AQA

GCSE
Mathematics

8300/1F-Paper 1 Foundation Tier
Mark scheme

8300

June 2018

Version/Stage: 1.0 Final

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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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 $a \leq$ value $< b$
3.14…	Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

Instructions on marking will be given but usually marks are not awarded to students who show no working.

Questions which do not ask students to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Continental notation

Accept a comma used instead of a decimal point (for example, in measurements or currency), provided that it is clear to the examiner that the student intended it to be a decimal point.

Question	Answer	Mark	Comments
1	$2\frac{1}{2}$	B1	
	Additional Guidance		
2	–7	B1	
	Additional Guidance		
3	$9a^2$	B1	
	Additional Guidance		
4	C	B1	
	Additional Guidance		

Question	Answer	Mark	Comments
5	14 000 × 0.2 or 14 000 ÷ 10 × 2 or (10% =) 1400 or (1% =) 140	M1	oe eg 14 000 ÷ 5 $\frac{20}{100} \times 14000$
	2800	A1	oe eg 2800.00
	Additional Guidance		
	2800 followed by 14 000 – 2800 (implied by 11 200)		M1A0
	14 000 ÷ 10 = 4000 followed by 4000 × 2 = 6000 (fully correct method)		M1A0
	14 000 ÷ 10 = 4000 followed by 20% = 8000 (method not shown for 20% but it is correct for 2 × their 10%)		M1A0
	14 000 ÷ 10 = 4000 followed by 20% = 6000 (method not shown for 20%)		M0A0
	10% = 140, 140 × 2 = 280 (method not shown for 10%)		M0A0
	14 ÷ 5 or 2.8 (without place value adjustment)		M0A0

6(a)	$\frac{17}{20}$	B2	B1 for $\frac{85}{100}$ oe fraction eg $\frac{850}{1000}$ B1 for their fraction correctly cancelled to simplest form
	Additional Guidance		
	On answer line $\frac{85}{100}$ and $\frac{17}{20}$ (either order) with or without an '='		B2
	$\frac{17}{20} = \frac{4}{5}$		B1
	If you only see $\frac{8.5}{10}$ or $\frac{42.5}{50}$ or $\frac{0.85}{1}$		B0

Question	Answer	Mark	Comments
6(b)	0.625	B1	oe decimal eg 0.6250
	Additional Guidance		
	.625		B1
7	**Alternative method 1**		
	6 × 8 or 48 or 2^2 or 2 × 2 or 4	M1	may be on diagram
	48 ÷ 4 = 12 or 48 ÷ 12 = 4 or 4 × 12 = 48 or $\frac{4}{48}$ (=) $\frac{1}{12}$	A1	oe eg 48 ÷ 2 = 24 and 24 ÷ 2 = 12
	Alternative method 2		
	6 ÷ 2 or 2 ÷ 6 or 8 ÷ 2 or 2 ÷ 8	M1	
	3 × 4 = 12 or $\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$ with full working seen	A1	Need to justify where this product comes from with M1 work seen

Question	Answer	Mark	Comments
7 cont	**Alternative method 3**		
	One row of 4 squares drawn or one column of 3 squares drawn	M1	Mark intention, not accuracy of drawing, 2m labels not required
	Rectangle split into 4 columns and 3 rows	A1	
	Additional Guidance		
	(2 × 2 = 4, 6 × 8 = 48 and) 4 is $\frac{1}{12}$ of 48		M1A1
	4 12s are 48		M1A1
	8 × 6 = 48, 12 ÷ 48 = 4 (cannot condone incorrect order as 'show that')		M1A0
	$\frac{4}{48}$ so correct		M1A0
	Beware 4 (or 12) arising from incorrect working eg 2 + 2 = 4, 8 + 6 = 14, 14 – 2 = 12		M0A0
	2 × 2 + 2 × 2 = 8 (misconception on area of rug) cannot score for 2 × 2		M0A0
	6 × 8 = 48 and 48 × 2 = 96 (ignore additional 'method' and give M1 for 48) 6 × 8 = 48 and 48 ÷ 2 = 24 (ignore additional 'method' and give M1 for 48) 6 x 8 x 2 (ignore additional 'method' and give M1 for 6 × 8)		M1A0
	6 × 8 = 48 and 48 ÷ 2 ÷ 2 = 12 (equivalent to dividing by 4)		M1A1
	Ignore references to perimeter or units if it is clear they are working out area		

