GCSE MARKING SCHEME

MATHEMATICS - LINEAR

NOVEMBER 2014

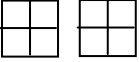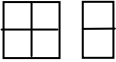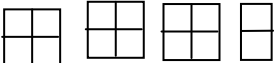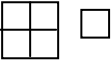# INTRODUCTION

The marking schemes which follow were those used by WJEC for the November 2014 examination in GCSE MATHEMATICS - LINEAR. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

GCSE Mathematics - Linear Paper 1 (Non calculator) Foundation Tier November 2014	Marks	Final Mark Scheme Comments
1. (a) (i) 52004	B1	
(ii) six million **(and)** seven hundred thousand	B1	**Accept six point seven million**
(b) (i) 36 and 44	B1	
(ii) 37	B1	Allow 37+46 etc as long as 37 seen
(iii) 56	B1	
(iv) 81	B1	
(c) (i) 79600	B1	
(ii) 80000	B1	
(d) 1, 2, 3, 4, 6, 12	B2	B1 for at least 4 correct factors with at most 1 incorrect number. Ignore repeated numbers Accept answers written in the form 1×12, 2×6, 3×4
(e) 15/2.97 OR 15/3	M1	Using a repeated addition method (or multiplication) only gets M1 if it shows trying to get the most for £15. £14.85 gets M1 A0.
= 5	A1	Note: We condone 3/15 =5 and award M1,A1. If their answer is incorrect, such as 3/15 = 4 then award M0,A0.
	12	
2. (a) 7 hundred(s) OR 700 OR hundred(s)	B1	**Do not accept 100**
(b) 23 OR 29	B1	
(c) (Disha spends) **(£)**5.60 **OR 560 (p)**	B1	
(Number of pineapples =) 560/80	M1	
= 7 (pineapples)	A1	
Look for		
• spelling	QWC 2	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.
• clarity of text explanations,		
• the use of notation (watch for the use of '=', £, p)		
		QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar
QWC2: Candidates will be expected to		
• present work clearly, with words explaining process or steps AND		OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar.
• make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer		
QWC1: Candidates will be expected to		QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar
• present work clearly, with words explaining process or steps OR		
• make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	7	
3. (a) Delivery charge = $250 - 5 \times 40$	M1	Correctly substituted shown by correct attempt to evaluate.
Delivery charge = (£)50	A1	
(b) Number of days = (350 – 30)/40	M1	For correct substitution with subtraction
= 8 (days)	A1	Allow embedded references to the correct answer.
	4	

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GCSE Mathematics - Linear Paper 1 (Non calculator) Foundation Tier November 2014	Marks	Final Mark Scheme Comments
4. (a) E AF AS AM AU	B1 B1 B1 B1	**Penalise −1 once only for contiguous or fragmented symbols** **For Africa AND America**. Accept other configurations of the 2 squares, **for example** Accept other configurations of the 3 squares **for example**
(b) Both axes labelled, e.g. frequency along one axis and Europe (E), Africa (AF), Asia (AS), Americas (AM), Australasia (AU), along other axis - anywhere within the base (inc.) of the corresponding bar.	B1	Accept 'Number' OR 'Athletes' for frequency.
Uniform scale for the frequency axis starting at 0.	B1	If no scale then B0 and allow one 2 cm square to represent 10. Same applies to any other consistent recognisable scale. For example one 1cm square to represent 10 consistently.
Five bars at correct heights (bars must be of equal width).	B2	B1 for any 3 or 4 correct bars.
(c) (The) America(s) OR (AM)	B1	Accept 70 and (The) America(s) OR (AM), but B0 for 70 only.
(d) 30/200 OR 3/20 **OR 15%** OR equivalent **I.S.W.**	B2 11	B1 for 200, B1 for a correct numerator on F.T. in a fraction <1. Penalise -1 for incorrect notation, e.g. '30 out of 200', '30:200'

5. (a) