GCSE
MATHEMATICS (linear)
4365/1H
Mark scheme

4365
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Final – v1.0

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.

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.
Q	Marks awarded for quality of written communication.
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.
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.
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 $a \leq$ value $< b$
25.3…	Allow answers which begin 25.3 e.g. 25.3, 25.31, 25.378.
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.

Paper 1 Higher Tier

Q	Answer	Mark	Comments
1	Anna Observation or 3 Brian Questionnaire or 1 Carl Controlled Experiment or 2	B2	B1 1 or 2 correct Accept any clear indication such as O, Obs, Experiment If answer line blank, allow correct answers to be written alongside list above for B1 or B2. ie B(rian) by Questionnaire, C(arl) by controlled experiment, A(nna) by Observation.

Additional Guidance. If two answers given on same line, eg 'Controlled experiment/Data logging' written by Carl, then this is choice and marked as a wrong answer, even if one of the choices is correct.

2a	Square, Kite and Rhombus	B2	Any order B1 any two correct

2b	Any valid property that distinguishes the parallelogram from the others eg no right angles diagonals different lengths	B1	Ignore any irrelevant comments but do not allow a wrong comment even if a correct one seen. Any reference to line symmetry must state or imply zero.

Additional Guidance. See list of exemplars.

2c	Diagonals bisect each other	B1	

Q	Answer	Mark	Comments
	Alternative method 1. Scheme if sides found		
3	Any product seen or implied of 2 numbers that make 12 or 15 or 20	M1	
	All three of 3, 4 and 5 stated or marked on diagram	M1dep	
	60	A1	Answer only of 60 with no product seen is 3 marks
	3 × 4 × 5 or correctly evaluated product of their 3 sides, 2 of which must be correct	Q1	Strand (ii) Product must be seen.
	Alternative method 2		
	Any one of 3, 4 or 5 seen on diagram (correctly for the net) or any sides of cuboid	M1	
	Side found and corresponding cross-section identified	M1dep	
	60	A1	Answer only of 60 with no product seen is 3 marks
	Correct side and cross-section multiplied, ie 5 × 12 or 4 × 15 or 3 × 20	Q1	Strand (ii) Product must be seen.

Additional Guidance. Beware of 60 from incorrect work. No incorrect work and answer of 60 is 3 marks.
1 side correct, maximum 1 mark
2 sides correct, maximum 2 marks
Use positive marking.

Q	Answer	Mark	Comments
4(a)	Overlapping responses eg If you did 1 hour what box would you tick? No time frame eg Does not say in how long Missing times eg Not enough time options	B2	B2 any 2 of 3 B1 any 1 of 3

Additional Guidance. Mark as a whole.
Two correct statements and no wrong statements B2
Two correct statements and any wrong statements B1
One correct statement and one wrong statement B1
One correct statement and two or more wrong statement B0

eg **1** No place to mark 5   **2** Doesn't say in how many days   B2

eg **1** No place to mark $1\frac{1}{2}$ or 5   **2** Doesn't say in how many days   B1

eg **1** No place to mark $1\frac{1}{2}$ **2** No place to mark 5   B1

eg **1** No place to mark $1\frac{1}{2}$ or 5   **2** BLANK   B1
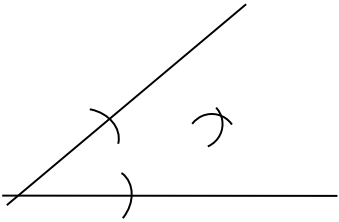
Beware of repeats.
Ignore irrelevant statements.
Do not accept references to question worded wrongly ie 'Do exercise not take it', 'Not referring to Leisure centre', 'Different types of exercise'. Ignore these as irrelevant even if not factually correct.

Q	Answer	Mark	Comments
4(b)	Suitable response section covering 0 to 7, no gaps, no overlap, with at least 4 separate choices	B1	

Additional Guidance. Note that 5+ may have two meanings, ie ≥5 or >5. Allow whichever gives the mark if appropriate.
'Other' is acceptable as a 'catch all' if not all 7 days listed, but not if 0 to 7 already covered, in which case it is overlap.

