AQA

GCSE

Mathematics (Linear)

4365/1F Paper 1

Mark scheme

4365

June 2016

Version: 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.

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. e.g. accept 0.5 as well as $\frac{1}{2}$
[*a*, *b*]	Accept values between *a* and *b* inclusive.
[a, b)	Accept values a ≤ value < b
3.14…	Accept answers which begin 3.14 e.g. 3.14, 3.142, 3.1416
Q	Marks awarded for quality of written communication
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 candidate has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the candidate. In cases where there is no doubt that the answer has come from incorrect working then the candidate should be penalised.

Questions which ask candidates to show working

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

Questions which do not ask candidates to show working

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

Misread or miscopy

Candidates often copy values from a question incorrectly. If the examiner thinks that the candidate 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 candidate intended it to be a decimal point.

Paper 1 Foundation Tier

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td>1a</td><td>4 or Four</td><td>B1</td><td></td></tr>
<tr><td rowspan="11">1b</td><td>Black 10
and
Blue 14</td><td>B1ft</td><td>ft $2\frac{1}{2}\times$ their key
and
$3\frac{1}{2}\times$ their key</td></tr>
<tr><td>Silver frequency 16</td><td>B1ft</td><td>ft 60 – (20 + their Black and their Blue)</td></tr>
<tr><td>Silver ◯ ◯ ◯ ◯</td><td>B1ft</td><td>ft correct number of circles (not 0) for their Silver frequency ÷ their key</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="3">Mark the pictogram unless completely blank</td></tr>
<tr><td colspan="3">Allow use of 1 circle represents 4 cars even if key blank or completed with another value
ie allow correct or follow through</td></tr>
<tr><td colspan="2">Key given as 5
Black ◯ ◯ ◖ 12.5
Silver ◯ ◯ 10
Blue ◯ ◯ ◯ ◖ 17.5</td><td>B3ft</td></tr>
<tr><td colspan="2">Key given as 4
Black ◯ ◯ ◖ 9
Silver ◯ ◯ ◯ ◯ ◖ 18
Blue ◯ ◯ ◯ ◖ 13</td><td>B0
B1ft
B1ft</td></tr>
<tr><td colspan="2">Key given as 5
Black ◯ ◯ ◖ 10
Silver ◯ ◯ ◯ 16
Blue ◯ ◯ ◯ ◖ 14</td><td>B1 B1 B0
assume starts again with consistent use of 4</td></tr>
<tr><td colspan="2">Key given as 5
Black ◯ ◯ ◖ 10
Silver ◯ ◯ ◯ ◯ 16
Blue ◯ ◯ ◯ ◖ 14</td><td>B3
assume starts again with consistent use of 4</td></tr>
<tr><td colspan="3">Mark intention for size of circles / part circles. Ignore alignment of symbols / rows</td></tr>
<tr><td colspan="3">Allow two half circles for one full circle</td></tr>
</table>

Q	Answer	Mark	Comments
2a	Tea and biscuit	B1	Either order Accept any unambiguous indication eg T, B Allow answers of £1.20 and 65p if Tea and Biscuit seen in working
2b	(£1.20 +) £1.20 + £1.00 + 65p or 4.05 or 405 or 2.85 or 285	M1	Allow one tea only ie £1.20 + £1.00 + 65p Allow mixed or missing units
	95 or 0.95	A1	95 may be implied by correct coins in answer Ignore units
	50, 20, 20, 5	A1ft	ft M1A0 if their 95 possible as 4 coins If units given must be correct Must show units if coins are mixed £ and p
	Additional Guidance		
	£5 – £4.05 = £1.05 £1, 2p, 2p, 1p (needs units here as both £ and p)		M1 A0 A1ft
	1.20 + 1.20 + 1 + 65 = 3.75 50, 50, 20, 5 (although subtraction not shown the coins are correct for their 95 which is 1.25)		M1 A0 A1ft implied
	Must select correct values from the table		