Question	Answer	Mark	Comments
8	**Alternative method 1**		
	40 ÷ 3 or 13(.3…) or 13 r(emainder)1 or 39 ÷ 3 or 13	M1	3, 6, 9, …, 39
	14	A1	
	Alternative method 2		
	Three integers, in any order, which add to 40	M1	eg 10 + 10 + 20 or 15, 17, 8 or 16 : 14 : 10
	14	A1	
	Additional Guidance		
	Mark the values given, ignore any reference to names for M1		
	Use the scheme that awards the better mark		
	40 ÷ 3 = 13.1 answer 14		M1A0
	13, 13, 14 on answer line (any order) with no indication 14 is chosen		M1A0
	Answer 14 with trial 12, 12, 14 seen (comes from wrong working)		M0A0
	12, 12, 16 12 + 12 + 16 = 40 12 + 12 + 16 = 38 (incorrect total)		M1 M1 M0
	Answer $\frac{14}{40}$		M1A0
	14 : 40		M1A0
	14 out of 40 or 14 in 40		M1A1

Question	Answer	Mark	Comments
9	1(.00) + 3 – 5 or 1(.00) – 2 or (Time in London) 4.(00)(am) or 04:00 or New York is 2 hours behind Rio	M1	oe implied by 11(.00) allow 24 + 1(.00) + 3 – 5 or 24 + 1(.00) – 2
	11(.00)pm or 23.00	A1	correct time presentation
	Additional Guidance		
	Time notation – allow 23:00, 23.00, 23 00 or 2300		
	23.00pm		M1A0
	11(.00) or 11am or 11 o'clock		M1A0
	1 – 2 = –1 –1 with no calculation shown		M1A0 M0A0
	– 2 (hours) (only)		M0A0

Question	Answer	Mark	Comments
10(a)	Orders the numbers to at least the sixth number from either end 1 2 2 3 4 5 (… … … …) or 8 6 5 5 5 4 (… … … …) or 4 and 5 indicated or $\frac{4+5}{2}$	M1	(… … … …) 5 4 3 2 2 1 or (… … … …) 4 5 5 5 6 8
	4.5 with no errors in working	A1	oe eg $4\frac{1}{2}$
	Additional Guidance		
	4/5		M1A0
	4,5 (cannot accept as 4.5)		M1A0
	Allow 4 and 5 to be the only ones not crossed out as '4 and 5 indicated'		M1
	eg 1 2 2 3 4 5 5 6 6 8 and answer 4.5 (error in ordering)		M1A0
	eg 1 2 3 3 4 5 5 5 6 8 and answer 4.5 (error in ordering)		M1A0
	Ignore any + signs between ordered values unless the total is then calculated and used in this part		

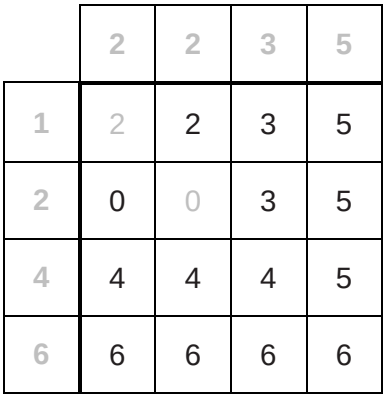
Question	Answer	Mark	Comments
10(b)	(5 + 6 + 1 + 3 + 5 + 5 + 8 + 4 + 2 + 2) ÷ 10 or 41 ÷ 10	M1	Allow one value omitted or incorrect if method clear
	4.1 or $4\frac{1}{10}$	A1	
	Additional Guidance		
	Answer of 4 with correct working or 4.1 seen		M1A1
	Answer of 4 without correct working and without 4.1 seen		M0A0
	Condone missing first and/or final bracket for M1		
	If their total is not 41, all additions must be shown or implied eg they write 5 + … + 2 = 42 and 42 ÷ 10 eg they write 5 + 6 + 1 + etc = 24 and 24 ÷ 10 (both clearly implying that they are adding up all the numbers – minimum is two of the values shown as being added) but, for example, 42 ÷ 10 (no other working)		M1A0 M0
	Method mark could be scored for work at top of page, <u>above</u>, but not in, part (a) It cannot be assumed that work done in part (a) is intended for part (b)		
	Answer of $\frac{41}{10}$ or $\frac{4.1}{1}$ or 4 r(emainder) 1		M1A0

