



**General Certificate of Secondary Education
January 2013**

Mathematics (Linear)

4365

Paper 1 Foundation Tier 43651F

FINAL

Mark Scheme

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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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.

- 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. (QWC)
- 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 following a mistake in an earlier step.
- SC** Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
- oe** Or equivalent. Accept answers that are equivalent.
eg, accept 0.5 as well as $\frac{1}{2}$

Paper 1 Foundation Tier

Q	Answer	Mark	Comments
1(a)	(0)305, 1505, 5 past 3	B1	oe Ignore any reference to am or pm

Additional guidance

Accept colon, no gap shown, decimal point, comma in time notation

1(b)	Acute	B1	
1(c)	12 25	B3	B2 Answer of 11 25 or 12 40 or (0)9 10 + 3 × 60 + 15 oe B1 10 10 or 11 10 or 12 10 seen or (0)9 25 or 10 25 seen or 3 × 60 + 15 oe All times are oe

Additional guidance

It is valid to add the time intervals in any order because they are asked for the final time and not the intermediate times so, for example, allow 11 25 to come from adding 60 then 15 then 60

11 25 and 12 40 score B2 because they are commonly seen and both only have one error:

11 25 is missing 60 mins and 12 40 has two breaks

The equivalentents for $3 \times 60 + 15$ may be in hours or minutes (condone 3.15 (hours))

Condone any notation (words/ colons/ commas/ gaps etc) for time and ignore any reference to am or pm

If the intermediate times are incorrect, then you need to see the addition of 60 (min) or 1 (h) or 15 (min)

Exemplars

9 10 10 10 11 10 11 35 12 35 will only score B1 because it's not a fully correct method but

9 10 10 10 11 10+15 11 35 12 35 will score B2 because a full method is seen or implied

2(a)	27	B1	
2(b)	10	B1	
2(c)	16	B1	
2(d)	13	B1	

Q	Answer	Mark	Comments
3	3×65 or 195(p) or (£)1.95 or 3×110 or 330(p) or (£)3.30	M1	$65 + 110$ or 175(p) or (£)1.75
	Adds all six items their (3×65) + their (3×110)	M1dep	$3 \times$ their ($65 + 110$)
	No and (£)5.25 or 525p	A1	oe eg She will be 25p short

3 Alt	(£)5 – at least two items eg (£)5 – 220	M1	Cost of items	S			
				0	1	2	3
	Adds up the rest of the six items	M1dep	D	0		220	330
				1	175	285	395
				2	130	240	350
3	195	305		415	525		
No and correct amount of money left and correct cost of remaining items	A1	oe eg No and (£)1.70 and (£)1.95 or No and (£)3.05 and (£)3.30					

Additional guidance

Condone poor or mixed money notation for the first two marks eg $195 + 3.3$

In the alt method there are many possible combinations to get the A1, but their answers will always be within 25p of each other so check this first

4(a)	9	B1	Ignore working which may be for 4(b)
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Q	Answer	Mark	Comments
4(b)	5 7 (9) 9 10	B1	Numbers arranged in ascending or descending order and a clear indication that 9 is the middle number or A clear and complete statement that 9 is the middle number when you arrange them in order

Additional guidance

Any incorrect working eg wrong order/ wrong numbers/ selecting both 9s or $(9 + 9)/2$ is B0
 A clear indication of 9 being the middle could be eg by eliminating the numbers either side in the ordered list
 If there is an explanation rather than a demonstration, then both parts of the explanation are needed
 ie 9 is the middle number is not enough

5	T, T, F, T	B3	B2 3 correct B1 2 correct
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6(a)	F	B1	
	Square	B1	

6(b)	9	B1	
	cm ²	B1	

7(a)	Bar of height 4 labelled Coffee or C and Bar of height 5 labelled Juice or J (in either order but with a gap of 1 square between all bars)	B2	B1 One of the bars labelled and correct or B1 Diagram fully correct but missing or incorrect label(s) or B1 Diagram fully correct but no gaps or incorrect gaps

