + 1 (h) + 30 (m) or 180	M1		
	3	A1	oe answer in hours eg three hours SC1 2.3(0)	
	<b>Additional Guidance</b>			
	Ignore rounding attempt to 2 or 3 after correct answer seen eg 2.5 in working with answer 3			M1A1
	2 h 60 min in working with answer 2			M1A0
	1.9(0)			M0

Q	Answer	Mark	Comments	
6	$4 \times 2(.00)$ or 800 or 8.00	M1	oe	
	20 – their 8 or 12 or 2000 – their 800 or 1200	M1	oe $0.8 \leq \text{their } 8 < 20$ $80 \leq \text{their } 800 < 2000$ 12 or 1200 implies M2	
	15	A1		
	<b>Additional Guidance</b>			
	Up to M2 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts			
	$2(.00) \div 4 = 0.5$ then $20 - 0.5$			M0M1A0

Q	Answer	Mark	Comments
7(a)	3	B1	allow answer in words

Q	Answer	Mark	Comments
7(b)	<b>Alternative method 1</b>		
	$2 + 6 + 9$ or 17 (2021) or $5 + 8 + 3$ or 16 (2022)	M1	oe
	17 and 16	A1	
	<b>Alternative method 2</b>		
	$2 - 5 + 6 - 8 + 9 - 3$ or $-3 - 2 + 6$ or $5 - 2 + 8 - 6 + 3 - 9$ or $3 + 2 - 6$	M1	oe eg 6 fewer bronze, 3 more gold, 2 more silver,
	Indication that there was 1 less medal in 2022	A1	oe indication there was 1 more medal in 2021
	<b>Additional Guidance</b>		
	17 must not be linked with 2022, 16 must not be linked with 2021		
	Ignore further work after correct answer seen		

Q	Answer	Mark	Comments
7(c)	Valid reason	B1	eg 24 is a multiple of 3 or 24 ÷ 3 is a whole number or 8 + 8 + 8 = 24
	<b>Additional Guidance</b>		
	Ignore incorrect or irrelevant statements alongside correct statements, unless contradictory		
	3 is a factor of 24		B1
	(24 ÷ 3 =) 8		B1
	(24 ÷ 3 =) 8		B1
	3 × 8 = 24		B1
	It could be 8, 8 and 8		B1
	24 divided by 3 is a whole number		B1
	24 can be (fully) divided by 3 (condone)		B1
	3 goes into 24 (condone)		B1
	24 fits evenly into 3 (condone)		B1
	The three equal totals could add up to 24		B1
	There are 3 whole numbers that add to make 24		B0
	24 is a factor of 3		B0
The difference between the possible answers is 3		B0	

Q	Answer	Mark	Comments
<b>8</b>	<b>Alternative method 1</b>		
	7.2 ÷ 8 or 0.9	M1	oe
	7.2 + their 0.9 or 8.1	M1	oe their 0.9 must not be 0.1 and must be less than 7.2
	their 8.1 – 8 or 0.1	M1dep	oe dep on 2nd M1
	100	A1	SC1 any correct conversion litres to millilitres with M0 scored
	<b>Alternative method 2</b>		
	7.2 × 1000 or 7200 or 8 × 1000 or 8000 or 7.2 ÷ 8 or 0.9	M1	oe
	their 7200 ÷ 8 or their 0.9 × 1000 or 900	M1	oe their 7200 must include the digits 72 consecutively their 0.9 must not be 0.1 and must be less than 7.2
	their 7200 + their 7200 ÷ 8 or their 7200 + their 0.9 × 1000 or 8100	M1dep	oe their 7200 must include the digits 72 consecutively their 0.9 must not be 0.1 and must be less than 7.2 dep on 2nd M1
	100	A1	SC1 any correct conversion litres to millilitres with M0 scored

**Additional Guidance continues on the next page**

<b>Additional Guidance</b>		
<b>8 cont</b>	Up to M3 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts	
	Beware of 0.1 or 100 from incorrect working	
	8100 or 0.1 (not from incorrect working)	M1M1M1
	$720 \div 8$ and $720 + 90$ (720 includes the digits 72 consecutively)	M0M1M1A0
	720 and 90 and 810	M0M1M1A0
	720 and 800 and 90 and 10	M0M1M1A0
	In Alt 2, $0.0072 \div 8$ (0.0072 includes the digits 72 consecutively)	M0M1