Q	Answer	Mark	Comments
2c	**Alternative method 1**		
	£2.25 + 50p or £2.75	M1	Allow mixed or missing units
	their £2.75 – £1.60	M1dep	
	1.15	A1	Allow £1.15p
	Alternative method 2		
	£2.25 – £1.60 or 65p	M1	Allow mixed or missing units
	their 65p + 50p	M1dep	
	1.15	A1	Allow £1.15p
	Additional Guidance		
	Further work cannot score the second mark – mark the whole method 2.25 + 50 = 2.75 2.75 – 1.60 = 1.15 1.15 – 50 (further work) Answer £0.65		M1 M0dep A0
	Allow coffee to be £1.20 or £1.50		M2 max
3a	10 squares shaded	B1	
3b	$\frac{15}{25}$ or 0.6 or 60%	B1	oe fraction, decimal or percentage seen but not ratio
	$\frac{3}{5}$	B1ft	ft their fraction if it will cancel given in its simplest form
	Additional Guidance		
	$\frac{3}{5}$ and 60% both given as answers – choice		B1
	Answer $\frac{3}{5}$ (not from incorrect working)		B1 B1
	Fraction only given in words eg 15 out of 25 or 3 over 5		B1 max

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td>4a</td><td>802</td><td>B1</td><td></td></tr>
<tr><td>4b</td><td>87</td><td>B1</td><td></td></tr>
<tr><td rowspan="11">4c</td><td colspan="3">Alternative method 1</td></tr>
<tr><td>52
36 ×
312
1560
or
36
52 ×
72
1800</td><td>M1</td><td>Two rows attempted with at least one row correct and the 0 present for multiplication by the multiple of 10
0 may be implied by correct alignment unless total indicates otherwise</td></tr>
<tr><td>their 312 + their 1560
or
their 72 + their 1800</td><td>M1dep</td><td></td></tr>
<tr><td>1872</td><td>A1</td><td></td></tr>
<tr><td colspan="3">Alternative method 2</td></tr>
<tr><td><table><tr><td></td><td>50</td><td>2</td></tr><tr><td>30</td><td>1500</td><td>60</td></tr><tr><td>6</td><td>300</td><td>12</td></tr></table></td><td>M1</td><td>Four products attempted with at least three of the four correct and the 00 present for the 30 × 50 product</td></tr>
<tr><td>their 1500 + their 60 + their 300 + their 12</td><td>M1dep</td><td></td></tr>
<tr><td>1872</td><td>A1</td><td></td></tr>
<tr><td colspan="3">Alternative method 3</td></tr>
<tr><td><table><tr><td>5</td><td>2</td><td></td></tr><tr><td>1 / 5</td><td>0 / 6</td><td>3</td></tr><tr><td>3 / 0</td><td>1 / 2</td><td>6</td></tr></table></td><td>M1</td><td>Four products attempted with at least three of 15, 06, 30 and 12 correct and correct grid format</td></tr>
<tr><td>their 1, their 3 + their 5 + their 0, their 0 + their 1 + their 6, their 2</td><td>M1dep</td><td>Totals calculated for each diagonal</td></tr>
<tr><td>1872</td><td>A1</td><td></td></tr>
</table>

see over for Additional Guidance for 4c

<table>
<tr><td rowspan="9">4c cont</td><td colspan="2">Additional Guidance</td></tr>
<tr><td>1512 from 50 × 30 + 2 × 6</td><td>M0 M0dep A0</td></tr>
<tr><td>52
36
312
2580
2892
One row correct and 0 present for second row</td><td>M1
M1dep
A0</td></tr>
<tr><td>52
36
312
156
468
Misconception as no 0 present</td><td>M0
M0dep
A0</td></tr>
<tr><td>36
52
72
1850
1922
One row correct and 0 present for second row</td><td>M1
M1dep
A0</td></tr>
<tr><td>50 × 30 = 1200 50 × 6 = 300 2 × 30 = 60 2 × 6 = 14 only two correct
1200 + 300 + 60 + 14 = 1574</td><td>M0
M0dep A0</td></tr>
<tr><td><table><tr><td></td><td>50</td><td>2</td></tr><tr><td>30</td><td>1500</td><td>60</td></tr><tr><td>6</td><td>30</td><td>12</td></tr></table>Three correct out of four and 00 correct on 1500
1500 + 60 + 30 + 12 = 1602</td><td>M1
M1dep A0</td></tr>
<tr><td><table><tr><td></td><td>50</td><td>2</td></tr><tr><td>30</td><td>150</td><td>60</td></tr><tr><td>6</td><td>300</td><td>12</td></tr></table>Three correct out of four but 00 incorrect on 1500
150 + 60 + 300 + 12 = 522</td><td>M0
M0dep A0</td></tr>
<tr><td>50 × 30 = 1500 2 × 36 = 72 Only equivalent to three products
1500 + 72 = 1572</td><td>M0
M0dep A0</td></tr>
</table>

