GCSE
MATHEMATICS
8300/1F

Foundation Tier Paper 1 Non-Calculator

Mark scheme

November 2018

Version: 1.0 Final

18BG8300IF/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 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.

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 $a \leq$ 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

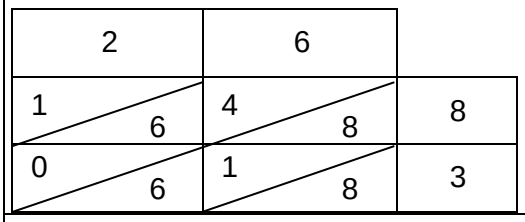
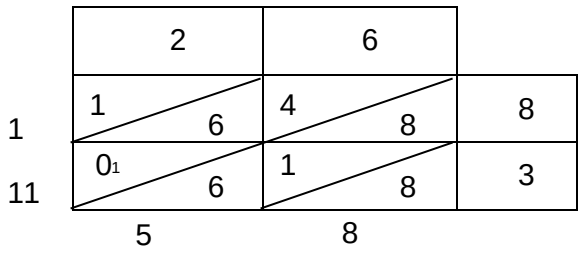
Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Continental notation

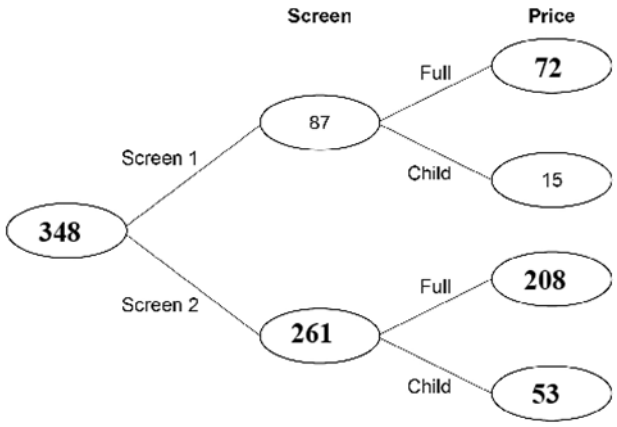
Accept a comma used instead of a decimal point (for example, in measurements or currency), provided that it is clear to the examiner that the student intended it to be a decimal point.

Question	Answer	Mark	Comments
1	–11	B1	
2	Mode	B1	
3	0.95	B1	
4	Circumference	B1	

Question	Answer	Mark	Comments
5	**Alternative method 1**		
	$\begin{array}{r} 83 \\ \times\ 26 \\ \hline 498 \\ 1660 \end{array}$ or $\begin{array}{r} 26 \\ \times\ 83 \\ \hline 78 \\ 2080 \end{array}$	M1	at least one row correct, with the 0 correct for multiplication by the multiple of 10 you may see the rows of working switched
	their 498 + their 1660 or their 78 + their 2080	M1dep	
	2158	A1	
	Alternative method 2		
	<table><tr><td></td><td>20</td><td>6</td></tr><tr><td>80</td><td>1600</td><td>480</td></tr><tr><td>3</td><td>60</td><td>18</td></tr></table>	M1	at least three of the calculated values correct may be seen as 4 calculations, not in a grid
	their 1600 + their 480 + their 60 + their 18	M1dep	
	2158	A1	

Question	Answer	Mark	Comments
5 cont	**Alternative method 3**		
		M1	at least three of the calculated values correct
	Total calculated for each diagonal with at least one correct carrying figure	M1dep	clear attempt to add each diagonal
	2158	A1	
	Additional Guidance		
	20 × 80 + 6 × 3 (= 1618)		M0A0
	Alternative method 1: if the place holder 0 is missing or misaligned, allow this to be evidenced by their 8 as the units value in the answer, or an 'x' in place of the 0		
	Alternative method 2: if numbers are broken down further they must have at least 8 of the calculated values correct in example below (oe) eg 40 40 3 and 10 10 6 (ie a maximum of one error)		
	Alternative method 3: diagonals must slope the correct way for M1 (unless recovered)		
	Diagonal lines not present is M0 unless this is recovered by seeing correct totals around the grid		
	Example of alternate method 3 with carrying completed once 		M1M1depA0