<b>Q</b>	<b>Answer</b>	<b>Mark</b>	<b>Comments</b>
<b>9(a)</b>	6 in car not used every day	B1	
	31 in no car owned	B1	
	73 in total number of people	B1ft	ft 42 + their 31 or 36 + their 6 + their 31
	<b>Additional Guidance</b>		
	6 in car not used every day		B1
	53 in no car owned		B0
	95 in total number of people		B1ft
	5 in car not used every day		B0
32 in no car owned		B0	
74 in total number of people		B1ft	

Q	Answer	Mark	Comments
<b>9(b)</b>	$\frac{36}{42}$ or $\frac{6}{7}$ or 0.857(...) or 85(.7 ...)%	B1	oe fraction
	<b>Additional Guidance</b>		
	Ignore attempts to simplify or convert after correct fraction seen eg1 $\frac{36}{42}$ seen, answer $\frac{5}{7}$ eg2 $\frac{36}{42}$ seen, answer 8.57...%		B1
	Ignore words if correct answer seen eg1 $\frac{36}{42}$ seen, answer 36 out of 42 eg2 85.7%, unlikely		B1
	Answer given as ratio (even if correct answer also seen) eg 36 : 42		B0
	Answer only in words eg 36 out of 42		B0
	Only 85.7... (without %)		B0

Q	Answer	Mark	Comments
10(a)	Hexagon	B1	

Q	Answer	Mark	Comments
10(b)	Valid reason	B1	eg sides are not equal or angles are not equal
	<b>Additional Guidance</b>		
	Ignore incorrect or irrelevant statements alongside correct statements, unless contradictory		
	Regular polygons must have equal sides		B1
	Sides are different (condone)		B1
	Some sides are more than 1 cm		B1
	It doesn't have one line of symmetry		B0

Q	Answer	Mark	Comments
10(c)	2	B1	allow in words
	0	B1	allow in words

Q	Answer	Mark	Comments
11(a)	5	B1	
	<b>Additional Guidance</b>		
	5 in output oval with answer line blank		B1
	5 in output oval with different answer on answer line		B0

Q	Answer	Mark	Comments
11(b)	$b = \frac{a+3}{7}$ or $b = (a+3) \div 7$	B2	oe eg $b = \frac{3+a}{7}$ B1 $b = a + 3 \dots$ or $b = 3 + a \dots$ or $3 + a \div 7$ SC1 $a = 7b - 3$
	<b>Additional Guidance</b>		
	Further incorrect work after a B2 response is B1 eg $b = \frac{a+3}{7}$ followed by $b = 7a + 21$		B1
	Further incorrect work after a B1 response is B1 eg $\frac{a+3}{7}$ followed by $7a + 21$		B1
	Condone $\frac{a+3}{7}$ on answer line if $b = \frac{a+3}{7}$ seen in working		B2
	$\frac{a+3}{7} = b$		B2
	$b = (3+a) \div 7$		B2
$\frac{3a}{7}$		B0	

Q	Answer	Mark	Comments
12(a)	$3x + 5y$	B2	either order B1 $3x$ or $5y$
	<b>Additional Guidance</b>		
	Further incorrect work after a B2 response is B1 eg $3x + 5y$ followed by $8xy$		B1
	Further incorrect work after a B1 response is B1 eg $15x + 5y$ followed by $75xy$		B1

Q	Answer	Mark	Comments
12(b)	$12 \times 20$ or 240 or $20^2$ or 400	M1	oe
	$12 \times 20$ or 240 and $20^2 - b$ or $400 - b$ or $20^2 - 240$ or $400 - 240$	M1dep	oe may be seen in an equation
	160	A1	
	<b>Additional Guidance</b>		
	Embedded answer		M1M1A0

Q	Answer	Mark	Comments
12(c)	$4p + 6$	B1	

Q	Answer	Mark	Comments
13	False Cannot tell	B2	B1 one correct
	<b>Additional Guidance</b>		
	A tick and a cross in the same row – mark the tick		
	Allow any unambiguous indication		