Q	Answer	Mark	Comments
5a	$7 \times 3 - 4 \times -2$ or $21 - -8$ or $21 + 8$ or 21 **and** –8 seen separately	M1	
	29	A1	
	Additional Guidance		
	Only $21 - 8 = 13$ seen		M0 A0
	$7 \times 3 = 21$ and $4 \times -2 = 8$ and $21 - 8$ implies $7 \times 3 - 4 \times -2$		M1 A0
	21 and –8 seen then answer $21a + 8b$		M1 A0
	$7 \times 3 = 21a$ and $4 \times -2 = -8b$ then answer $21a + 8b$		M0 A0
	$21a - 8b$ or $21a + 8b$ only		M0 A0
5b	12	B1	
5c	16	B1	

Q	Answer	Mark	Comments
6	11 50 – 08 50 or 3 hours or 180 mins or 11 50 – 15 minutes or 11 35 or 08 50 + 15 minutes or 09 05	M1	
	their 3 hours – 15 minutes or their 11 35 – 08 50 or 11 50 – their 09 05 or 2h 45m or 165 minutes	M1dep	oe 1 hour – 5 mins 1 lesson + 5 mins = 60 mins 1 lesson + 5 mins = 1 hour
	55	A1	
	Additional Guidance		
	Units may be omitted if unambiguous		
	Using 100-minute hour in the subtraction can score M1 max eg 3 – 0.15 = 2.85		M1M0
	3 – 0.15 = 2.45 or 3 – 0.15		M1M1dep
	08 50 – 11 50		M0
	08 50 – 11 50 with an answer		M1

7a	[52, 54]	B1	Mark answer line If answer line blank, check angle A in diagram

Q	Answer	Mark	Comments
7b	**Alternative method 1**		
	12 **or** 8 seen	M1	[11.9, 12.1] or [7.9, 8.1] May be on diagram
	$\frac{1}{2}$ × their 12 × their 8	M1dep	Must be two perpendicular lengths
	48	A1	[47, 49.01]
	Alternative method 2		
	Perpendicular from *B* to *AC* or *A* to *CB* measured as 9.6 cm **and** sides as 10	M1	[9.5, 9.7] or [9.9, 10.1] May be on diagram
	$\frac{1}{2}$ × their 10 × their 9.6	M1 dep	Must be two perpendicular lengths
	48	A1	[47, 49.01]
	Additional Guidance		
	Allow M1 for 12 or 8 even if not used to reach answer		
	$\frac{1}{2}$ × 12 × 10		M1 M0dep A0
8a	$x - 6$	B1	
8b	$\frac{y}{4}$	B1	
8c	$2(w + 4)$ or $2w + 8$	B1	Accept $2 \times (w + 4)$ or $(w + 4) \times 2$
	Additional Guidance		
	$w + 4 \times 2$		B0
	$2w + 8 = 10w$		B0

Q	Answer	Mark	Comments
9a	Both fractions correctly written with a common denominator eg $\frac{7}{10}$ and $\frac{4}{10}$ or $\frac{35}{50}$ and $\frac{20}{50}$ or $\frac{14}{20}$ and $\frac{8}{20}$ or 0.7 and 0.4	M1	
	$\frac{3}{10}$ or 0.3	A1	oe eg $\frac{6}{20}$ or $\frac{15}{50}$ Ignore incorrect cancelling or change of form once correct answer seen
	Additional Guidance		
	$\frac{3}{10}$ followed by $\frac{1.5}{5}$		M1 A1
	$\frac{3.5}{5}$ and $\frac{2}{5}$ or $\frac{1.5}{5}$		M1 A0
9b	24	B1	