Additional guidance

If in doubt please escalate the clip

7(b)	7 (boys)	B1	
	their 7 – 4	M1	Subtraction may be implied by correct ft answer of their 7 – 4
	3	A1ft	ft B0M1 but must be integer answer for A1

Additional guidance

The 7 may be seen on the answer line for B1 and condone even if says 7 more boys
 If they misread the table for girls ie use 5, 7 or 9 girls then can award up to max of B1M1A0
 4 – 7 is acceptable for B1M1 and if it is followed by 3 will gain all the marks
 Answer only is full marks

Q	Answer	Mark	Comments
8(a)	15	B1	
8(b)	$30 \div 6 (= 5)$ or $30 \div 3$ or $(15 -) \frac{15}{3}$ or $15 \div 3 (\times 2)$	M1	oe eg $360 \div 30 (= 12)$ and $(180 - 60) \div$ their 12 eg $180 - 60 (= 120)$ and $\frac{\text{their } 120}{360} \times 30$ may be using their (a) for 15 (but not an angle)
	10	A1ft	ft their (a) – 5 or their (a) $\div 3 \times 2$ but must be integer answer for A1

Additional guidance

An answer of 5 would score M1

In the live marking you can scroll up to the pie chart and their answer to part (a) so that you can follow through

Please check the diagram and part (a) for any relevant working

Q	Answer	Mark	Comments
*9	Decimals		
	$(\frac{1}{10} =) 0.1$ or $(11\% =) 0.11$	M1	
	$(\frac{1}{10} =) 0.1$ and $(11\% =) 0.11$	A1	oe
	Converting $\frac{1}{10}$ and 11% to decimals with at least one right and arranging in correct ft order for their decimals	Q1	Strand (ii) SC1 $\frac{1}{10}$, 11%, 0.2 with no working

*9 Alt 1	Percentages		
	$(\frac{1}{10} =) 10(\%)$ or $(0.2 =) 20(\%)$	M1	
	$(\frac{1}{10} =) 10(\%)$ and $(0.2 =) 20(\%)$	A1	oe
	Converting $\frac{1}{10}$ and 0.2 to percentages (both with percentage signs) with at least one right and arranging in correct ft order for their percentages	Q1	Strand (ii) SC1 $\frac{1}{10}$, 11%, 0.2 with no working

*9 Alt 2	Fractions		
	$(0.2 =) \frac{2}{10}$ or $(11\% =) \frac{11}{100}$	M1	oe fraction
	$\frac{10}{100}$ and $\frac{20}{100}$ and $\frac{11}{100}$	A1	oe three correct fractions with common denominator
	Converting all numbers to fractions with a common denominator with at least one numerator right and arranging in correct ft order for their fractions	Q1	Strand (ii) SC1 $\frac{1}{10}$, 11%, 0.2 with no working

Additional guidance

The first mark is for any one correct conversion to another form

For Q1 the answer may be with the numbers in the original or converted format (or a combination)

The fractions in Alt 2 may contain decimals eg condone $\frac{1}{10}$, $\frac{2}{10}$, $\frac{1.1}{10}$ for M1A1 (and, if ordered, for Q1)

No working – can score SC1

Q is dependent on at least M1

10(a)	54.32	B1	
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Q	Answer	Mark	Comments
10(b)	Listing the positions of hurdles		
	Listing at least 3 'hurdles' eg 45, 80, 115, ... or 35, 70, 105, ... or 85, 120, 155, ... or 355, 320, 285, ...	M1	oe Condone 1 error
	Complete list eg 45, 80, 115, 150, 185, 220, 255, 290, 325, 360, (400) or 85, 120, 155, 190, 225, 260, 295, 330, 365, (400) or 400, 355, 320, 285, 250, 215, 180, 145, 110, 75, 40, (0)	M1dep	oe Ascending or descending with max 1 error (may be more if cumulative)
	10	A1	SC1 10 with M0M0