Q	Answer	Mark	Comments
5	Arc(s) centred on A of lengths within 1 cm of each other crossing both lines, and intersecting arcs centred on the intersection points.	M1	
	Angle bisector from A within tolerance	A1	Must score the M to get the A.

Additional Guidance. Must see arcs on rays, ie no dots as can be measured with a ruler.
Note that using bottom ray as length of arc will have just one arc about 2mm from end of oblique ray. This is same as 'two arcs'.

6	$3x + 6 + 2x - 2$	M1	3 terms correct
	$5x + 4$	A1	Do not award if incorrect further work eg $5x + 4 = 9$, but $5x + 4 = 0$, $x = -0.8$ is OK

7(a)	140 or 4.5 or $4\frac{1}{2}$ or 4.50 or 4 h 30m 50	B3	B1 each Do not accept 4.30

Q	Answer	Mark	Comments
7(b)	Indication that car X passes start at 15, 30, 45, 60 mins or Indication that car Y passes start at 20, 40, 60 mins or 15 for X and 20 for Y	M1	NB time in hours can score M1 ie ¼, ½, ¾ etc.. ¼ for X and $\frac{1}{3}$ for Y.
	60	A1	Answer of 1 hour is M1, A0

Additional Guidance. 60 from wrong work is zero marks but 60 from no work or no incorrect work is full marks.

Q	Answer	Mark	Comments
8(a)	LOBF drawn. Must be a straight line between (15, [110, 120]) to (25, [150, 170])	M1	
	Value read from LOBF at $h = 145$, may be rounded or truncated to nearest integer	A1ft	ft their line ± ½ square SC1 answer in range [21, 23] with M0 scored.

Q	Answer	Mark	Comments
8(b)	Complete answer Correct substitution Correct evaluation and conclusion (See table) or $h = 4f + 60$ drawn and correct conclusion eg B is OK because on line	B2	B1 for correct substitution with incorrect evaluation and correct conclusion for their value B1 for correct substitution with partial evaluation and correct conclusion for their value if it had been evaluated. B1 for correct substitution with correct evaluation and incorrect conclusion for their value. B1 if $h = 4f + 60$ drawn.

Person	Length	Value (calculated, stated)	Conclusion
A	11	104 (108)	No
B	25	160 (160)	Yes
C	18	132 (140)	No
D	28	172 (180)	No
E	15	120 (120)	Yes
F	21	144 (140)	No
G	17	128 (118)	No
H	26	164 (164)	Yes
I	13	112 (100)	No
J	24	156 (150)	No

Q	Answer	Mark	Comments
9(a)	1200	B1	
9(b)	$5\frac{1}{2}$ value after 5th value stated as 1200 and 6th value stated or implied as 1400 or list of 10 values in order with median marked between 1200 and 1400.	Q1	Strand (ii) (1200 + 1400)/2 is Q0 unless list seen or 1200 and 1400 identified as 5th and 6th values
9(c)	Manager's salary is too large or large values distort the mean or majority of employees earn less than the mean	B1	oe eg Mean not representative of the majority Must refer to 'distortion caused by one large salary or a majority of low salaries'.
10(a)	B	B1	
10(b)	G	B1	
10(c)	$(1\frac{1}{2}, 2\frac{1}{2}, 4)$	B2	B1 for two coordinates Accept 1.5, 2.5
11	18 or 618 or 600 × 1.03	M1	
	£12.54 seen or $\frac{3}{100}$ × (their 618 – 200)	M1	oe 418 × 1.03
	£430.54	A1ft	ft on M1, M0 or M0, M1 with no further errors. SC2 436.54 SC1 436 with no working

Additional Guidance. Misread or misinterpretation of 1.3 not 1.03. If correct leads to 754 award 2/3