Q	Answer	Mark	Comments
10	134	B1	
	Angles on a straight line add to 180°	Q1	Strand (i)
	Additional Guidance		
	It is possible to score B0 Q1, ignore their angle for the Q mark		
	Straight line = 180		Q1
	All straight lines add up to 180		Q1
	Because on a straight line 180 – 46 = 134		Q1
	180 – 46 = 134		Q0
	Line = 180		Q0
	They are angles on a straight line		Q0
	Angles at a point = 360, 360 – 180 – 46 = 134		Q0
11a	2.2	B1	
11b	1.6	B1	

Q	Answer	Mark	Comments
11c	**Alternative method 1**		
	Any value read from graph ($\pm\frac{1}{2}$ square) **and** multiplied by appropriate value eg 5 gal 22 litres, 22 × 6 or 10 gal 44 litres, 44 × 3 or 15 gal 68 litres, 68 × 2	M1	oe Sum of litre values corresponding to a total of 30 gallons read from graph ($\pm\frac{1}{2}$ square) eg 22 + 44 + 68 or 67 + 67 or 45 + 45 + 45
	[132, 138]	A1	Must be from a correct calculation if shown
	Alternative method 2		
	30 × 4.5	M1	oe
	135	A1	
	Additional Guidance		
	Answer only [132, 138]		M1 A1
	68 + 68 = 138 (calculation error seen)		M1 A0
	2 gallons = 9 litres 9 × 15 = 135		M1 A1
	1 gallon = 4 litres (within $\pm\frac{1}{2}$ square tolerance) 4 × 30 = 120 (out of final tolerance)		M1 A0
	3 gallons = 14 litres (within $\pm\frac{1}{2}$ square tolerance) 14 × 10 140 (out of final tolerance)		M1 A0
	Acceptable values in tolerance for the M mark eg 1 gallon → [3, 5] × 30 2 gallons → [8, 10] × 15 3 gallons → [12, 14] × 10 5 gallons → [21, 23] × 6 10 gallons → [44, 46] × 3 15 gallons → [66, 68] × 2		

Q	Answer	Mark	Comments
12	**Alternative method 1**		
	(10% =) 19 or (50% =) 95 or (20% =) 38 or (30%) = 57 or (5% =) 9.5 or (1% =) 1.9 etc	M1	Any correct comparison of a percentage and a value except 100% = 190
	Any combination of values that make 35% eg 95 – their 19 – their 9.5, their 19 + their 19 + their 19 + their 9.5 or 66.5	M1dep	Must be correct values or valid method shown leading to their values 256.5 or $256\frac{1}{2}$ or 256.50p
	256.50	Q1ft	Strand (i) ft 190 + their 35% if M1, M0 awarded Must be correct money notation
	Alternative method 2		
	0.35 or 1.35 seen or $\frac{35}{100}$ or $\frac{135}{100}$ or 135%	M1	
	0.35×190 or 1.35×190 or 66.5 or $\frac{135}{100}$, $\frac{190}{1}$ or $\frac{35}{100}$, $\frac{190}{1}$	M1dep	oe 256.5 or $256\frac{1}{2}$ or 256.50p
	256.50	Q1	Strand (i) Must be correct money notation

see over for Additional Guidance for 12

	Additional Guidance		
12 cont	19 38 5% = 19 ÷ 2 = 8 35% = 19 + 38 + 8 = 65 255		M1 M1dep Q0
	10% = 19 20% = 38 5% = 8 35% = 19 + 38 + 8 = 65 255		M1 M0dep Q1ft
	10% = 19 20% = 38 5% = 9.5 35% = 19 + 38 + 9.5 = 64.5 254.50		M1 M1dep Q0 ft
	190 × 1.35 Uses box method to get 256.5 265.50	Transcription error	M1 M1dep Q1
	10% = 19 20% = 36 5% = 9.5 35% = 19 + 36 + 9.5 = 44.5 224.50		M1 M0dep Q0ft