10(b) Alt 1	Adding consecutive distances		
	Adds at least 3 consecutive distances 45 + 35 + 35 + ... or 35 + 35 + 35 + ... or ... + 35 + 35 + 40	M1	oe eg 45 + 70 + ...
	Complete method shown with 9 lots of 35 ie 45 + 35 + 35 + 35 + 35 + 35 + 35 + 35 + 35 + 35 + 40 with total in range (370, 430)	M1dep	oe
	10	A1	SC1 10 with M0M0

10(b) Alt 2	$400 - (45 + 40) (= 315)$	M1	
	their $315 \div 35$ or $35 \times 9 = 315$	M1dep	315, 280, 245, 210, 175, 140, 105, 70, 35, (0) in either order and allow 1 error (may be more if cumulative)
	10	A1	SC1 10 with M0M0

Additional guidance

Question says you must show your working so answer only of 10 scores SC1

An answer of 10 requires a completely correct full method with no errors or omissions for 3 marks

There are lots of equivalents to all three schemes so you will need to use your judgment

Some answers are a combination of two schemes eg $45 + 35 + 35 = 115$, $115 + 35 + 35 = 185$ etc but if you only see one error in a full method then award M2

Q	Answer	Mark	Comments
11	2×11 and 3×5 or 22 or 15	M1	oe
	37	A1	

Additional guidance

$2 \times 11 = 22a$ and $3 \times 5 = 15b$ is M1 because correct method seen first

$22a + 15b$ is M0 because no correct method seen

37 followed by further work with algebra eg $37ab$ is M1A0, but just $37ab$ is M0A0

$2(11) (+) 3(5)$ is M0 unless further correct work seen

*12	$\frac{10}{100} \times 200$ oe or 20 seen	M1	$\frac{90}{100} \times 200$ oe or 180 is M2
	200 – their 20 or 180 seen	M1dep	
	6	A1	
	Method shown for 90% of 200 and dividing their result by 30	Q1	Strand (iii)

*12 Alt	$\frac{200}{30}$ or $\frac{20}{3}$	M1	oe
	$\frac{10}{100} \times$ their $\frac{200}{30}$ or $\frac{2}{3}$	M1dep	oe
	6	A1	
	Method shown for dividing by 30 and finding 90% of their result	Q1	Strand (iii)

Additional guidance

Correct method with arithmetic error(s) is likely to score M2A0Q1

The **Q mark** needs a method that leads to 90% shown (not just 180 seen) **and** the division shown

Answer of 6 only is M2A1Q0

180 seen, then answer of 6 scores M2A1Q0

20, 180 and 6 is Q0

but 20, 180 and $\div 30$ all seen scores Q1

and $(200 - 20) / 30$ scores Q1

If build-up or build-down is used for 90%, it needs to be complete and either correct or **full** method shown

Exemplars

$10\% = 20$, $90\% = 140$ is M1M0 because 140 is incorrect and the full method is not shown

$10\% = 20$, $90\% = 9 \times 20 = 140$ is M1M1 as method shown

$10\% = 2$, $90\% = 18$ is M0M0 because 2 is incorrect and the full method is not shown

$10\% = 200 / 10 = 2$, $90\% = 18$ is M1M1 as method is shown and 18 is ft correct

Q	Answer	Mark	Comments
13	3	B2	B1 8 seen as value of X for Set A or 3 seen as value of X for set A but different value for set B

Additional guidance

Condone 3 from ambiguous working eg $7 - 4 = 3$, $5 - 2 = 3$

The 8 or the 3 for B1 may be embedded eg $7 - 4 = 3$ or $4 + 4 = 8$

14	27	B1	
	81	B1ft	ft their 27×3 Answers must be evaluated

15(a)	75	B1	
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15(b)	$(27 - 5) \div 2$	M1	Condone omission of brackets
	11	A1	
	3	B1ft	ft (their $11 - 5) \div 2$ if A0 awarded SC1 -0.75 SC1 24.5 and 22

Additional guidance

$(27 \div 2 - 5 = 8.5, 8.5 \div 2 - 5 =)$ -0.75 scores SC1

$27 - (5 \div 2) = 24.5, 24.5 - (5 \div 2) = 22$ scores SC1, but 22 alone does not score SC1