Question	Answer	Mark	Comments
6	$18 \div 3$ or 6 or 18×5 or 90 or $\frac{5}{3}$	M1	oe
	30	A1	
	Additional Guidance		
	$18 \times 10 \div 6$ with incorrect or no answer		M1A0
	Decimals for $\frac{5}{3}$ must be correct to 1dp or better (ie 1.7, 1.67, etc)		
	$18 \div \frac{3}{5}$ is M1 but $\frac{3}{5}$ alone is M0		
7	$3206 \div 7$	M1	may be seen as a calculation attempted such as in the 'bus stop' method
	458	A1	
	Additional Guidance		
	$7 \div 3206$ must be recovered eg by correct use in division sum		
	"Chunking" or build-up must convince that the equivalent to the full division is being attempted (ie reach or go beyond 3206)		
	Condone $3206 \div 420$ (working in seconds) for M1		
	Accept $\frac{3206}{7}$ for M1 unless contradicted by further work		

Question	Answer	Mark	Comments
8	Total for Screen 2 is 261	B1	
	Total is 348	B1ft	ft 87 + their 261
	Full price for Screen 1 is 72	B1	
	Child price for Screen 2 is 53	B1	
	Full price for Screen 2 is 208	B1ft	ft if their full price value for Screen 2 and their child price value for Screen 2 sum to their total for Screen 2 or their two full price values and their two child price values sum to their overall total
	Additional Guidance		
	Mark the diagram, but if diagram completely blank, accept answers in working only if absolutely clear which entry is being referenced		
	Example of final B1ft: Screen 2 Child Price recorded as 68, leads to 193 as Screen 2 full price		
			B5

Question	Answer	Mark	Comments
9	**Alternative method 1**		
	$(1\frac{1}{4} =) \frac{5}{4}$	M1	oe improper fraction
	$\frac{4}{8}$ and $\frac{10}{8}$ or $\frac{2}{4}$ and $\frac{5}{4}$ or $\frac{3.5}{4}$	M1dep	oe common denominator with at least one correct numerator may be seen as start and end of a list
	$\frac{7}{8}$	A1	oe fraction
	Alternative method 2		
	$(1\frac{1}{4} - \frac{1}{2} =) \frac{3}{4}$	M1	oe
	$\frac{1}{2}$ + their $(\frac{3}{4} \div 2)$ or $1\frac{1}{4}$ – their $(\frac{3}{4} \div 2)$	M1dep	oe
	$\frac{7}{8}$	A1	oe fraction
	Alternative method 3		
	$(1\frac{1}{4} + \frac{1}{2} =) 1\frac{3}{4}$ or $\frac{7}{4}$	M1	oe
	their $1\frac{3}{4} \div 2$ or their $\frac{7}{4} \div 2$	M1dep	oe
	$\frac{7}{8}$	A1	oe fraction

Question	Answer	Mark	Comments
9 cont	**Alternative method 4**		
	(1.25 – 0.5 =) 0.75 or (1.25 + 0.5 =) 1.75	M1	accept equivalent in percentages but must see % sign
	(0.5 + 0.75 ÷ 2 =) 0.875 or (1.25 – 0.75 ÷ 2 =) 0.875 or $(\frac{1.25+0.5}{2}$ =) 0.875 or 87.5%	M1dep	0.875 must be correct accept equivalent in percentages but must see % sign
	$\frac{7}{8}$	A1	oe fraction
	Alternative method 5		
	Positions of $\frac{1}{2}$ and $1\frac{1}{4}$ correctly marked on line or correct midpoint marked on line	M1	if more points are marked, labels of $\frac{1}{2}$ and $1\frac{1}{4}$ must be given or indicated mark intention in terms of exact position accept decimals or equivalent fractions
	Correct midpoint marked on line and $\frac{3}{4}$ marked as $\frac{6}{8}$ and 1 marked as $\frac{8}{8}$	M1dep	oe fractions with common denominator > 4
	$\frac{7}{8}$	A1	oe fraction
	Additional Guidance		
	In alternative method 5: $\frac{1}{4}$ marked at $1\frac{1}{4}$ is sufficient for $1\frac{1}{4}$		
	In all schemes, award of M1dep means that M2 is awarded		
	Use the scheme that gives the greatest number of marks – ignore errors in the scheme(s) you do not use		