Q	Answer	Mark	Comments
13	**Alternative method 1**		
	(Width =) 10 or (length =) 15 seen	B1	May be on the diagram
	their height × their width × their length with at least two values correct or 5 × 10 × 15	M1	
	750	A1	Ignore incorrect units, eg cm^2 SC2 for 6000 from using 10 as diameter
	Alternative method 2		
	5 × 5 × 5 or 125	B1	
	6 × their 125	M1	their 125 must be from 5 × 5 × 5
	750	A1	Ignore incorrect units, eg cm^2 SC2 for 6000 from using 10 as diameter
	Additional Guidance		
	On diagram, height marked as 10, width as 10 and length as 15 10 × 10 × 15 1500		B1 M1 A0
	On diagram, height marked as 10, width as 20 and length as 15 10 × 20 × 15 3000		B1 M0 A0
	On diagram, height marked as 10, width as 20 and length as 30 10 × 20 × 30 6000		SC2
	On diagram, height marked as 5, width as 10 and length as 15 In script 10 × 20 × 30 6000	Mark method that leads to answer.	SC2
	On diagram, height marked as 5, width as 20 and length as 30 5 × 20 × 30 3000		B0 M0 A0
	5 × 10 × 15 = 750 750 ÷ 3 = 250 (on answer line)	Mark whole method	B1 M0 A0

Q	Answer	Mark	Comments
14	‘half’ dimension of either smaller rectangle seen, ie 3 **or** 5	B1	Could be on any diagram 15 **or** 9 implies B1
	3 cm **and** 5 cm marked or stated as sides of shaded rectangle or 6 – their (6 ÷ 2) **and** 5 or 10 – their (10 ÷ 2) **and** 3 or sides of larger rectangle marked or stated as 15 cm **and** 9 cm or 48 stated as answer	M1	May be implied by 3 × 5 or 15 × 9
	16	A1	
	Additional Guidance		
	Note M1 is for finding dimensions of large or shaded rectangle. Ignore further working		
	Lengths of 5, 10, 3, 6, (5, 10, 3, 6) marked around side(s) of the larger rectangle 3 × 5 15		B1 M1 A0
	Lengths of 5, 10, 3, 6, (5, 10, 3, 6) marked around side(s) of the larger rectangle 9 × 15 135		B1 M1 A0
	Lengths of 4 and 5 marked as ‘half’ dimension on rectangles at top of page 5 and 2 marked as dimensions of shaded rectangle 12		B1 M1 A0
	Lengths of 5, 10, 3, 6, (5, 10, 3, 6) marked around side(s) of the larger rectangle only		B1, M0, A0
	3 × 5 (= 15) seen		B1, M1, A0
	15 on answer line with no correct or no working		B0, M0, A0
	16 on answer line with no working		B1, M1, A1

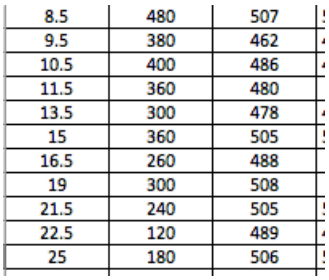
Q	Answer	Mark	Comments
15a	0.4 and 0.2	B2	B1 for 1 – (0.1 + 0.3) or 0.6 or total of White and Yellow = 0.6
	Additional Guidance		
	Mark table but if table blank or scores zero look in script for working or answers White (W) = 0.4 and Yellow (Y) = 0.2 must be clearly stated to get B2		
	1 – (0.1 + 0.3) = 0.4 White 0.8, Yellow 0.4		B1
	No working White 0.5 Yellow 0.1		B1
	White blank, Yellow 0.6		B1
	Table blank. W 0.4, Y 0.2 in script		B2
	Table blank. W 0.2, Y 0.4 in script		B1
	Table blank 0.4 and 0.2 in script		B1
	White 0.8, Yellow 0.4		B0
	White 0.6, Yellow 0.3		B0