If 11 is wrong then check for follow through eg $27 \rightarrow 12 \rightarrow 3.5$ scores M0A0B1ft

$(27 - 5) \div 2 = 12$ and 3.5 scores M1A0B1ft

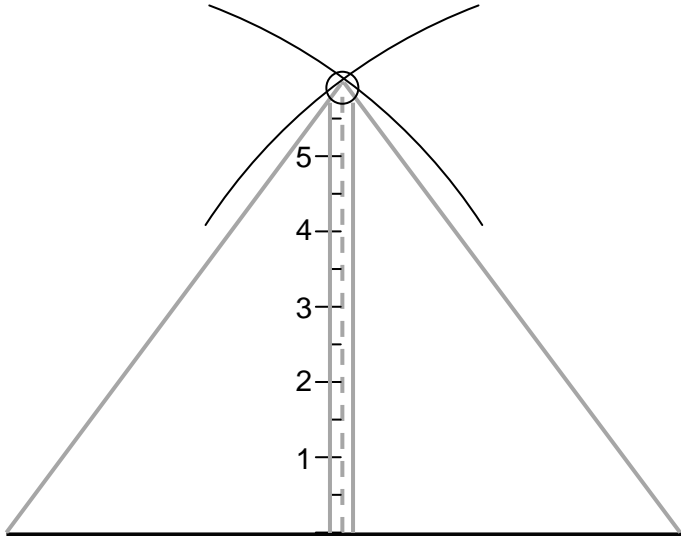
Ignore further working and award full marks if an attempt at further terms is made after term of 3 seen

If 3 is embedded, award M1A1B0

3, 11, 27 on answer line by any scheme is 3 marks

15(b) Alt 1	$2x + 5 = 27$	M1	
	11 or $2(2x + 5) + 5 = 27$ oe or $(27 - 15) \div 4$	A1	
	3	A1	

15(b) Alt 2	Two fully correct trials eg any two of $u_1 = 1, u_2 = 7, u_3 = 19$ $u_1 = 2, u_2 = 9, u_3 = 23$ $u_1 = 4, u_2 = 13, u_3 = 31$ $u_1 = 5, u_2 = 15, u_3 = 35$	M1	
	Fully correct trial with first term 3 ie $u_1 = 3, u_2 = 11, u_3 = 27$	M1Dep	
	3	A1	

Q	Answer	Mark	Comments
16	Isosceles triangle with base on 9 cm line and vertex within 2 mm (ie in the circle on the overlay)	B2	B1 for any isosceles triangle on the base with vertex within 2 mm of centre line or B1 for any side 7.5 cm long \pm 2 mm or any arc 7.5 cm drawn \pm 2 mm or 7.5 (cm) seen
	No and 1.2 (m) or 120 (cm) or No and 6 (cm) and 6.4 (cm)	B1ft	ft the vertical height of their triangle Jack's height accurately drawn \pm 2 mm on diagram and a decision stated or Vertical height of their triangle may be stated and compared to Jack's scale height ie [6.2, 6.6]
			

Additional guidance

Note that you can swap the overlay for a ruler or a length measurer but you need to do so each clip
The overlay is only 6 cm high so if their triangle is taller you need to judge whether it is within 2 mm of the centre line

Condone lack of arcs for all three marks

Drawing Jack's height as 6.4 (\pm 2 mm) may be used for comparison (use the length measurer to check it)

An answer of No and [1.16, 1.24] with a diagram is likely to be all 3 marks

NB Must have a diagram to score the final mark

Q	Answer	Mark	Comments
17(a)	Line from (0800, 0) to (0930, 60)	B1	Line need not be straight ± 1 small square
	1 cm horizontal line from their (0930, 60) or horizontal line ending at 1000	B1ft	± 1 small square
	Line from (1000, 60) to meet the time axis between (1106, 0) and (1118, 0) inclusive or line from their (1000, 60) down 6 cm and across 2.4 cm oe	B1ft	Line need not be straight ± 1 small square
17(b)	Correct ft decision and reference to their graph or correct ft decision and correct ft time (± 6 minutes) read from their graph	B1ft	Must be from a line that meets the time axis at least 6 mins after their 1000
17(b) Alt	Correct ft decision and calculation of home time eg 60 miles at 50 mph = 1.2 hours 1130 is 1.5 hours after 10 or 10 + 1.2 hours = 1112	B1ft	ft from their 1000