Question	Answer	Mark	Comments
11	**Alternative method 1 – coaches, income, fuel, drivers, profit, answer**		
	6	B1	number of coaches
	300 × 25 or 7500 or 50 × 25 or 1250	M1	total income for one or all coaches
	(their 6) × 200 × 0.7 or 140 or 840 or (their 6) × 200 × 70 or 14 000 or 84 000	M1	cost of fuel for one or all coaches 140 is implied by 230 (fuel + one driver)
	their 6 × 90 or 540 or their 1250 – their 140 – 90 or 1020	M1	cost of all drivers or profit for one coach
	their 7500 – their 840 – their 540 or their 6 × their 1020	M1dep	oe method to calculate profit must be consistent units dependent on M3
	6120	A1	

Question	Answer	Mark	Comments
11(cont)	**Alternative method 2 – profit per passenger**		
	90 ÷ 50 or 1.8(0)	B1	cost per passenger for a driver
	200 × 0.7 or 140 or 200 × 70 or 14 000	M1	cost of fuel per coach
	their 140 ÷ 50 or 2.8(0) or their 14 000 ÷ 50 or 280	M1dep	cost per passenger for the fuel dependent on M1
	25 – their 1.8(0) – their 2.8(0) or 20.4(0)	M1dep	oe profit made per passenger must be consistent units dependent on B1M1M1
	their 20.4(0) × 300	M1dep	method to calculate total profit must be consistent units dependent on previous mark
	6120	A1	
	Additional Guidance		
	540 + 840 or 1380 (without evidence for the second mark)		B1M0M1M1 (Alt 1)
	6 (for B1) may be implied by a calculation or value such as 540		(Alt 1)

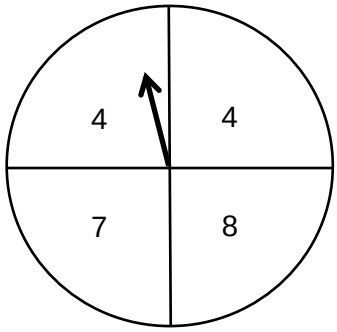
Question	Answer	Mark	Comments
12(a)	(16.4 – 3.92 =) 12.48 or (16.4 + 7.8 =) 24.2 or (7.8 – 3.92 =) 3.88	B1	
	20.28	B1ft	ft their 12.48 + 7.8 or their 24.2 – 3.92 or their 3.88 + 16.4 SC1 4.68
	Additional Guidance		
	Answer of 20.28		B1B1
	4.68 comes from 16.4 – (3.92 + 7.8)		SC1
	– 4.68		SC0
	Follow through must have at least 1 decimal place eg 16.4 – 3.92 = 12 then 12 + 7.8 = 19.8 eg 16.4 – 3.92 = 12.58 then 12.58 + 7.8 = 20.38		B0B0ft B0B1ft
12(b)	406.23	B2	Ignore further work e.g rounding B1 400 ≤ answer < 410 B1 digits 40 623 (not 406.23)
	Additional Guidance		
	0406.23		B2
	Ignore trailing zeros eg 406.230000		B2
	406.23 in division calculation and 406 on answer line		B2
	406.23 in division calculation and 46.23 on answer line cannot be considered a transcription error and cannot be ignored as further work		B1

Question	Answer	Mark	Comments

13(a)	All values correct	B2	B1 one correct row or one correct column
	Additional Guidance		
			

	2	**2**	**3**	**5**
1	2	2	3	5
2	0	0	3	5
4	4	4	4	5
6	6	6	6	6

13(b)	$\frac{5}{16}$	B1ft	oe fraction, decimal or percentage ft their table if at least 8 values
	Additional Guidance		
	Answer must match their table, if table blank, accept $\frac{5}{16}$ (oe) for B1		
	5 out of 16, 5 in 16, 5 : 16		B0
	$\frac{5}{16}$ (matches their table) = $\frac{1}{4}$		B1ft (ignore further work)