Q	Answer	Mark	Comments
15b	200, 150 and 100	B2ft	B2ft their probabilities in (a) but only for probabilities that total 1 B1 White 200 or Blue 150 or Yellow 100 B1ft for **one** of their (a) for white × 500 or their (a) for yellow × 500 Do not allow B1ft for any probabilities that are greater than 1
	Additional Guidance		
	If answer of 200, 150 and 100 given do not check for ft even if table in (a) wrong. 2 marks. They could have started again		
	In (a) Red 0.1, White 0.2, Blue 0.3, Yellow 0.4 Answers (50) 100, 150 and 200	B2ft	
	In (a) Red 0.1, White 0.5, Blue 0.3, Yellow 0.1 Answers (50) 250, 150 and 50	B2ft	
	In (a) Red 0.1, White 0.3, Blue 0.3, Yellow 0.3 Answers (50) 150, 150 and 150	B2ft	
	In (a) Red 0.1, White 1.2, Blue 0.3, Yellow 0.2 Answers (50) 600, 150 and 100	B1	
	In (a) Red 0.1, White 0.2, Blue 0.3, Yellow 0.1 Answers (50) 100, 250 and 100	B1ft	
	In (a) Red 0.1, White 1.2, Blue 0.3, Yellow 0.2 Answers (50) 600, 150 and 200	B1	

Q	Answer	Mark	Comments
15c	$\frac{50}{400}$	B2ft	oe eg $\frac{1}{8}$, 0.125, 12.5% ft their table in (b) B2ft for numerator of 50 and denominator from their (b) B1 for 50 out of 400 B1 for 50 ÷ 400 B1ft for 50 out of their 400 from (b) B0 for any ratio Ignore any incorrect cancelling or change of form once correct answer seen
	Additional Guidance		
	For follow through from their (b) denominator is either 500 – their Yellow **or** 50 + their White + their Blue		
	Table in (b) (50), 100, 150, 200 $\frac{50}{300}$ oe	B2ft	
	$\frac{100}{400}$	B0	

Q	Answer	Mark	Comments
16	$6^2 + 8^2$ or 36 + 64 or 100 or $8^2 - 6^2$ or $6^2 + 8^2 - 2 \times 6 \times 8 \times \cos 90$	M1	3, 4, 5 seen If $6^2 + 8^2$ used in cosine rule must be correct
	$\sqrt{6^2 + 8^2}$ or $\sqrt{\text{their } 36 + \text{their } 64}$ or $\sqrt{100}$	M1dep	oe $\frac{5 \times 6}{3}$ or $\frac{5 \times 8}{4}$
	10	A1	10 no working is full marks
	Additional Guidance		
	Scale drawing is M0		
	(3, 4, 5) × 2 = (6, 8, 10)		M1, M1dep, A1
	$\sqrt{6^2 + 8^2} = \sqrt{110} = 10.5$		M1, M1dep, A0
	$6^2 + 8^2 - 2 \times 6 \times 8 \times \cos 90$ 100 – 96		M1, M0dep
	$6^2 + 8^2 - 6 \times 8 \times \cos 90$		M0
	$\sqrt{6^2 + 8^2} =$ $\sqrt{6^2} + \sqrt{8^2} = 6 + 8 = 14$		M1, M1dep A0
	$6^2 + 8^2 = 12 + 16 = 28$ $\sqrt{28}$		M1, M1dep, A0
	6 × 8 ÷ 2 = 24 24 – 8 – 6 = 10	Correct answer but from wrong method	M0

Q	Answer	Mark	Comments
17a	Higher temperature lower soup sales Lower temp more soup sold	B1	oe
	Additional Guidance		
	Less soup when warm		B1
	Sales go down as temperature goes up		B1
	Sell more soup when it is cold		B1
	As temperature gets higher the soup gets lower		B1
	The hotter the day is the less people want soup because it is hot		B1
	The hotter the temperature the less likely someone is going to buy soup		B1
	When more soup is sold the weather gets colder		B0
	Soup sales depend on temperature		B0
	Negative correlation		B0
	As the temperature decreases the monthly sales of soup decreases		B0
	As the soup gets hotter the sales go down		B0
	The lower the average the more sales of soup		B0
	It decreases as monthly temperature increases		B0