Question	Answer	Mark	Comments
10	1, 5, 7 and 35	B2	any order B1 for any two or three correct values
	Additional Guidance		
	Their correct values must be identified as answers, and not given in, for example, a list of the first ten integers or as values in a calculation		
	If more than 4 answers given, maximum B1 if at least two correct		
11(a)	$\frac{5}{6}$	B1	oe fraction, decimal or percentage allow 0.83(3…) or 83(.3…)%
	Additional Guidance		
	Ignore use of probability words unless contradictory		
11(b)	2, 3, 4, 5 and 6 identified	M1	
	20	A1	
	Additional Guidance		
	Values are identified even if used in a wrong calculation eg $2 \times 3 \times 4 \times 5 \times 6$ or answer 23 456		
	20 is M1A1 unless clearly obtained from wrong working		
12	$1\frac{1}{7}$	B1	
13	18	B1	
14	13	B1	

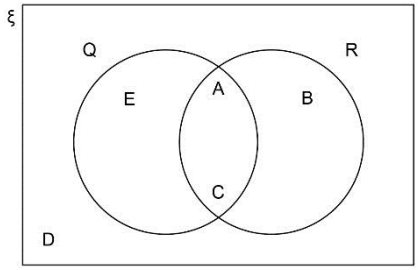
Question	Answer	Mark	Comments
15	*ADC* = 110 or *BAD* = 180 – 110 or *BAD* = 70 or *BCD* = 180 – 110 or *BCD* = 70 or any indication that angle *EAD* = angle *EDA* or any indication that angle *BCD* = angle *ADE*	M1	may be seen on diagram eg both written as x or both having the same value
	EDA = 180 – 110 or *EDA* = 70 *or EAD* = 180 – 110 or *EAD* = 70	M1dep	may be seen on diagram
	40	A1	
	Additional Guidance		
	Angle values must be identified with the correct angle, either by notation or use of the diagram Notation such as *D* = 110 or *C* = 70 is not acceptable (although marks may still be awarded for correct position of angles on diagram)		
	Work on the diagram can score up to M2		
	Subject to the previous comment, award the higher mark for work seen on diagram and work seen in working space		
	Ignore incorrect angles when awarding up to M2, but any incorrect work cannot score M2A1		
	40 marked as angle *AED* on diagram but :- 180 on answer line or no sign of 40 as final answer in working	M2A0	

Question	Answer	Mark	Comments
16	3 : 18 or 18 : 3 or $\frac{1}{3}$: 1 or 1 : $\frac{1}{3}$ or 6 × 3	M1	oe both ratios correctly scaled so that the values for *a* are equal (ignore additional scaling) eg 6 : 36 **and** 6 : 2
	18	A1	
	Additional Guidance		
	Do not accept words instead of ratios for M1		
	Accept embedded answers eg $b = 18c$		M1A1
	1 : 6 2 : 12 3 : 18 4 : 24 (etc)		M1
	18 – 3 (= 15)		M1A0

Question	Answer	Mark	Comments
17(a)	Ticks 'No' and gives correct explanation indicating her error	B1	eg It should be 0.03 0.3 would give 30% It's 10 times too big You need to divide by 10 as well
	Additional Guidance		
	'Yes' ticked		B0
	If 'No' is not ticked, explanation must include a decision that the statement is incorrect 'No' not ticked and 'it should be 0.03' (only implies 'No') 'No' not ticked and 'it should be 0.03 so she is wrong'		B0 B1
	It is not sufficient to only show a different correct method, eg 'No' and 'divide by 100 and multiply by 3' eg 'No' and 'she has divided by 10 and multiplied by 3 but she should have divided by 100 then multiplied by 3'		B0 B1
	'No' and '1700 × 0.03' (a correction of Laura's method)		B1
	Calculating the correct answer must come with the correct evaluation of Laura's method eg 'No' and 'should be 51' eg 'No' and 'Laura gets 510 but it should be 51'		B0 B1

