GCSE
MATHEMATICS
8300/1F

Foundation Tier Paper 1 Non-Calculator

Mark scheme

November 2022

Version: 1.0 Final

22BG8300/1F/MS

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	65 min	B1	

Q	Answer	Mark	Comments
2	5 cm	B1	

Q	Answer	Mark	Comments
3	60%	B1	

Q	Answer	Mark	Comments
4	25	B1	

Q	Answer	Mark	Comments
5	14a + 3b or 3b + 14a	B2	B1 for 14a or (+)3b
	Additional Guidance		
	14a + 3b followed by further work eg 17ab		B1
	B1 response followed by further work eg 2a + 3b = 5ab		B1

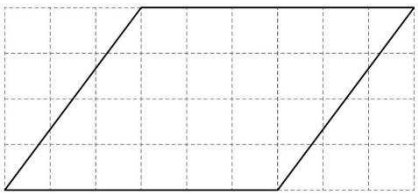
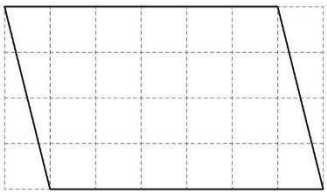
Q	Answer	Mark	Comments
6(a)	40 + 90 – 32 – 38 or 40 + 90 or 130 or 32 + 38 or 70 or 40 – 32 or 8 or 90 – 38 or 52	M1	oe
	60	A1	
	Additional Guidance		
	Check table for working		
	Up to M1 may be awarded for correct work, with no or incorrect answer, even if seen amongst multiple attempts		

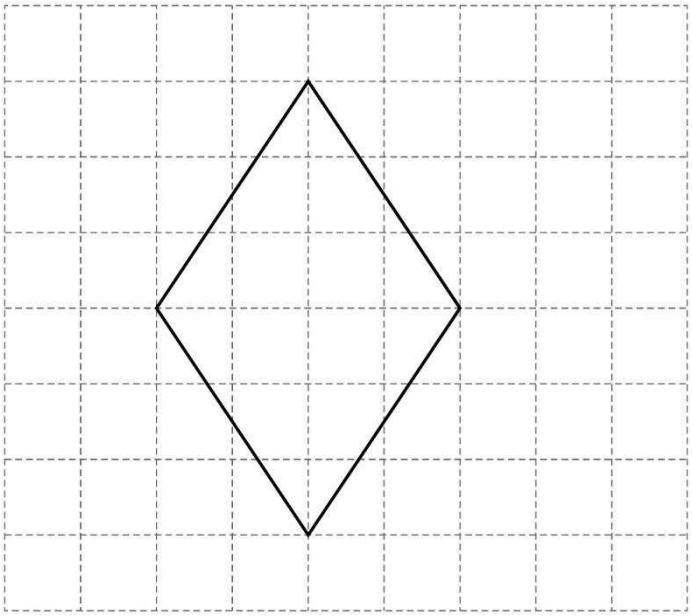
Q	Answer	Mark	Comments
6(b)	**Alternative method 1**		
	$\frac{40+32}{200}$ or $\frac{72}{200}$ or $\frac{36}{100}$	M1	oe
	36	A1	SC1 64
	Alternative method 2		
	$\frac{40}{200} \times 100$ or $\frac{20}{100}$ or 20 or $\frac{32}{200} \times 100$ or $\frac{16}{100}$ or 16 or $\frac{36}{100}$	M1	oe
	36	A1	SC1 64
	Alternative method 3		
	(40 + 32) ÷ 2 or 40 ÷ 2 or 20 or 32 ÷ 2 or 16	M1	oe eg 72 × 0.5
	36	A1	SC1 64
	Additional Guidance		
	72 out of 200 or 72 ÷ 200		M1
	72% of 200		M0
	Build up method, eg 10% = 20, 5% = 20 ÷ 2 = 10, 1% = 20 ÷ 10 = 2, 10 + 5 + 1 = 16(%) 10% = 20, 5% = 10, 1% = 0.5, 10 + 5 + 0.5 = 15.5(%) (method not shown for 1%)		M1 M0