Q	Answer	Mark	Comments
17b	**Alternative method 1**		
	Line of best fit drawn	M1	Line of best fit must be long enough to go between [(4, 460), (4, 600)] and [(22.5, 120) , (25, 180)]
	470	A1ft	ft their line if M1 awarded (± ½ small square accuracy) Must be read from 7 (± ½ small square) SC1 no LOBF or wrong LOBF and answer in range [420, 540]. If point shown must be at 7 (± ½ small square)
	Alternative method 2		
	Chooses (4, 560) and any other point (x_1, y_1) or (10, 390) Calculates $560 - 3 \times \frac{(560 - y_1)}{(x_1 - 4)}$ or $y_1 + \frac{(x_1 - 7)(560 - y_1)}{(x_1 - 4)}$	M1	
	Correct answer for their chosen value (10, 390) gives 475 Values given to 3 sf at least	A1	 SC1 interpolation does not score M1 but answer in range [420, 540]
	Additional Guidance		
	(4, 560) to (10, 390) (4 + 10) ÷ 2 = 7 (560 + 390) ÷ 2 = 475		M1, A1
	(4, 560) to (8.5, 480) 480 + (1.5 ÷ 4.5) × (560 – 480) 506.66		M1, A1
	Line of best fit in range and answer in range but read from 7.5		M1, A0

8.5	480	507	
9.5	380	462	
10.5	400	486	
11.5	360	480	
13.5	300	478	
15	360	505	
16.5	260	488	
19	300	508	
21.5	240	505	
22.5	120	489	
25	180	506	

Q	Answer	Mark	Comments
18	$35x + 40$ or $40x + 17.5$ seen	B1	Any letter, eg h, symbol eg ? or _
	$35x + 40 = 40x + 17.5$ or $40x + 17.5 - (35x + 40)$	M1	oe
	$5x = 22.5$	A1	oe
	4.5 or 4 h 30 m oe	A1ft	ft their equation if M awarded and equation is of the form $5x = a$ or $bx = 22.5$ SC2 correct answer without minimum algebra shown Ignore wrong units, eg £4.50
	Additional Guidance		
	Minimum algebra is B1, M1 SC2 can be scored after B1, M0 but 2 marks maximum		
	$35x + 40 = 40x + 17.5$ $75x = 22.5$ $x = 0.3$		B1, M1 A0 A1ft
	$35 \times x + 40 = 40 \times x + 17.5$ $5x = 57.5$ $x = 11.5$		B1, M1 A0 A1ft
	$40x + 17.5 = y$ $35x + 40 = y$ – $5x - 22.5 = 0$ $x = 4.5$		B1 M1 A1 A1
	$40x + 17.5$ $35x + 40$ - $5x - 22.5$ $x = -4.5$	The solution implies that an equation was present BOD	B1 M1 A1 A0ft
	$35x + 40 = 40x + 17.5$ $5x = 22.5$ Cost of job = £197.50		B1, M1 A1 A0
	35 × number of hours + 40 = 40 × number of hours + 17.5		B1 (by implication) M1
	35 × number of hours + 40	Repeats question	B0

Q	Answer	Mark	Comments
19a	4	B1	
19b	1, 1, 2, 3 or 1, 1, 4, 4 or 1, 2, 3, 4 or 1, 2, 5, 5 or 1, 3, 4, 5 or 1, 3, 6, 6 or 1, 4, 5, 6 or 2, 2, 3, 5 or 2, 2, 5, 6 or 2, 3, 4, 6	B2	Numbers do not have to be in order B1 for any set of 4 **whole** numbers between 1 and 6 with middle two values when ordered that differ by an odd number SC1 for a correct answer that uses **whole** numbers greater than 6 or 0, eg 3, 4, 5, 8 2 × range = (sum middle two values + 1)
	Additional Guidance		
	5, 1, 3, 4		B2
	1, 1, 4, 5		B1
	2, 2, 3, 4		B1
	4, 1, 4, 5		B0
	1, 3, 4, 8		B0
	4, 5, 6, 10		SC1
	0, 0, 1, 1		SC1