Question	Answer	Mark	Comments
13(c)		B2	numbers can be in any section if the spinner is blank, mark the top row of table, where the numbers must be in the order 4 4 7 8 for B2 B1 for any two or three correct numbers on spinner or, if spinner is blank, in the correct position in the table
	Additional Guidance		
	Ignore any other values written in table		
	Spinner takes precedence over table eg top row of table is 4 4 7 8 spinner is 2 3 5 8	B0	

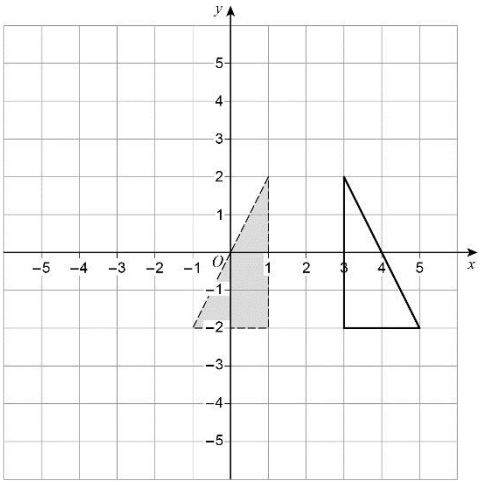
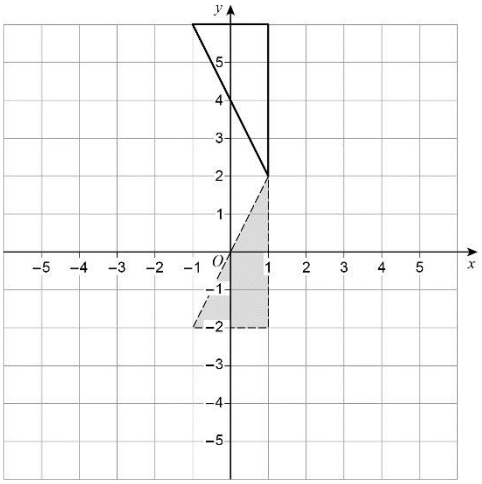
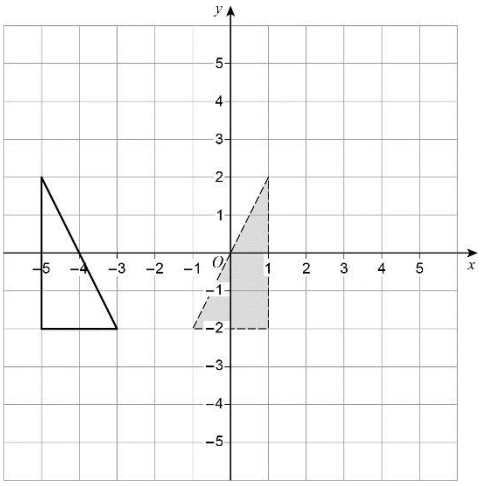
14(a)	2×6 or 12 or $6 \times \frac{2}{3}$ or $6 - \frac{1}{3} \times 6$	M1	oe eg $6 \div 3 = 2$ followed by $6 - 2$ $6 \div 3 = 2$ followed by 2×2
	4	A1	
	Additional Guidance		
	Accept minutes for M1 even if units not given ie 2×360 or 720 etc However, answer in minutes accepted only if units changed to minutes on answer line		