Additional guidance – exemplars

These are B1:

Yes as he gets home at 11 10 (11 10 within one small square of his graph)

Yes he will see the show, I've shown it by my graph (line ends before 11 30)

Yes my graph shows that Dan gets home by 11 30 (line ends at (11 12, 0))

No, see my graph (line ends after 11 30)

Yes as after an hour, he has 10 miles to do at 50 mph which will take less than half an hour

Yes as he gets home at 1024 B1 ft mark (line ends at (1024, 0))

No as he gets home at 11 45 (line ends at 11 48 so within 6 minutes)

Yes my graph shows he gets home at 11 30 (line ends at 11 30)

No my graph shows he gets home at 11 30 so he'll miss the first few minutes (line ends at 11 30)

These are B0:

Correct graph in (a) then Yes he does get home by 11 30 (no reference to graph made)

Yes 50mph = 50 miles every hour. After 1 hour, 10 miles from home which equals 11 00 (incomplete)

He gets home at 11 12 (no decision made)

Yes he gets home at 11.2 (incomplete eg needs to compare 11.2 with 11.5 or convert 11.2 correctly)

Q	Answer	Mark	Comments						
18	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>4</td> <td>12</td> <td>10</td> </tr> <tr> <td>15</td> <td>5</td> <td>6</td> </tr> </table>	4	12	10	15	5	6	B3	<p>B2 12 and/or 10 in correct position and any product that makes 60 in first column (not using 5 or 6)</p> <p>B1 12 and/or 10 in correct position or any product that makes 60 in first column (not using 5 or 6)</p>
4	12	10							
15	5	6							

Additional guidance

Condone missing or incorrect 26s and 60s

Exemplars

20	10	12	scores B1
3	5	6	

$2\frac{1}{2}$	12	10	scores B2
24	5	6	

19	Kite either horizontal or vertical with long diagonal 6 cm and short diagonal 4 cm	B2	B1 for any kite Condone a square using the given side or an arrowhead for B1
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Additional guidance

Assume lines are intended to be straight

20	$4n$	M1	Accept $4 \times n$ or $n \times 4$ but not $n4$
	$4n + 2$	A1	<p>oe</p> <p>eg $4 \times n + 2$</p> <p>$3n + n + 2$</p> <p>$2(2n + 1)$</p> <p>SC1 $n4 + 2$</p>

*21a	Open circle at -2 with line going right to at least 4 or arrow (of any length) to the right	Q1	Strand (i) If line is marked with any sort of circle at the RHS this is Q0
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Q	Answer	Mark	Comments
21b	$3x \leq 11 - 5$ or $3x \leq 6$ or $x - 2 \leq 0$	M1	Working with = sign must be recovered to \leq to gain any credit
	$x \leq 2$	A1	Must have $x \leq$ on answer line SC1 $x < 2$

Additional guidanceJust ≤ 2 scores M1A0 $x \leq 2$ seen in working, then incorrect answer is M1A0Any inequality that is one step away from the correct answer is M1 eg $x + 1 \leq 3$ Embedded answer $3 \times 2 + 5 \leq 11$ is M0 unless further creditworthy workAny slight error in notation eg $x \leq 2$ or $x = \leq 2$ is M1A0

22	$\pi \times 10^2 \times 4$	M1	
	$\pi \times 100 \times 4$ or $3.1 \times 100 \times 4$ or 31×40 or 124×10	A1	Any of these products or better Condone use of 3.14 or 3.142 or $\frac{22}{7}$
	1240	A1	Accept 1256 or 1256.8 or 1257.(...) or 1260

Additional guidanceFurther working eg $\div 10$ or $\div 2$ means an incorrect method has been used so M0To get the first A1 the student must show that $10^2 = 100$ which may be done as two products using 10