Question	Answer	Mark	Comments
17(b)	Ticks 'No' and gives correct explanation	B1	eg $\frac{30}{29}$ is bigger than 1 58 is from $\frac{29}{30}$ the answer would have to be bigger than 60 it will be a decimal

Additional Guidance	
'Yes' ticked	B0
'60 doesn't divide by 29' oe	B0
'No' ticked and 'the numerator and denominator are wrong way round'	B1
If 'No' is not ticked, explanation must include a decision that the statement is incorrect 'No' not ticked and 'it should be more than 60' (only implies 'No') 'No' not ticked and 'it should be more than 60 so she is wrong'	 B0 B1
'No' ticked and 60 ÷ 29 = 2.(…) then 2.(…) × 30 = [60, 70) accept 2 r2 for 2.(…)	B1
'No' ticked and 30 ÷ 29 = 1.(…) and 1.(…) × 60 = [60, 70) accept 1 r1 for 1.(…)	B1
'No' ticked and 'because it's a top heavy fraction' 'No' ticked and 'because it's a top heavy fraction so it's bigger than 1'	B0 B1
'No' ticked and '$1\frac{1}{29}\times 60$' 'No' ticked and '$1\frac{1}{29}\times 60$ so the answer is over 60'	B0 B1

Question	Answer	Mark	Comments
18		B3	D can be anywhere inside the rectangle and outside the circles B2 for 3 or 4 letter positions correct B1 for 1 or 2 letter positions correct
	Additional Guidance		
	Accept names of shapes written on diagram but do not accept first letter only (ambiguous)		
	Duplicating a letter in more than one region is choice and that letter cannot be counted as correct		
	Ignore anything written outside the rectangle		

Question	Answer	Mark	Comments
19	3.5 or $3\frac{1}{2}$ or 49 or (49 =) $\frac{98}{2}$	M1	
	3.5 – 49 or 49 – 3.5 or $3\frac{1}{2} - 49$ or $49 - 3\frac{1}{2}$ or $\frac{7}{2} - \frac{98}{2}$ or $\frac{98}{2} - \frac{7}{2}$	M1dep	45.5 (oe) implies M2
	–45.5 or $-45\frac{1}{2}$ or $-\frac{91}{2}$	A1	
	Additional Guidance		
	$\frac{7}{2}$ without $\frac{98}{2}$	M0	
	7^2 without 49	M0	
	$\frac{7}{2} - 7^2$ (no further correct work)	M0	
	$7^2 = 14$, 3.5 – 14 = –10.5	M1M0A0	
	$\frac{7}{2} - 49$	M1	
	3.5 – 7^2	M1	

Question	Answer	Mark	Comments
20	**Alternative method 1**		
	$3x = 19 + 8$ or $3x = 27$ or $(19 + 8) \div 3$ or $\frac{27}{3}$	M1	accept in 'flow chart' eg $(x \rightarrow) \times 3 \rightarrow -8 \rightarrow 19$ and $\leftarrow \div 3 \leftarrow +8 \leftarrow 19$ enough for M1
	9	A1	
	Alternative method 2		
	$x - \frac{8}{3} = \frac{19}{3}$	M1	
	9	A1	
	Additional Guidance		
	$3 \times 9 - 8$ (= 19)		M1A0