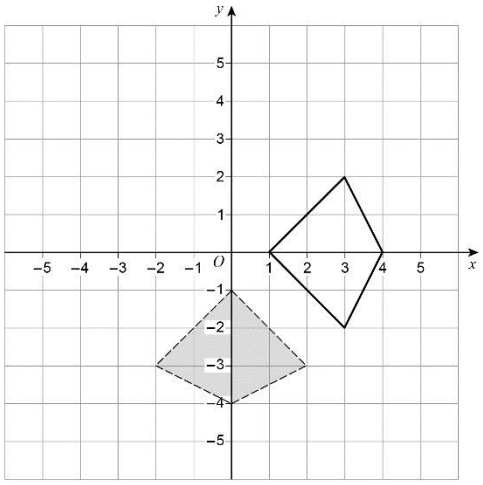
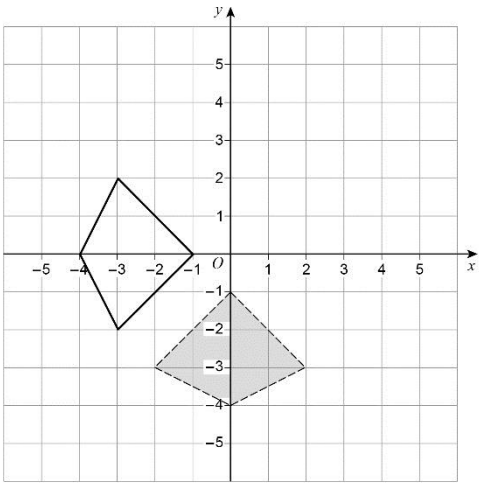
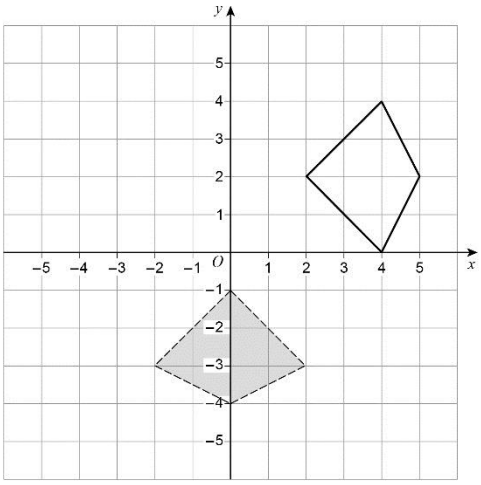
Question	Answer	Mark	Comments
14(b)	It takes less (time)	B1	oe
	Additional Guidance		
	(It will be) quicker / faster		B1
	(It will) now take less than *(their answer to part (a))* hours		B1
	Time will decrease		B1
	It will not take as long		B1
	It will not take long		B0
	It will now take 2 hours (their answer in (a) was 3 hours)		B0 no comparison
	The room will be painted at a faster rate		B0 repeats question
	3^{rd} person will finish quicker than the other 2		B0

Question	Answer	Mark	Comments
15	**Alternative method 1**		
	3 × 7 or 21 or 40 ÷ 2 or 20	M1	oe
	21 and 20	A1	
	Alternative method 2 – works out and uses correct possible values for a, b, x and y		
	Substitute values into $9a + 3b$ that satisfy $3a + b = 7$ or substitute values into $3x + 4y$ that satisfy $6x + 8y = 40$	M1	eg $a = 2$ and $b = 1$ substituted into $9a + 3b$ or $x = 4$ and $y = 2$ substituted into $3x + 4y$
	21 and 20	A1	Correct evaluation of their expressions with correct values for the letters
	Additional Guidance		
	Beware 21 or 20 coming from wrong working		
	Accept either of 21 or 20 seen if there is also an explanation that the other value is one more or one less (as appropriate) than the calculated one		M1A1
	Use the scheme that awards the better mark		
	$a = 3$ and $b = –2$ then 9 × 3 + 3 × –2 or $x = 0$ and $y = 5$ then 3 × 0 + 4 × 5		M1

Question	Answer	Mark	Comments
16	(3, 0)	B1	
	Additional Guidance		
17	positive and odd	B1	
	Additional Guidance		
18	1 : 100 000	B1	
	Additional Guidance		
19	33.3%	B1	
	Additional Guidance		

Question	Answer	Mark	Comments
20	($\sqrt{121}$ =) 11 or –11 or 121 = 11^2 or 121 = 11 × 11 seen	B1	oe
	13 – 10 or 3 or $(13 – 10)^2$ or 3^2 or 3 × 3 or 9	M1	
	2 or – 20	A1ft	ft their 11
	Additional Guidance		
	Accept 2 and –20		B1M1A1ft
	$11 – 16^2$ or 11 – 256 or –245		B1M0A0
	11 × 9 = 99		B1M1A0
	$\sqrt{121}$ = 60.5, $60.5 – 3^2$ = 51.5		B0M1A1ft
	$60.5 – 3^2$ = 51.5		B0M1A0ft

Question	Answer	Mark	Comments
21(a)		B2	B1 for all three vertices correctly plotted but not joined or reflection in $y = 2$  or reflection in $x = a$, $-2.5 \leq a \leq 2.5$ eg 
	Additional Guidance		
	Tolerance – half a square for all three vertices		
	Vertices must be joined with intended straight lines for B2		
	B1 answers must lie wholly on the grid		

Question	Answer	Mark	Comments
21(b)		B2	B1 for all four vertices correctly plotted but not joined or for rotation 90° clockwise about (0, 0)  or any rotation of 90° anticlockwise eg 
	Additional Guidance		
	Tolerance – half a square for all four vertices		
	Vertices must be joined with intended straight lines for B2		
	B1 answers must lie wholly on the grid		

Question	Answer	Mark	Comments
22	$24 \times \frac{3}{4}$ or 24 ÷ 4 (× 3) or 6 (× 3) or 18 or 18 : 6	M1	oe
	30 : 6	A1	
	5 : 1	B1ft	ft their ratio written in simplest form
	Additional Guidance		
	15 : 3 or 10 : 2		M1A1B0
	answer 1 : 5 answer 6 : 30		M1A0B1ft M1A0B0ft
	18 : 24 then 3 : 4		M1A0B1ft
23	29	B3	B2 answer 27, 28, 30 or 31 B1 answer 25, 26, 32 or 33 or 4 × 4 × 3 or 48 (total cubes) or 2 × 3 × 4 or 24 (missing cuboid) or 19 seen (cubes in original shape)
	Additional Guidance		
	Beware of 29 or close to 29 arising from (clear) adding of the squares in the original diagrams. This alone is B0, however B1 can still be scored for either 48, 24 or 19 (or the appropriate products leading to 48 or 24)		

Question	Answer	Mark	Comments
24	405 ÷ (4 + 11) or 405 ÷ 15 or 27 or build up in 15s to 405	M1	Clear intention to divide Do not accept 15 ÷ 405 unless clearly recovered
	their 27 × 4 or 108 or their 27 × 11 or 297	M1dep	
	108 and 297	A1	
	Additional Guidance		
	297 and 108		M1M1A0
	Answer 108 : 297		M1M1A1
	Partial build up using ratios from 4 : 11 (eg 104 : 286) is 0 marks unless correct answer achieved		M0M0A0
	If 405 is divided by 10 and then divided by 5 this is M0 unless 405 ÷ 15 was clearly seen first, then it is M1M0A0		

Question	Answer	Mark	Comments
25	$\frac{1.86}{1.6(0)}$	M1	oe $\frac{0.93}{0.8(0)}$ or $1\frac{0.26}{1.6}$
	$\frac{186}{160}$ or $1\frac{26}{160}$	A1	oe with no decimal values
	$\frac{93}{80}$ or $1\frac{13}{80}$	B1ft	ft correct simplification of their fraction using the digits 186 and 16(0) ignore incorrect conversion from $\frac{93}{80}$ to a mixed number
	Additional Guidance		
	Cannot score B1ft from an incorrect mixed number		
	$\frac{160}{186} = \frac{80}{93}$		M0A0B1ft
	$\frac{80}{93}$ implies B1ft		M0A0B1ft
	$\frac{93}{80} = 1\frac{3}{80}$ (incorrect conversion to mixed number)		M1A1B1
	$\frac{186}{160} = \frac{31}{30}$ (incorrect simplification of fraction)		M1A1B0
	$\frac{93}{80} = \frac{31}{30}$ (incorrect simplification of fraction)		M1A1B0
	$\frac{93}{80} = \frac{0.93}{0.8}$ (incorrect simplification of fraction)		M1A1B0
	$\frac{186}{16} = \frac{93}{8}$		M0A0B1ft
	$\frac{1.86}{1.6} = \frac{9.3}{8}$		M1A0B0
	$\frac{1.86}{1.6} = \frac{186}{16} = \frac{93}{8}$		M1A0B1ft
	$\frac{1.86}{1.6} = \frac{86}{60} = \frac{43}{30}$ (simplification does not come from 186 and 16(0))		M1A0B0

Question	Answer	Mark	Comments
26	x-coordinate of C = 12 or y-coordinate of C = 8 or 12 marked on x-axis below C and 8 marked on y-axis left of C or x-coordinate of D = 6 + 6 + 6 or y-coordinate of D = 2 + 3 + 3 + 3 or $\frac{x}{6} = 3$ or $6 = (2 \times 0 + x) \div 3$ or $\frac{y-2}{5-2} = 3$ or $5 = (2 \times 2 + y) \div 3$ or 18 marked on x-axis below D or 11 marked on y-axis left of D	M1	oe sets up a correct equation for x-coordinate of D or y-coordinate of D
	(C is the point) (12, 8) or (D is the point) (18, …) or (…, 11) or 18 marked on x-axis below D and 11 marked on y-axis left of D	A1	condone missing brackets if intention is clear
	18, 11	A1	
	Additional Guidance		
	(12,8 , 18,11) on answer line with previous link to C and D (12,8 , 18,11) on answer line with no previous link to C and D		M1A1A1 M1A1A0
	12, 8 on answer line with no other working		M1A1A0
	Accept correct working on diagram and correct answer on diagram if not contradicted by answer line		
	11, 18 on answer line does not score the last mark, but may score M1A0 or M1A1		
	11, 18 with no working		M0A0A0

Question	Answer	Mark	Comments
27(a)	$\frac{31}{50}$ or 0.62 or 62%	B1	oe fraction, decimal or percentage
	Additional Guidance		
	31 or 62		B0
	31 : 50		B0
	31 out of 50 or 31 in 50		B0
	Ignore subsequent attempts to simplify $\frac{31}{50}$ or convert it to a decimal or percentage, eg $\frac{31}{50}$ = 0.6		B1
	$\frac{31}{50}$ = 0.5 oe is considered as choice		B0

Question	Answer	Mark	Comments
27(b)	Valid reason	B1ft	eg 31 is more than 19 (12) more heads than tails 31 is more than 25 31 ≠ 25 (6) more than expected it should be 25 times heads and tails should be (roughly) equal it landed on heads more than half the times relative frequency/probability is more than 0.5 ft if their 0.62 > 0.5 0.62 > 0.5 ft if their 0.62 > 0.5
	Additional Guidance		
	ft is only available if comparing their relative frequency to 0.5, and their relative frequency must be greater than 0.5		
	Condone the probability given as 50/50 in otherwise correct reasons eg Probability is 50/50 so there should be 25 heads		B1
	There were only 19 tails		B1
	There weren't enough tails		B1
	Because it landed on heads 31 times and it should be 25/25		B1
	It should be $\frac{1}{2}$		B1
	The probability should be $\frac{1}{2}$ but it lands on heads 31 times		B1
	There were 31 heads		B0
	There were 19 tails		B0
	There were 31 heads and 19 tails		B0
	The coin could be fixed		B0
	Incorrect statement eg 31 is 22 more than 19		B0

Question	Answer	Mark	Comments
28	$5x + 15 < 60$ or $5x < 45$ or $x + 3 < 12$	M1	
	$x < 9$ or $9 > x$	A1	SC1 incorrect sign eg $x \leq 9$ or $x = 9$ or $x > 9$ or $x \geq 9$ or $x = < 9$ or answer of 9
	Additional Guidance		
	Allow use of other inequality signs or = if recovered to answer of $x < 9$		M1A1
	Embedded answer of $5(9 + 3) < 60$		M0A0
	$5x + 3 < 60$ followed by $x + 3 < 12$ followed by $x < 9$ is not a recovery, but is two errors		M0A0

Question	Answer	Mark	Comments
29	**Alternative method 1**		
	$-2\frac{7}{8} + 15\frac{1}{4}$ or $15\frac{2}{8}$ or (–)2.875 and 15.25 or (–)$\frac{23}{8}$ and $\frac{61}{4}$	M1	oe common denominator for both fractional parts of the mixed numbers conversion of both numbers to decimals with at least one correct conversion of both numbers to improper fractions with at least one correct
	$-2\frac{7}{8} + 15\frac{2}{8}$ or –2.875 + 15.25 or $-\frac{23}{8} + \frac{122}{8}$	M1dep	oe common denominator correct decimals oe common denominator
	$\frac{99}{8}$ or $12\frac{3}{8}$ or 12.375	A1	oe fraction, mixed number or decimal
	Alternative method 2		
	–2 + 15 and (–)$\frac{7}{8} + \frac{1}{4}$	M1	
	–2 + 15 and (–)$\frac{7}{8} + \frac{2}{8}$ or $13 - \frac{5}{8}$	M1dep	oe common denominator
	$\frac{99}{8}$ or $12\frac{3}{8}$ or 12.375	A1	oe fraction, mixed number or decimal
	Additional Guidance		
	$15\frac{1}{4} - -2\frac{7}{8}$ scores M0, but followed by $15\frac{2}{8} + 2\frac{7}{8}$ scores M1 on Alt 1		
	Values in 2nd mark must be correct; no ft from incorrect conversion		
	$\frac{99}{8}$ incorrectly converted to a decimal or mixed number		M1M1A1
	$13\frac{-5}{8}$		M1M1A0

Question	Answer	Mark	Comments
30	(x =) 3 and (y =) 2 in correct positions	B2	B1 $y = \frac{24}{x}$ or $4 = \frac{k}{6}$ or $k = 24$ oe or (x =) 3 in correct position above 8 or (y =) 2 in correct position below 12
	Additional Guidance		
	$y = \frac{1}{kx}$ or $4 = \frac{1}{6k}$ oe followed by $k = \frac{1}{24}$, with no or incorrect values in table		B1

Question	Answer	Mark	Comments
31	**Alternative method 1 – width of small rectangle is x (any letter)**		
	x and $2x$ or $x + 2x + x + 2x$ or $6x$	M1	oe
	$x + 2x + x + 2x = 15$ or $6x = 15$	M1dep	oe
	$(x =)$ 2.5	A1	from correct working or with 5 as the other dimension or with 7.5 as the length of the large rectangle
	25	A1ft	ft 10 × their 2.5 with M1M1 awarded
	Alternative method 2 – length of small rectangle is x (any letter)		
	x and $\frac{x}{2}$ or $x + \frac{x}{2} + x + \frac{x}{2}$ or $3x$	M1	oe
	$x + \frac{x}{2} + x + \frac{x}{2} = 15$ or $3x = 15$	M1dep	oe
	$(x =)$ 5	A1	from correct working or with 2.5 as the other dimension or with 7.5 as the length of the large rectangle
	25	A1ft	ft 5 × their 5 with M1M1 awarded
	Alternative method 3 – **a = width of small rectangle and b = length of small rectangle (any letters)**		
	$b = 2a$ or $10a$ or $5b$	M1	correct expression for perimeter of the large rectangle in one variable
	$6a = 15$ or $3b = 15$	M1dep	correct equation in one variable
	$(a =)$ 2.5 or $(b =)$ 5	A1	from correct working or with both values correct or with one value correct and 7.5 as the length of the large rectangle
	25	A1ft	ft 10 × their a or 5 × their b with M1M1 awarded

31(cont)	**Alternative method 4 – trial and improvement using ratio of sides**			
	length = 2 × width seen or implied	M1		
	Two correctly evaluated trials for perimeter of small rectangle with length = 2 × width	M1dep	eg 8 + 4 + 8 + 4 = 24 and 10 + 5 + 10 + 5 = 30	
	2.5 and 5	A1	implied by 2.5 + 5 + 2.5 + 5 = 15	
	25	A1		
	Additional Guidance			
	Note that there is no ft in method 4			
	In all methods, marks can be awarded for annotation of the diagram, with lengths clearly identified, or working inside or alongside the diagram eg 2.5 and 5 marked correctly as the dimensions of the small rectangle 2.5 marked as the width of the small rectangle and 7.5 marked as the length of the large rectangle			M1M1A1 M1M1A1
	If full marks not awarded, mark both the diagram and working then award the better mark			
	In alt 4, one or more trials may be crossed out to indicate that they do not give the correct perimeter. Do not treat this as the usual crossed out work not to be marked if replaced.			

Question	Answer	Mark	Comments
32	One correct conversion to a comparable form 0.08×10^{-2} or 0.0008 400×10^{-4} or 0.04 0.06×10^{-2} or 0.0006 7×10^{-2} or 700×10^{-4}	M1	
	6×10^{-4} 8×10^{-4} 4×10^{-2} 0.07 with no clearly incorrect working	A1	oe accept in converted form
	Additional Guidance		
	Correct answer from clearly incorrect working	A0	
	Accept numbers with two decimal points if it is clear that the point has been moved to the correct place eg 0.0008.0 with curved lines between each place value between the decimal points		
	If the numbers are converted into fractions, at least two must be given correctly with common denominators to score the first mark		
	eg $\frac{4}{100}$ and $\frac{7}{100}$	M1	
	eg $\frac{6}{1000}$ and $\frac{8}{1000}$ only	M0	
	eg $\frac{6}{10\,000}$ and $\frac{7}{100}$ only	M0	