Q	Answer	Mark	Comments
14(a)	12	B1	

Q	Answer	Mark	Comments
14(b)	$1 \times 7$ and $2 \times 5$ and $3 \times 4$ and $4 \times 1$ and $5 \times 3$ or $7$ and $10$ and $12$ and $4$ and $15$ or $48$	M1	oe allow one error or omission
	$(7 + 10 + 12 + 4 + 15) \div 20$ or $48 \div 20$ or their $48 \div 20$	M1dep	oe eg $\frac{48}{20}$ or $\frac{12}{5}$ or $2\frac{2}{5}$ without working their 48 must be the correct sum of their products
	2.4	A1	SC1 33.75
	<b>Additional Guidance</b>		
	$48 \div 5$		M1M0
	$1 \times 7 + 2 \times 5 + 3 \times 4 + 4 \times 1 + 5 \times 5$ ( $5 \times 5$ is one error) $58 \div 20 = 2.9$		M1 M1A0
	$8 + 10 + 12 + 4 + 15$ (8 is one error) $49 \div 20 = 2.45$		M1 M1A0
	Answer 2 after 2.4 seen		M1M1A0
	$7 + 10 + 12 + 4 + 15 \div 20$ not recovered		M1M0
	Correct products or values seen but a different method used is a choice of methods eg $7 \ 10 \ 12 \ 4 \ 15$ followed by $20 \div 5$ or $20 \div 15$		M0

Q	Answer	Mark	Comments
15(a)	450 or 480 or 510 or 17 ( $\times$ 30) or 17th or any 3 multiples of 30 that are greater than 30	M1	
	510	A1	
	<b>Additional Guidance</b>		
	510 in working with answer 17 or 17th or $17 \times 30$		M1A0

Q	Answer	Mark	Comments	
15(b)	3	B2	B1 answer 6 or answer 7 or answer 3 ( $\times$ ) 7 or answer 3, 7 or (1) 2 3 4 6 (12) or (1) 3 7 (21) or (12 $\Rightarrow$ ) 2 ( $\times$ ) 2 ( $\times$ ) 3 or $2^2$ ( $\times$ ) 3 or (21 $\Rightarrow$ ) 3 ( $\times$ ) 7	
	<b>Additional Guidance</b>			
	If correct answer 3 is obtained from a list of factors, then the list must contain no errors			
	For use of prime factors, allow in repeated division or a factor tree or a Venn diagram or inclusion of 1			
	List of factors may be seen in factor pairs (allow repeats) eg $(1 \times 12)$ $2 \times 6$ $3 \times 4$		B1	

Q	Answer	Mark	Comments
16	$2 \times 0.65$ or 1.3	M1	oe implied by 15.6 or 12.3(...)
	Ticks Yes and 15.6 or Ticks Yes and 12.3(...)	A1	oe eg $\frac{16}{1.3}$ is more than 12
	<b>Additional Guidance</b>		
	Ignore area and volume calculations		
	Ticks Yes and 12 r0.4		M1A1
	Ticks Yes and 0.4 cm over		M1A1
	Ticks No and 15.6		M1A0
	$16 \times 0.65$		M1

Q	Answer	Mark	Comments
17(a)	703 125	B1	

Q	Answer	Mark	Comments
17(b)	16	B1	

Q	Answer	Mark	Comments
18	$b$ and $d$	B1	

Q	Answer	Mark	Comments
19(a)	Straight line from (0, 0) to (10, 22.5)	B2	$\pm \frac{1}{2}$ square
			B1 one correct point $\pm \frac{1}{2}$ square
			from (1, 2.25) to (10, 22.5) seen or plotted
			or
			one correct ratio apart from 4 : 9
			or
			one correct pair of amounts apart from 4 juice 9 water
			<b>Additional Guidance</b>
Mark intention			
If no points plotted, a correct point from (1, 2.25) to (10, 22.5) can be implied by a straight line with positive gradient			
Two points plotted with the same $x$ -coordinate is choice unless the line is drawn through one of the points			
Condone straight line from (4, 9) to (10, 22.5)		B2	
(4, 9) seen with graph not drawn or incorrect		B1	
10 : 22.5 seen with graph not drawn or incorrect		B1	
8 juice 18 water with graph not drawn or incorrect		B1	

Q	Answer	Mark	Comments
19(b)	<b>Alternative method 1 – uses the given ratio</b>		
	13.5	B1	
	<b>Alternative method 2 – uses their graph</b>		
	Correct water reading for 6 litres of juice from their straight line	B1ft	$\pm \frac{1}{2}$ square
	<b>Additional Guidance</b>		
	13 or 14 from a correct straight line		B1

Q	Answer	Mark	Comments
<b>20</b>	Ticks No and valid reason	B1	eg ticks No and Aaron has thrown more often
	<b>Additional Guidance</b>		
	Ignore incorrect or irrelevant statements alongside correct statements, unless contradictory		
	Ticks Yes		B0
	Ticks No and 60 is more than 50		B1
	Ticks No and 60 is 10 more than 50		B1
	Ticks No and 60 is 20 more than 50 (ignore incorrect value 20)		B1
	Ticks No and she has less data to look at		B1
	Ticks No and her number of throws is lower		B1
	Ticks No and Bryony used fewer throws which gives her a lower chance of getting heads		B1
	Ticks No and Aaron has more number of throws and has more heads (ignore irrelevant has more heads)		B1
	Ticks No and Bryony throws fewer coins		B1
	Ticks No and she threw it only 50 times, Aaron 60		B1
	Ticks No and she threw it 50 times, Aaron 60		B0
	Ticks No and she threw it 50 times and got 17		B0
	Ticks No and the probability is $\frac{17}{50}$		B0
	Ticks No and because her total is lower		B0

Q	Answer	Mark	Comments
<b>21</b>	<b>Alternative method 1</b>		
	tan identified	M1	oe eg $\tan^{-1}$
	$\tan x = \frac{12}{5}$ or $\tan x = 2.4$	M1dep	oe eg $\tan^{-1} \frac{12}{5}$ or $90 - \tan^{-1} \frac{5}{12}$
	[67, 67.4]	A1	SC1 [22.6, 23]
	<b>Alternative method 2</b>		
	$\sin x = \frac{12}{\sqrt{5^2 + 12^2}}$ or $\cos x = \frac{5}{\sqrt{5^2 + 12^2}}$	M2	oe eg $\sin x = \frac{12}{\sqrt{169}}$ or $\sin^{-1} \frac{12}{\sqrt{5^2 + 12^2}}$ or $\cos x = \frac{5}{\sqrt{169}}$ or $\cos^{-1} \frac{5}{\sqrt{5^2 + 12^2}}$ or $90 - \sin^{-1} \frac{5}{\sqrt{5^2 + 12^2}}$ or $90 - \cos^{-1} \frac{12}{\sqrt{5^2 + 12^2}}$
	[67, 67.4]	A1	SC1 [22.6, 23]
	<b>Additional Guidance</b>		
	Accept 13 for $\sqrt{169}$		
	Tan can be identified by, for example, circling TOA in SOHCAHTOA		
	Answer from accurate drawing		M0M0A0
	$\sin x = \frac{12 \sin 90}{\sqrt{169}}$		M2
$(x =) \tan 2.4$ or $(x =) \tan 0.41666\dots$ or $(x =) \tan \left(\frac{12}{5}\right)^{-1}$ unless recovered		M1M0A0	
$\tan = \frac{12}{5}$ or $\tan = \frac{5}{12}$ or $\tan x = \frac{5}{12}$ with no further correct working		M1M0A0	

Q	Answer	Mark	Comments
	2 + 3 or 5 and $4\frac{1}{4} + 3\frac{3}{4}$ or 8 or $4\frac{1}{4} - 2$ or $2\frac{1}{4}$ and $3\frac{3}{4} - 3$ or $\frac{3}{4}$ or 3	M1	oe eg 120 + 180 or 300 and 255 + 225 or 480 implied by $4\frac{1}{4} + 3\frac{3}{4} - 2 - 3$
22	$\frac{8-5}{5}$ or $\frac{2\frac{1}{4} + \frac{3}{4}}{2+3}$ or $\frac{3}{5}$ or 0.6 or $\frac{4\frac{1}{4} + 3\frac{3}{4}}{2+3} (\times 100)$ or $\frac{8}{5} (\times 100)$ or 1.6 ( $\times 100$ ) or 160	M1dep	oe eg $\frac{4\frac{1}{4} + 3\frac{3}{4} - 2 - 3}{2+3}$ eg $\frac{480 - 300}{300}$ or $\frac{180}{300}$ or 1.6 - 1
	60	A1	
<b>Additional Guidance</b>			
Allow working fully in minutes but units must be consistent in a single calculation eg 2 h 15 and 0 h 45 eg 2 + 3 = 5 and 255 + 225 = 480 eg 3 + 120 and $255 + 3\frac{3}{4}$ unless recovered			M1 M1 M0
$2 + 3 = 6$ , $4\frac{1}{4} + 3\frac{3}{4} = 8$ , $8 - 6 = 2$ , $2 = 40\%$			M1M1A0
$2 + 3 = 6$ , $4\frac{1}{4} + 3\frac{3}{4} = 8$ , answer 40% (2 is implied)			M1M1A0
$8 - 6 = 2$ , $2 = 40\%$ (no method shown for 6)			M0M0A0

Q	Answer	Mark	Comments
23(a)	-2 and 6	B1	either order
	<b>Additional Guidance</b>		
	Ignore $x =$ written before answers		
	(-2, 0) or (6, 0)		B0

Q	Answer	Mark	Comments
23(b)	(2, -16)	B2	B1 $x = 2$ or (2, ...) or $y = -16$ or (... , -16) or $(x - 2)^2 - 16$
			B1ft correct $y$ -coordinate for their $x$ -coordinate with $x \neq -1, 0$ or 5 SC1 (-16, 2)
	<b>Additional Guidance</b>		
	If answer line is blank, check diagram for indication of $x$ or $y$ values		
	(3, -16)		B1
	(3, -15)		B1ft
	(1, -15)		B1ft
	(2.5, -15.75)		B1ft
(0, -12)		B0ft	

Q	Answer	Mark	Comments	
24	(8th term =) $2^9$ or 512	M1	oe may be implied	
	Common difference of A indicated as 3	M1	may be implied eg $3n \dots$ or $\dots + 3(n - 1)$	
	$3n + 8 =$ their 512 or (their 512 – 8) $\div 3$ or (their 512 – 11) $\div 3$ or 167	M1dep	oe equation eg $11 + 3(n - 1) = 2^8$ dep on 2nd M1 their 512 may be any number and may be in index form	
	168	A1		
	<b>Additional Guidance</b>			
	$n + 3$ implies 2nd M1			
	Do not award M1 for 512 if it is in a list of powers of 2 unless it is indicated or it is the highest power evaluated			
	Common difference of 3 may be shown on the progression for the 2nd M1			
	8, (11, 14, 17, 20), 23 without common difference of 3 shown does not imply 2nd M1			
	168 from trial and improvement		M3A1	
	Embedded answer $3 \times 168 + 8 = 512$		M3A0	
	$3n + 8 = 512$ or $3n + 8 = 2^9$ or $3n = 504$		M1M1M1	
	$3n - 8 = 512$		M1M1M0	
	$3n + 8 = 32$ ( $2^9$ not seen)		M0M1M1	
	$3n + 6 = 2^9$		M1M1M0	
$512 - 20 = 492$ , $492 \div 3$ (indicating common difference of 3)		M1M1M0		
$3n - 8 = 256$ ( $2^9$ not seen)		M0M1M0		

Q	Answer	Mark	Comments
25	<b>Alternative method 1</b>		
	$6 \times 3$ or 18	M1	oe may be seen in an equation eg $5 \times x + 6 \times 3 = 88$
	$\frac{88 - 6 \times 3}{5}$ or $\frac{70}{5}$ or 14	M1dep	oe
	50	A1	
	<b>Alternative method 2</b>		
	$11 \times 3$ or 33	M1	oe may be seen in an equation eg $11 \times 3 + 5 \times y = 88$
	$\frac{88 - 11 \times 3}{5}$ or $\frac{55}{5}$ or 11	M1dep	oe
	50	A1	
	<b>Additional Guidance</b>		
	Up to M2 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts		
	Working for up to M2 may be seen on the diagram		
	Beware of 50 from incorrect working $11 + 3 + 11 + 5 = 30$ , $11 + 3 + 6 = 20$ , $30 + 20 = 50$		MOMOA0