<table>
<tr><th>Question</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td rowspan="2">21</td><td colspan="3">Alternative Method 1</td></tr>
<tr><td>Lists at least 5 correct combinations or at least 5 correct outcomes or constructs correct two-way table
eg
17 and 12 or 29
17 and 23 or 40
17 and 15 or 32
17 and 16 or 33
12 and 23 or 35
12 and 15 or 27
12 and 16 or 28
23 and 15 or 38
23 and 16 or 39
15 and 16 or 31 or
<table><tr><th></th><th>17</th><th>12</th><th>23</th><th>15</th><th>16</th></tr><tr><th>17</th><td></td><td></td><td></td><td></td><td></td></tr><tr><th>12</th><td></td><td></td><td></td><td></td><td></td></tr><tr><th>23</th><td></td><td></td><td></td><td></td><td></td></tr><tr><th>15</th><td></td><td></td><td></td><td></td><td></td></tr><tr><th>16</th><td></td><td></td><td></td><td></td><td></td></tr></table></td><td>M1</td><td>outcomes may be seen in the two-way table

ignore additional combinations such as 17 and 17 for M1

ignore any totals in a correctly constructed two-way table

17 and 12 & 12 and 17 are accepted as two different combinations</td></tr>
<tr><td>Fully correct list or two-way table
eg
29, 40, 32, 33, 35, 27, 28, 38, 39, 31
or 40, 32, 33, 35, 38, 39, 31 or
<table><tr><th></th><th>17</th><th>12</th><th>23</th><th>15</th><th>16</th></tr><tr><th>17</th><td></td><td>29</td><td>40</td><td>32</td><td>33</td></tr><tr><th>12</th><td>29</td><td></td><td>35</td><td>27</td><td>28</td></tr><tr><th>23</th><td>40</td><td>35</td><td></td><td>38</td><td>39</td></tr><tr><th>15</th><td>32</td><td>27</td><td>38</td><td></td><td>31</td></tr><tr><th>16</th><td>33</td><td>28</td><td>39</td><td>31</td><td></td></tr></table></td><td>A1</td><td>accept ticks/crosses with correct pairs instead of values

in the two-way table, it is acceptable to have only one set of ten cells completed (top right or bottom left) if all correct

accept ticks and/or crosses in cells

do not accept incorrect combinations such as 17 and 17 for A1</td></tr>
</table>

21cont	$\frac{7}{10}$ or 0.7 or 70%	A1ft	oe ft their list or two-way table with M1 scored and a probability > 0 and < 1
	Alternative Method 2		
	States that outcomes of 30 or under may only be achieved by using the 12	M1	oe
	Lists the three (or six) combinations which give outcomes of 30 or under 12 and 15 (15 and 12) 12 and 16 (16 and 12) 12 and 17 (17 and 12) or Lists the three outcomes of 30 or under (may be repeated) 27 28 29	A1	
	$\frac{7}{10}$ or 0.7 or 70%	A1ft	oe ft their list with M1 scored and a probability > 0 and < 1 eg if only 27 and 28 found and answer 0.8 given score M1A0A1ft

The Additional Guidance for Q21 is on the next page

21cont

Additional Guidance

Correct answer with no incorrect working	M1A1A1
If work is crossed out, this may be the removal of totals not above 30 and these should still be considered if appropriate	

This example shows that the answer 0.7 may not score full marks.

	17	**12**	**23**	**15**	**16**
17		29	40	32	33
12	29		36	27	28
23	40	36		37	39
15	32	27	37		31
16	33	28	39	31	

and answer of 0.7

M1A0A1ft

This is an example of following through from their table to give A1ft.

	17	**12**	**23**	**15**	**16**
17		29	40	32	33
12	29		35	27	28
23	40	36		38	39
15	32	27	37		21
16	33	28	39	21	

and answer of 0.6

M1A0A1ft

Ignore use of probability words unless contradictory	

Question	Answer	Mark	Comments
22(a)	x: –2, –1, 0, 1, 2 y: 4, 1, 0, 1, 4	B1	
22(b)	Plots their points correctly or restarts with 4 or 5 correct points plotted	M1	$\pm\frac{1}{2}$ square tolerance allow one error
	Correct graph	A1	smooth quadratic curve through points
	Additional Guidance		
	Allow $\pm\frac{1}{2}$ square tolerance for curve passing through points		
	If their points do not form a quadratic curve, it is maximum M1		
	The 'base' of the quadratic curve should be a smooth fairly flat curve, not a pointed shape		
	Ignore additional points beyond $x = 2$ and $x = –2$		
	Ignore extended graph beyond $x = 2$ and $x = –2$		
22(c)	Draws a horizontal line from 2.6 on the y-axis to their graph	M1	implied by correct vertical line down to the x-axis from correct point or at least one correct value seen for their graph
	Correct readings from their graph	A1ft	must see both values
	Additional Guidance		
	Positive value only or negative value only given		M1A0
	Tolerance on readings of $\pm\frac{1}{2}$ square		
	It is sufficient, for M1, for the horizontal line to meet the graph once		
	No graph and answer of 1.6		M0A0

Question	Answer	Mark	Comments
23(a)	–1	B1	
23(b)	$n^2 + n$ or $n + n^2$	B1	
	Additional Guidance		
	Accept $1n^2 + 1n$ or $1n^2 + n$ or $n^2 + 1n$ etc…	B1	
	Do not accept $n \times n + n$ or $n^2 + n1$	B0	
23(c)	**Alternative method 1**		
	(n + n + 1 =) 2n + 1 **and** states that 2n is even **and** states that even + 1 = odd **or** even + odd = odd	B2	B1 (n + n + 1 =) 2n + 1
	Alternative method 2		
	States that one of the numbers is even and the other is odd **and** states that even + odd = odd	B2	B1 states that one of the numbers is even and the other is odd or states that even + odd = odd
	Additional Guidance		
	Numerical examples with no other explanation	B0	
	$n + n + 1 = 2n + 1 = 3n$	B0	

Question	Answer	Mark	Comments
24	$\frac{\sqrt{3}}{2}$	B1	

Question	Answer	Mark	Comments
25	**Alternative method 1**		
	$\frac{17}{2}$ or $\frac{8}{3}$	M1	oe fractions
	their $\frac{17}{2}$ × their $\frac{3}{8}$	M1	conversion of both mixed numbers to improper fractions and multiplication of the conversion of $8\frac{1}{2}$ by the reciprocal of the conversion of $2\frac{2}{3}$
	$\frac{51}{16}$	A1	oe fraction or decimal
	$3\frac{3}{16}$	B1ft	oe mixed number ft correct conversion of their improper fraction to a mixed number
	Alternative method 2		
	$\frac{17}{2}$ or $\frac{8}{3}$	M1	oe fractions
	$\frac{51}{6} \div \frac{16}{6}$	M1	conversion of both mixed numbers to improper fractions, correct conversion to improper fractions with a common denominator and division of the conversion of $8\frac{1}{2}$ by the conversion of $2\frac{2}{3}$
	$\frac{51}{16}$	A1	oe fraction or decimal
	$3\frac{3}{16}$	B1ft	oe mixed number ft correct conversion of their improper fraction to a mixed number

The Additional Guidance for question 25 is on the next page

Question	Answer	Mark	Comments

	Additional Guidance	
25 cont	Working with decimals	0, 3 or 4
	Ignore incorrect attempt to simplify a mixed number eg $3\frac{3}{16} = 3\frac{1}{8}$	M1M1A1B1
	$3\frac{3}{16}$ seen, then $\frac{51}{16}$ on answer line	M1M1A1B0
	$\frac{9}{2}$ and $\frac{8}{3}$, $\frac{27}{6} \div \frac{16}{6}$, $\frac{27}{16}$, $1\frac{11}{16}$	M1M1A0B1ft
	$\frac{9}{2}$ and $\frac{8}{3}$, $\frac{27}{6} \div \frac{16}{6}$, $1\frac{11}{16}$	M1M1A0B1ft
	$\frac{9}{2}$ and $\frac{4}{3}$, $\frac{27}{6} \div \frac{8}{6}$, $\frac{27}{8}$, $3\frac{3}{8}$	M0M1A0B1ft

Question	Answer	Mark	Comments
26	**Alternative method 1**		
	Correct reading of at least one value at 0 hours [46, 50] at 1 hour [63, 67] at 2 hours [80, 84] at 3 hours [96, 100] at 4 hours [114, 118]	M1	may be seen on graph
	$\frac{\text{subtraction of two values}}{\text{correct number of hours}}$	M1	division by 1 may be implied
	17	A1	SC1 29
	Alternative method 2		
	A difference in the range for 1 hour [15, 19] for 2 hours [32, 36] for 3 hours [49, 53] for 4 hours [66, 70]	M1	may be seen on graph
	$\frac{\text{difference}}{\text{correct number of hours}}$	M1	division by 1 may be implied
	17	A1	SC1 29
	Additional Guidance		
	(119 – 42) ÷ 4 = 19.25		M0M1A0
	for 2nd M1 in Alt 1, subtraction must be in the correct order unless recovered		
	17 does not imply three marks, so working must be checked eg (110 – 42) ÷ 4 = 17		M0M1A0

Question	Answer	Mark	Comments
27(a)	8 and lowest (value) or 8 and outlier	B1	oe Accept 102 for day 8
	Additional Guidance		
	8 and '(Only 102 landed whereas) All the other days were over 140'	B1	
	8 and 'Fewer (less) planes landed (than the other days)'	B1	
	8 and 'It's an anomaly'	B1	
	8 and 'There was a (big) drop / reduction / decrease in the number of planes'	B1	
	8 and 'There were only 102 planes'	B1	
	8 and 'It's low' or 8 and 'It's lower' or 8 and 'It's too low'	B1	
	8 and 'It doesn't follow the trend (or pattern)'	B1	
	8 and 'It reduces a lot that day'	B1	
	Ignore a non-contradictory statement with a correct statement eg 8 and It's the lowest, it dropped by 53'	B1	
	Do not award B1 with a numerical error in the statement eg 8 and 'It's the lowest by 40'	B0	
	8 and 'There were 102 planes'	B0	
	8 and 'There's a drop of 53 (implies a point to point comparison)'	B0	
	8 and 'It's below average'	B0	
	8 and 'It's the odd one out'	B0	

Question	Answer	Mark	Comments
27(b)	**Alternative method 1**		
	150 × 24 ÷ 4 or 150 × 6 or 900	M1	oe
	their 900 × 365 or their 900 × 7 × 4 × 12 or their 900 × 7 × 52 or 302 400 or 360 000	M1dep	for 365, allow 336, 360, 364, 366, 370 and 400
	324 000 or 327 600 or 328 500 or 329 400 or 333 000	A1	
	Alternative method 2		
	365 × 150 or 54 750 or 365 × any multiple of 150	M1	for 365, allow 336, 360, 364, 366, 370 and 400 for 54 750 allow 50 400, 54 000, 54 600, 54 900, 55 500 and 60 000
	their 54 750 × 24 ÷ 4 or 302 400 or 360 000	M1dep	
	324 000 or 327 600 or 328 500 or 329 400 or 333 000	A1	
	Alternative method 3		
	365 × (24 ÷ 4) or 365 × 6 or 2190	M1	for 365, allow 336, 360, 364, 366, 370 and 400 for 2190, allow 2016, 2160, 2184, 2196, 2220 and 2400
	their 2190 × 150 or 302 400 or 360 000	M1dep	
	324 000 or 327 600 or 328 500 or 329 400 or 333 000	A1	

Question	Answer	Mark	Comments
27(c)	Ticks 'Her prediction could be too low or too high' and explains that fewer landings in winter would make it too low, but fewer landings at night would make it too high or states that the actual numbers are not given	B2	oe reason B1 ticks 'Her prediction could be too low or too high'
	Additional Guidance		
	Ticks 'Her prediction could be too low or too high' and states that there is not enough data		B1 only

Question	Answer	Mark	Comments
28	**Alternative method 1**		
	(5 – 2) × 180 or 3 × 180 or 540 or 180 – (360 ÷ 5) or (180 – 72) or 108	M1	oe
	Ticks 'No' and 540 or Ticks 'No' and 108	A1	
	Alternative method 2		
	States that a pentagon cannot have five (or all) right angles or states that a pentagon can have five (or all) obtuse angles or states that the maximum number of right angles is three or draws a pentagon with exactly three right angles shown	M1	
	Ticks 'No' and states that a pentagon cannot have five (or all) right angles or states that the maximum number of right angles is three or states that a pentagon can have five (or all) obtuse angles and draws a correct diagram of an attempted pentagon with four right angles shown or draws a pentagon with exactly three right angles shown or draws a pentagon with five obtuse angles	A1	

The Additional Guidance for question 28 is on the next page

Question	Answer	Mark	Comments

28 cont	**Additional Guidance**	
	If comparing 72° to 90°, they must state that they are referring to the exterior angles	
	If 'Yes' is ticked, M1 can still be scored	
	If neither box is ticked, 'No' must be implied by the explanation for M1A1	

29	**Alternative method 1**		
	$(6^2 =)$ 36 or $(8^2 =)$ 64 or 100 or $\sqrt{100}$	M1	
	10	A1	
	their $10 = 5a$ or (their $10)^3 = 125a^3$ or $1000 = 125a^3$ or $8 = a^3$	M1	
	2	A1ft	ft their 10 with both method marks scored
	Alternative method 2		
	5 or a	M1	
	$5a$	A1	
	their $5a = \sqrt{100}$ or their $5a = 10$	M1	$(a =) \frac{\sqrt{100}}{5}$ or $(a =) \frac{10}{5}$ implies M1A1M1
	2	A1ft	ft their $5a$ with both method marks scored
	Additional Guidance		
	Use the scheme that gives the better mark eg1 $\sqrt{14^2} = 5a$, $14 = 5a$, $a = 2.8$ scores M0A0M1A0 on alt 1 and M1A1M0A0 on alt 2 eg2 $\sqrt{100} = 5a^3$, $10 = 5a^3$, $a = \sqrt[3]{2}$ scores M1A1M0A0 on alt 1 and M1A0M1A1ft on alt 2		Award M1A1M0A0 Award M1A0M1A1ft

Question	Answer	Mark	Comments
30	**Alternative method 1**		
	280 – 80 or 200	M1	
	their 200 ÷ 80 (× 100) or 2.5 (× 100)	M1dep	oe
	250	A1	
	Alternative method 2		
	280 ÷ 80 or 3.5	M1	oe
	280 ÷ 80 × 100 (– 100) or their 3.5 × 100 (– 100) or 350 (– 100) or (their 3.5 – 1) (× 100) or 2.5 (× 100)	M1dep	oe
	250	A1	

Question	Answer	Mark	Comments
31	**Alternative method 1**		
	$(x + a)(x + b)$	M1	where $ab = \pm 12$ or $a + b = -1$
	$(x - 4)(x + 3)$	A1	
	4 and –3	A1	SC1 4 or –3 with no or one incorrect answer
	Alternative method 2		
	$\frac{(- -)1 \pm\sqrt{((-)1)^2 - 4(1)(-12)}}{2(1)}$ or $\frac{1 \pm\sqrt{1 + 48}}{2}$ or $\frac{1 \pm\sqrt{49}}{2}$	M1	oe allow one sign error
	$\frac{(- -)1 \pm\sqrt{((-)1)^2 - 4(1)(-12)}}{2(1)}$ or $\frac{1 \pm\sqrt{1 + 48}}{2}$ or $\frac{1 \pm\sqrt{49}}{2}$	A1	oe fully correct
	4 and –3	A1	SC1 4 or –3 with no or one incorrect answer
	Alternative method 3		
	$\left(x - \frac{1}{2}\right)^2 \ldots$	M1	
	$\left(x - \frac{1}{2}\right)^2 - \left(\frac{1}{2}\right)^2 - 12$ (= 0)	A1	oe equation
	4 and –3	A1	SC1 4 or –3 with no or one incorrect answer
	Additional Guidance		
	4 and –3 with no working		M1A1A1
	M1 can be scored amongst incorrect attempts to factorise		
	Condone trailing bracket missing eg $(x - 4)(x + 3$		M1A1