Q	Answer	Mark	Comments
	Alternative Method 1		
	$4x + 2 = 2x + 7$	M1	Must expand $2(2x + 1)$
	$x = 2.5$	A1	
	Substitution of their 2.5 into any other rod expression	M1dep	
	Lengths of rods 12, 12, 8, 6.5, 5.5, 4	A1	oe eg $2 \times 2.5 + 3$ implies 8
	Shows that $6.5 + 5.5$ and $8 + 4 = 12$ and that there are four sides of equal length	Q1	oe $3 \times 2.5 – 2 + 2.5 + 4 = 12$ Strand (ii) This may be shown as a diagram
	Alternative Method 2		
	$4x + 2 = 2x + 7$	M1	
	$x = 2.5$	A1	
12	$4x + 2$ or $2x + 7 = 12$	M1dep	
	$2x + 3 + 2x – 1$ or $x + 4 + 3x – 2$	A1	
	States that $2x + 3 + 2x – 1 = 4x + 2$ and $x + 4 + 3x – 2 = 4x + 2$ so there are four sides of equal length.	Q1	Strand (ii)
	Alternative Method 3		
	$2x + 3 + 2x – 1 = 4x + 2$ or $x + 4 + 3x – 2 = 4x + 2$	M1	
	$2x + 3 + 2x – 1 = 4x + 2$ and $x + 4 + 3x – 2 = 4x + 2$	A1	
	$2(2x +1) = 4x + 2$	M1dep	
	Explanation that all sides including $2x + 7$ are equal to $4x + 2$	Q2	Strand (ii)

Additional Guidance. Sides stated as 12, 12, 8, 6.5, 5.5 and 4 and conclusion but no algebra, SC2
Sides stated as 12, 12, 8, 6.5, 5.5 and 4 and no conclusion and no algebra, SC1

Q	Answer	Mark	Comments
13(a)	7×10^{-7}	B1	

Q	Answer	Mark	Comments
13(b)	300 000	B1	Allow spurious commas but not full stops

Additional Guidance. Mark answer line for (a) and (b)

Q	Answer	Mark	Comments
13(c)	3.2×10^{9}	B2	B1 for 3 200 000 000 B1 for 32×10^{8} B1 for correct standard form following one error

Additional Guidance. $4 \times 10^{3} \times 8 \times 10^{8} = 42 \times 10^{8} = 4.2 \times 10^{9}$ B1

Q	Answer	Mark	Comments
	Alternative Method 1		
	(1 tea =) 1.20	B1	6T + 4C = 13.20 and 5T + 4C = 12.00
	Substitution of their £1.20 into any equation or 1 cake = £1.50 or 4 cakes = £6	M1	
	9.60	A1	oe ft their tea value when working out total cost
	Correct conclusion based on 3 × their cost of tea plus 4 × their cost of a cake.	Q1	Strand (iii). Do not allow for made up values of T and C.
	Alternative Method 2		
	(1 tea =) 1.20	B1	6T + 4C = 13.20 and 5T + 4C = 12.00
	3T + 4C = £12.00 – £2.40	M1	3T + 4C = £13.20 – £3.60
	9.60	A1	oe ft their tea value when working out total cost
14	Correct conclusion based on subtracting 2 or 3 cups of their tea from original values	Q1	Strand (iii) or £10 – £9.60 = £0.40 so 40p change Do not allow for made up values of T and C.
	Alternative Method 3		
	Sets up a table (oe) ie T C Cost 6 4 13.2 5 4 12.0	M1	or a clear attempt to look for a pattern
	Continues 'table' for 1 more line ie T C Cost 6 4 13.2 5 4 12.0 4 4 10.8	M1	
	Continues 'table' for another line ie T C Cost 6 4 13.2 5 4 12.0 4 4 10.8 3 4 9.6	A1	
	Correct conclusion based on their table. If correct values then conclusion is Yes as cost is £9.60	Q1	Strand (iii)

Additional Guidance. £ signs and £ values to 2dp are not necessary.