Q	Answer	Mark	Comments
7	$\frac{1}{5} \times 30$ or $\frac{1}{8} \times 80$ or 10 or $\frac{5}{8} \times 80$	M1	oe
	6 or 50	A1	
	56	A1	SC2 54
	Additional Guidance		
	May be seen as a set of equivalent fraction numerators eg $\frac{1}{5}=\frac{6}{30}$ and $\frac{5}{8}=\frac{10}{16}=\frac{100}{160}=\frac{50}{80}$, 6 + 50 = 56 eg $\frac{1}{5}=\frac{6}{30}$ and $\frac{5}{8}=\frac{10}{16}=\frac{100}{160}=\frac{50}{80}$, answer $\frac{56}{110}$	M1A1A1 M1A1A0	
	6 out of 30 or 50 in 80 56 out of 110	M1A1 M1A1A1	
	Up to M1 may be awarded for correct work, with no or incorrect answer, even if seen amongst multiple attempts		

Q	Answer	Mark	Comments
8	100 – (65 + 19) or 100 – 84	M1	oe
	16	A1	
	Additional Guidance		
	Embedded answer eg 84 + 16 = 100	M1A0	

Q	Answer	Mark	Comments
9(a)	3 or 4 identified or 4 by 3 rectangle drawn on grid or triangle base 4, height 3 drawn on grid	M1	
	12	A1	
	Additional Guidance		
	$\frac{3 \times 4}{2}$		M1A0
	3 + 4 + 5 = 12 (perimeter of triangle, not area of rectangle)		M1A0
	For drawings, mark intention		
	Ignore units		

Q	Answer	Mark	Comments
9(b)	All three of • parallelogram with side as given • no right angles • area 24 cm^2	B2	B1 any two bullet points
	Additional Guidance		
	eg  or 		B2
	Vertices along the bottom edge do not need to be at intersections of gridlines		
	Mark intention for B2 and B1		
	Rectangle with sides 6 cm and 4 cm		B1
	Non right-angled triangle drawn off given line, with vertical height 8 cm		B1
	Trapezium (no right angles) drawn with parallel lines of length 6 cm and 10 cm, vertical height 3 cm		B1
	For those that start again, a horizontal line of 6 cm must be used		

Q	Answer	Mark	Comments
9(c)	Rhombus drawn using given two sides	B1	
	Additional Guidance		
		B1	
	Mark intention of straight lines		
	Ignore diagonals on a correct rhombus		

Q	Answer	Mark	Comments
10(a)	30	B1	

Q	Answer	Mark	Comments
10(b)	6420	B1	

Q	Answer	Mark	Comments
11(a)	60 ÷ 12 or 5 or 12 ÷ 8 or 1.5	M1	oe for repeated addition, allow one error
	40	A1	
	Additional Guidance		
	8 × 5 = 35		M1A0
	60 ÷ (12 ÷ 8)		M1A0

Q	Answer	Mark	Comments
11(b)	4 × 56 or 224 or 10 × 56 or 560 or 6 × 56 or 336 or 2 × 2.7(0) or 5.4(0) or 2.7(0) ÷ 6 or 0.45	M1	oe eg 4 × (0).56 or 2.24
	2.7(0) + their 224 or 494 or their 5.6(0) – their 336 + 2.7(0)	M1dep	oe eg 270 + 4 × 56
	4.94	A1	accept 494p
	Additional Guidance		
	Allow mixed units for up to M1M1dep eg 2.70 + 4 × 56 eg 56 + 56 + 56 + 56 = 224, 224 + 2.70		M1M1 M1M1
	Condone £4.94p		M1M1A1
	(£)4.5(0) implies 0.45		M1
	Up to M2 may be awarded for correct work, with no or incorrect answer, even if seen amongst multiple attempts		

Q	Answer	Mark	Comments	
11(c)	3 × 3.2(0) or 9.6(0) or 3.2(0) ÷ 2 or 1.6(0) or 4 × 3.2(0) or 12.8(0) or 3.5	M1	oe eg 3 × 320 or 960	
	3 × 3.2(0) + 3.2(0) ÷ 2 or 4 × 3.2(0) – 3.2(0) ÷ 2 or 3.5 × 3.2(0) or 11.2 or 1120	M1dep	oe eg 3 × 320 + 320 ÷ 2 or 7 × 1.6(0)	
	11.20	A1	accept 1120p	
	Additional Guidance			
	Allow mixed units for up to M1M1dep eg 3 × 3.2(0) + 320 ÷ 2			M1M1
	Condone £11.20p			M1M1A1
	Up to M2 may be awarded for correct work, with no or incorrect answer, even if seen amongst multiple attempts			

Q	Answer	Mark	Comments
12(a)	Any correct conversion using values given 800 ÷ 1000 or 0.8 or 2.1 × 1000 or 2100 or 1.9 × 1000 or 1900 or 2.7 (× 1000) or 2700 or 0.2 × 1000 or 200	M1	oe eg 0.800 may be seen in 2nd M1 2.7 or 4.8 or 2.9 implies 0.8 4800 implies 2100 and 1900 2900 implies 2100
	1.9 + their 0.8 – 2.1 or their 1900 + 800 – their 2100 or their 0.8 – (2.1 – 1.9) or 800 – (their 2100 – their 1900) or 600	M1	oe allow their conversions allow mixed units eg 1.9 + 800 – 2.1
	0.6	A1	
	Additional Guidance		
	Check diagram		
	600 (implies 2100 and 1900)		M1M1
	Accept additional zeroes in the answer eg 0.600 or 00.6		M1M1A1
	No correct unit changes or no changes attempted can score M0M1A0 but calculation must be seen eg 190 + 800 – 210 = 780		M0M1A0
	Up to M2 may be awarded for correct work, with no or incorrect answer, even if seen amongst multiple attempts		

Q	Answer	Mark	Comments
12(b)	**Alternative method 1**		
	$\frac{200-60}{2}$ or $\frac{140}{2}$ or 70	M1	oe eg $\frac{200}{2} - \frac{60}{2}$ may be seen or implied in a ratio eg n : 70 or 70 : n
	130 : 70	A1	must be in correct order
	13 : 7	B1ft	ft a correct and full simplification of any unsimplified ratio condone $\frac{13}{7}$: 1 or 1 : $\frac{7}{13}$ SC2 7 : 13
	Alternative method 2		
	$\frac{200+60}{2}$ or $\frac{260}{2}$ or 130	M1	oe eg $\frac{200}{2} + \frac{60}{2}$ may be seen or implied in a ratio eg 130 : n or n : 130
	130 : 70	A1	must be in correct order
	13 : 7	B1ft	ft a correct and full simplification of any unsimplified ratio condone $\frac{13}{7}$: 1 or 1 : $\frac{7}{13}$ SC2 7 : 13

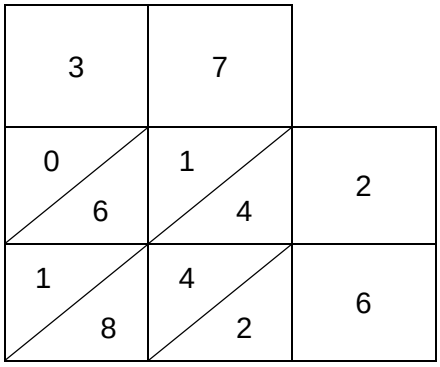
Mark scheme and Additional Guidance continue on the next page

12(b) cont	**Alternative method 3**			
	$200 + 60$ and $200 - 60$ or 260 and 140	M1		
	260 : 140	A1	must be in correct order	
	13 : 7	B1ft	ft a correct and full simplification of any unsimplified ratio condone $\frac{13}{7}$: 1 or 1 : $\frac{7}{13}$ SC2 7 : 13	
	Additional Guidance			
	70 : 130 with answer 7 : 13			M1A0B1ft
	Accept 0.53(846…) or 0.54 for $\frac{7}{13}$ or 1.85(714…) or 1.86 for $\frac{13}{7}$			
	For the M1 in Alt1, 70 must come from working towards a ratio of 130 : 70 or 70 : 130, not from a simplification of 140 : 60 $200 - 60 = 140$, 140 : 60, 70 : 30 $200 - 60 = 140$, 140 : 60, 70 : 30, 7 : 3			 M0A0B0ft M0A0B1ft
	Ignore any units given in the answer			
	Algebraic approach may be seen but no marks scored until $x = \frac{200 - 60}{2}$ reached oe			
	For any ratio, condone correct simplification to 1 : n or n : 1			B1ft

Q	Answer	Mark	Comments
13	Valid explanation referencing the multiplication by 2 twice	B1	eg she has multiplied by 2 twice
	Additional Guidance		
	She multiplied 2 by 2 but there was only one 2 to start with	B1	
	2×2 should not be calculated	B1	
	She doubled everything	B1	
	There should only be one 2	B1	
	There should be a 2	B0	
	She's adding up the 2s, whereas it should be $cd \times 2 = 2cd$	B0	
	She multiplied by 4 (instead of 2)	B1	
	She has 4 instead of 2	B0	
	The 4 is wrong	B0	
	She should not have both $2c$ and $2d$	B1	
	She has multiplied (each of) c and d by 2 separately	B1	
	She has multiplied (each of) c and d separately	B0	
	She did $2c \times 2d$	B0	
	Answer is $2c + 2d$	B0	
	She shouldn't separate the c and d, it's just $2c$	B0	
	You don't times each letter by 2	B1	
	She has multiplied each letter by 2	B1	
	She has multiplied each letter by 2, it should be $2cd^2$	B0	
	It is $c \times d \times 2$ not $2c \times 2d$	B1	
	She shouldn't do all that it is just $cd \times 2 = 2cd$	B0	
	Answer is $2cd$	B0	
	Her answer is wrong	B0	

Q	Answer	Mark	Comments
14	**Alternative method 1**		
	222 or 740 with the 0 correct for the multiplication by 20 or 182 or 780 with the 0 correct for the multiplication by 30	M1	values may be seen separately or in rows ignore any decimal points
	their 222 + their 740 or their 182 + their 780	M1dep	ignore any decimal points
	digits 962	A1	
	0.0962	B1ft	ft their digits 962 ÷ 10 000
	Alternative method 2		
	At least three of 600, 140, 180 and 42	M1	may be seen in a grid ignore any decimal points
	their 600 + their 140 + their 180 + their 42	M1dep	ignore any decimal points
	digits 962	A1	
	0.0962	B1ft	ft their digits 962 ÷ 10 000

Mark scheme and Additional Guidance continue on the next page

14 cont	**Alternative method 3**		
		M1	at least three of the calculated values correct ignore any decimal points
	Total calculated correctly for each diagonal for their table	M1dep	ignore any decimal points
	digits 962	A1	
	0.0962	B1ft	ft their digits 962 ÷ 10 000
	Additional Guidance		
	Ignore use of a decimal point anywhere until final mark		
	Use the Alt that gives the best mark		
	B1ft is not available for an answer involving digits 962, other than correct answer 0.0962		
	$30 \times 20 + 7 \times 6 = 642$, answer 0.0642		M0M0A0B1ft
	Using fractions, digits 962 may be seen as part of a fraction for first A1 For unsimplified fractions, follow appropriate MS for M marks For simplified fractions, please follow the spirit of each MS for M marks		
	Alt 1 If the 0 is missing or misaligned allow if units digit 2 in their answer for the first M1 If the 0 is missing allow 0 to be replaced by x for the first M1		
	Alt 2 If numbers are broken down further there can be only one error for the first M1 eg 20 10 7 and 20 6 needs five of 400, 120, 200, 60, 140, 42		
	Alt 3 Diagonals must slope consistently for M1 unless recovered Diagonals missing is M0 unless recovered		

Q	Answer	Mark	Comments
15(a)	$11x - 6x$ or $6x - 11x$ or $\pm 5x$ or (+)$1 + 3$ or $-3 - 1$ or ± 4	M1	oe terms in x or constant terms collected
	$5x = 4$ or $-5x = -4$	A1	may be implied eg $4 \div 5$ or $-4 \div -5$ or $\frac{-4}{-5}$
	$\frac{4}{5}$ or 0.8	A1ft	oe ft any equation of the form $5x = a$ or $-5x = a$ or $bx = 4$ or $bx = -4$
	Additional Guidance		
	Ignore attempt to convert or simplify after correct answer seen		
	Trial and improvement scores 3 or 0		
	$5x - 4$ (= 0) with no further work		M1A0A0
	$\frac{4}{5}$ and $5x = 4$ on answer line		M1A1A1
	Embedded answer eg $11 \times 0.8 - 3 = 6 \times 0.8 + 1$		M1A1A0
	ft answers must be exact or rounded to 2 dp or better eg $17x = 4$, answer $\frac{4}{17}$ eg $17x = -4$, answer -0.24		M1A0A1ft M1A0A1ft
	$5x + 4$ or $5x + 4 = 0$ or $17x - 4$ or $17x - 4 = 0$ etc with no further work		M1
	$\pm 5x$ or ± 4 must not have come from incorrect working		

Q	Answer	Mark	Comments	
15(b)	$2x = 14 \times 5$ or $2x = 70$ or $\frac{x}{5} = 14 \div 2$ or $\frac{x}{5} = 7$ or $14 \times 5 \div 2$ or $70 \div 2$	M1	oe eg $14 \div 0.4$	
	35	A1		
	Additional Guidance			
	Trial and improvement scores 2 or 0			
	Embedded answer eg $\frac{2 \times 35}{5}$			M1A0
	$\frac{2x}{5} = \frac{14 \times 5}{5}$			M1

Q	Answer	Mark	Comments
16(a)	(green in A =) 28 ÷ 2 or 14 or (red in B =) 20 ÷ 5 × 3 or 12 or (total in A =) $28 \times \frac{3}{2}$ or (total in B =) $20 \times \frac{8}{5}$	M1	oe
	14 and 12 or (total in A =) 42 or (total in B =) 32 or (total green =) 34 or (total red =) 40	A1	may be implied by final answer
	74	A1	SC2 116 (using 56 green discs in A) or 26 (green in A + red in B)
	Additional Guidance		
	14 + 28 + 15 = 57 (implied correct interim total for Bag A) 14 + 28 + 15 + 20 = 77 (implied correct interim total for Bag A) 14 and 15, with 77 on answer line (implied correct interim total for Bag A)		M1A1A0 M1A1A0 M1A1A0
	14 + 28 + 15 + 20, no answer (no implied correct interim total)		M1A0A0

Q	Answer	Mark	Comments
16(b)	0	B1	oe fraction decimal or percentage
	1	B1	oe fraction decimal or percentage
	$\frac{28}{48}$ or $\frac{14}{24}$ or $\frac{7}{12}$ or 0.58(3…)	B1	oe fraction decimal or percentage
	Additional Guidance		
	Ignore incorrect simplification after correct answer seen		
	Do not accept probabilities written as ratios		
	First B1 $\frac{0}{14}$ (denominator may be any value except 0)		B1
	First B1 $\frac{0}{0}$		B0
	Second B1 $\frac{12}{12}$		B1
	Do not allow if only words given eg First answer Impossible Second answer Certain		B0B0
	Penalise only the first occurrence of "out of" eg 0 out of 48, 48 out of 48, 28 out of 48 eg 0, 1, 28 out of 48		B0B1B1 B1B1B0
	Penalise only the first occurrence of an incorrect but consistent denominator eg $\frac{0}{74}$, $\frac{12}{74}$, $\frac{28}{74}$ eg 0, $\frac{12}{116}$, $\frac{28}{74}$		B1B0B1 B1B0B0

Q	Answer	Mark	Comments
17	0.05	B1	

Q	Answer	Mark	Comments
18	$3 + 7$ or 10	M1	implied by 10 symbols or 6.2
	$62 \div$ their 10×3 or 6.2×3 or 18.6 or $62 \div$ their 10×7 or 6.2×7 or 43.4	M1dep	oe full method to work out either number
	18.6 or $\frac{93}{5}$ or $18\frac{3}{5}$ and 43.4 or $\frac{217}{5}$ or $43\frac{2}{5}$	A1	oe decimals, fractions or mixed numbers either order
	Additional Guidance		
	18.6 and 43.4 in working, but truncated or rounded to 18 or 19 and 43 on the answer line		M1M1A1
	$62 = 10x$		M1
	$\frac{x}{62} = \frac{3}{10}$ or $\frac{y}{62} = \frac{7}{10}$		M1

Q	Answer	Mark	Comments
19	**Alternative method 1**		
	$n + 1$ is even and odd × even is even	B2	oe B1 $n + 1$ is even or odd × even is even
	Alternative method 2		
	$n^2 + n$ and odd^2 is odd and odd + odd is even	B2	oe B1 $n^2 + n$ or odd^2 is odd and odd + odd is even
	Alternative method 3		
	n and $n + 1$ are consecutive numbers and odd × even is even	B2	oe B1 n and $n + 1$ are consecutive numbers or odd × even is even
	Additional Guidance		
	Alt 1 odd + 1 = even and multiplying an odd and an even = even	B2	

Q	Answer	Mark	Comments
20	Definitely true Cannot be true Might be true	B3	B1 for each any clear indication
	Additional Guidance		
	Only a cross in a row, mark the cross		
	A tick and cross(es) in a row – mark the tick		
	More than one tick in a row scores B0 for that row		

Q	Answer	Mark	Comments
21(a)	$\begin{pmatrix}4\\-1\end{pmatrix}$	B2	B1 $\begin{pmatrix}4\\....\end{pmatrix}$ or $\begin{pmatrix}....\\-1\end{pmatrix}$ or (4, –1) SC1 $\begin{pmatrix}-4\\1\end{pmatrix}$ or $\begin{pmatrix}-1\\4\end{pmatrix}$
	Additional Guidance		
	Ignore fraction lines		

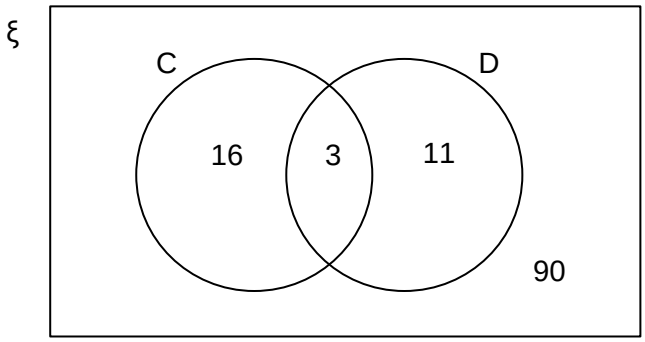
Q	Answer	Mark	Comments
21(b)	$\begin{pmatrix}12\\8\end{pmatrix}$	B1	
	Additional Guidance		
	$4\begin{pmatrix}3\\2\end{pmatrix}$ or $\begin{pmatrix}12\\8\end{pmatrix}$ in working with answer $\begin{pmatrix}3\\2\end{pmatrix}$		B0
	Ignore fraction lines		

Q	Answer	Mark	Comments
21(c)	$\begin{pmatrix}0\\-2\end{pmatrix}$	B1	

Q	Answer	Mark	Comments
22	Valid common denominator for subtraction with at least one numerator correct	M1	eg $\frac{21}{30} - \frac{8}{30}$ or $\frac{13}{30}$ or $\frac{105}{150} - \frac{40}{150}$ or $\frac{65}{150}$ condone decimals in numerator(s)
	their $\frac{13}{30} \times \frac{3}{2}$ or $\frac{\text{their } 13 \div 2}{\text{their } 30 \div 3}$	M1	oe product their $\frac{13}{30}$ can be any single fraction, mixed number or decimal other than their $\frac{13}{30}$ inverted or $\frac{7}{10}$ or $\frac{4}{15}$ condone decimals in numerator(s) correct answer not in correct fraction form eg $\frac{6.5}{10}$ scores M1M1
	$\frac{13}{20}$ or $\frac{39}{60}$	A1	oe fraction SC2 $\frac{29}{20}$ oe fraction or mixed number
	Additional Guidance		
	If 10 or 15 is used as the common denominator, both numerators must be correct for the first mark		
	Correct fraction in working with incorrectly simplified fraction on answer line		M2A1
	Correct fraction in working with conversion to decimal on answer line		M2A0
	$\frac{65}{150} \div \frac{2}{3} = \frac{32}{50}$		M1M0A0
	$\frac{65}{150} \div \frac{2}{3} = \frac{32.5}{50}$ with no further working		M1M1A0

Q	Answer	Mark	Comments
23	$\frac{12}{4} \leqslant x$ or $3 \leqslant x$ or $x < \frac{25}{4}$ or $x < 6.25$ or $x \leqslant 6$ or $x < 7$	M1	oe fully correct inequality is $\frac{12}{4} \leqslant x < \frac{25}{4}$ or $3 \leqslant x < 6.25$
	3 4 5 6 with no extras	A1	any order SC1 3 4 5 6 with one extra or any three of 3 4 5 6 with no extras or 12 16 20 24
	Additional Guidance		
	Ignore incorrect evaluations of 25 ÷ 4 if correct answer is given eg $3 \leqslant x < 6.5$ and answer 3 4 5 6		M1A1
	3 × 4 and 4 × 4 and 5 × 4 and 6 × 4 identified as only correct multiplications with no answer given implies M1		M1A0

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td rowspan="8">24</td><td>120 ÷ 4 × 3 or 90</td><td>M1</td><td>oe
implied by 90 in the box and outside the circles</td></tr>
<tr><td>14 + 19 + their 90 – 120
or 14 + 19 – 120 ÷ 4 or 3
or
19 – their 3 in C only
and 14 – their 3 in D only</td><td>M1</td><td>oe their 90 must be > 87

0 < their 3 < 14</td></tr>
<tr><td>16, 3, 11 and 90 in correct positions</td><td>A1</td><td>SC1 their 4 Venn diagram values total 120, allow a blank intersection to imply 0</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2">Allow up to M1M1 for working outside Venn diagram but Venn diagram takes precedence over working</td><td></td></tr>
<tr><td colspan="2">3 in the intersection with 90 in the box and outside the circles</td><td>M1M1</td></tr>
<tr><td colspan="2">3 in the intersection with a different number to 90 in the box and outside the circles</td><td>M0M1</td></tr>
<tr><td colspan="2"> 
</td><td>M1M1A1</td></tr>
</table>

Q	Answer	Mark	Comments
25	3^{11} (: 3^7) or $3^6 : 3^2$ or $3^5 : 3^{(1)}$ or $\frac{a}{3^7}$ or 177 147 : 2187	M1	oe eg 729 : 9 or 243 : 3 3^n may be implied by a multiplication string of n 3s a can be any value other than 3^7
	$\frac{3^{11}}{3^7}$ (: 1) or $\frac{3^6}{3^2}$ (: 1) or $3^6 \times 3^{-2}$ (: 1) or $\frac{3^5}{3^{(1)}}$ (: 1) or $3^{-1} \times 3^5$ (: 1) or 3^4 (: 1) or $\frac{177\,147}{2187}$ (: 1)	M1dep	oe left-hand side with one or two components eg $\frac{729}{9}$: 1 or $243 \times \frac{1}{3}$: 1 allow (: 1) to be (: 3^0) 3^n may be implied by a multiplication string of n 3s
	81 : 1	A1	
	Additional Guidance		
	$\frac{3^6 \times 3^5}{3^7}$ (: 1) with no further work		M1M0A0
	81 : 1 or 3^4 (: 1) could be seen from incorrect working eg $\frac{9^{11}}{3^7} = 3^4$ Answer 81 : 1		M1M0A0

Q	Answer	Mark	Comments
26	11 : 10	B1	

Q	Answer	Mark	Comments
27	cos identified or sin 30 identified	M1	oe
	(cos 60 =) $\frac{1}{2}$ or (sin 30 =) $\frac{1}{2}$	M1	oe may be seen in a table
	4	A1	
	Additional Guidance		
	Check diagram for working 4 written next to the x on the diagram is full marks unless contradicted		
	Cos can be identified by, for example, CAH circled in SOHCAHTOA		
	8 cos 60 $8 \times \frac{1}{2}$		M1M0 M1M1
	Answer 4 from creating an equilateral triangle		M1M1A1
	Answer only 4		M1M1A1
	Answer 4 from drawing a scale or full-sized diagram of the right-angled triangle		M0A0