Q	Answer	Mark	Comments
26	$\begin{pmatrix} 1 \\ 7 \end{pmatrix}$	B1	
	<b>Additional Guidance</b>		
	Condone $\begin{pmatrix} 1 \\ 7 \end{pmatrix}$		B1

Q	Answer	Mark	Comments
27	$380 \div (3 + 2)$ or $380 \div 5$ or 76	M1	oe eg $\frac{380}{5}$
	their $76 \times 3$ or 228	M1dep	oe $\frac{3}{5} \times 380$ scores M2
	$99 \div 3$ or 33 or $99 \div 3 \times 7$ or 231	M1	oe eg $\frac{99}{3}$ or $\frac{7}{3} \times 99$
	228 and 231 and B	A1	
	<b>Additional Guidance</b>		
	228 and 69.3 and A		M1M1M0A0

Q	Answer	Mark	Comments
28	<b>Alternative method 1 – compares speeds in m/s</b>		
	$400 \div 52$ or 7.69(2...)	M1	oe eg $\frac{400}{52}$ or $7\frac{9}{13}$
	$28.8 \times 1000 \div 60 \div 60$ or 8	M1	oe eg $28\,800 \div 3600$ or $28.8 \div 3.6$
	8 and 7.69(2...) and Anita	A1	oe eg 8 and $7\frac{9}{13}$ and Anita
	<b>Alternative method 2 – compares speeds in km/h</b>		
	$400 \div 52$ or 7.69(2...)	M1	oe eg $\frac{400}{52}$ or $7\frac{9}{13}$
	their $7.69(2...) \div 1000 \times 60 \times 60$ or	M1dep	oe eg $0.007.69(2...) \times 3600$
	27.69... and Anita	A1	
	<b>Alternative method 3 – time for Anita starting with m/s</b>		
	$28.8 \times 1000 \div 60 \div 60$ or 8	M1	oe eg $28\,800 \div 3600$
	$400 \div$ their 8 or 25	M1dep	oe eg $\frac{400}{8}$
	50 and Anita	A1	oe eg Anita by 2s
	<b>Alternative method 4 – time for Anita starting with km/h</b>		
	$\frac{400 \div 1000}{28.8}$ or [0.0138, 0.0139] or $\frac{400}{28.8}$ or [13.8, 13.9]	M1	oe eg $\frac{0.4}{28.8}$  eg $\frac{125}{9}$
	their [0.0138, 0.0139] $\times 60 \times 60$ or their [13.8, 13.9] $\div 1000 \times 60 \times 60$ or 50	M1dep	oe eg $\frac{0.4}{28.8} \times 3600$
50 and Anita	A1	oe eg Anita by 2s	

Mark scheme and Additional Guidance continue on the next page

Q	Answer	Mark	Comments
<b>28 cont</b>	<b>Alternative method 5 – distance for Anita in 52s</b>		
	28 800 × 52 or 1 497 600 or 28.8 ÷ 60 ÷ 60 or 0.008 or 28.8 × 52 or 1497.6	M1	oe eg $\frac{7488}{5}$
	their 1 497 600 ÷ 60 ÷ 60 or their 0.008 × 1000 × 24 or their 1497.6 × 1000 ÷ 60 ÷ 60 or 416	M1dep	oe eg 28 800 × 52 ÷ 3600
	416 and Anita	A1	
	<b>Additional Guidance</b>		
	Up to M2 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts		
	Ignore all units		
	Allow other correct comparisons eg 461.53... and 480 (this is metres per minute) eg 461.53... and 480 and Anita		M1M1 M1M1A1
	400 m = 0.4 km, 52 s = 52 ÷ 60 ÷ 60 = $\frac{13}{900}$ hour, 0.4 ÷ $\frac{13}{900}$ = 27.69... and Anita		M1M1A1
	$\frac{400 \div 1000}{52} = \frac{1}{130}$ (or 0.00769...)		M1

Q	Answer	Mark	Comments
<b>29</b>	120.35 ≤ mass < 120.45	B1	