Q	Answer	Mark	Comments
15	$y(x + 1)$ or $y \times x + 1$ $(= 3x - 2)$	M1	
	$yx + y = 3x - 2$	M1dep	
	$yx - 3x = -y - 2$ or $x(y - 3) = -y - 2$	M1dep	oe $2 + y = 3x - yx$ or $2 + y = x(3 - y)$ x terms on one side, all other terms on other side. Allow one sign error
	$x = \dfrac{-y-2}{y-3}$ or $x = \dfrac{y+2}{3-y}$	A1	Must have $x =$ SC3 $x = \dfrac{-3}{y-3}$ or $x = \dfrac{3}{3-y}$ Do not award if incorrect further work

| 16(a) | Bar between 2 and 3 to a height of 13
 Bar between 4 and 5 to a height of 19
 Bar between 7 and 10 to a height of 5 | B2 | B1 for bar between 7 and 10 correct |

Additional Guidance. Two of the values, 13 and 19 come straight from the table, so students who draw a 'bar chart' rather than a histogram will get two of the heights correct. This is why they have to get all three bars correct for 2 marks, and the only way they can score 1 mark is to get the bar between 7 and 10 at a height of 5. This mark is independent, so if they mess up the bars for 2 to 3 and/or 4 to 5, for example by misreading scales, then as long as the 7 to 10 bar is at a height of 5 award B1.
Note: Any 'gaps' between bars, eg 2 to 3 being draw from 2.1 to 3 counts as an error.

| 16(b) | 17 and 28 | B2 | B1 for 28 correct |

Additional Guidance. One of the values, 17 comes straight from the histogram, so students who read it as a 'bar chart' rather than a histogram will get one of the entries correct. This is why they have to get both entries correct for 2 marks, and the only way they can score 1 mark is to get the entry for $5 < c \leq 7$ as 28. This mark is independent, so if they mess up the entry for $3 < c \leq 4$ for example 8.5 or 34, as long as the other entry is 28 this scores B1.

| **17** | $\dfrac{60}{360} \times 2 \times \pi \times 12$ | M1 | oe Mark complete method |
| | 4π or [12.56, 12.6] or $\pi 4$ | A1 | NB $4\pi + 24$ is M1, A0

 NB $4\pi \div 2$ implies M0

 12.4 implies M1 |

Q	Answer	Mark	Comments
18	**Alternative Method 1**		
	$(x \pm 3)^2 \pm 9$ or ±7 or ±11 (= 0)	M1	
	$(x \pm 3)^2 = 7$ or 11	M1dep	
	$x + 3 = \pm \sqrt{7}$	A1	
	$-3 \pm \sqrt{7}$	A1ft	ft on one error, ie $3 \pm \sqrt{7}$ or $-3 \pm \sqrt{11}$ SC3 $-3 + \sqrt{7}$
	Alternative Method 2		
	$(x =) \dfrac{-6 \pm \sqrt{6^2 - 4 \times 1 \times 2}}{2}$	M1	Allow one sign error but not partial division or wrong formula
	$(x =) \dfrac{-6 \pm \sqrt{6^2 - 4 \times 1 \times 2}}{2}$	A1	No errors
	$(x =) \dfrac{-6 \pm \sqrt{28}}{2}$ or $\dfrac{6 \pm \sqrt{28}}{2}$ or $\dfrac{-6 \pm \sqrt{44}}{2}$	M1dep	
	$-3 \pm \sqrt{7}$	A1ft	ft on one error, ie $3 \pm \sqrt{7}$ or $-3 \pm \sqrt{11}$ SC3 $-3 + \sqrt{7}$

Q	Answer	Mark	Comments
19	**Alternative Method 1**		
	XYZ = 110 stated or shown **or** *BXZ* = 30 stated or shown	B1	*ABX* and *XZB* = 80
	XYZ = 110 stated or shown **and** *BXZ* = 30 stated or shown	B1	
	40°	B1	Must be from correct work Answer only B1
	Alternative Method 2		
	BZY = 110 stated or shown **or** *BXZ* = 30 stated or shown	B1	
	BXY = 70 stated or shown **and** *BXZ* = 30 stated or shown	B1	
	40°	B1	Must be from correct work Answer only B1

20(a)	$9\sqrt{2}$	B1	

20(b)	10	B1	

21	$(x =) \ 2(x + 1)$ or $2x + 1$ or $\dfrac{1}{2}x \ (= x + 1)$	M1	oe May be seen as an index is $(3^2)^{x+1}$ or $9^{1/2x}$
	–2	A1	Correct answer is 2 marks even if working nonsense or wrong.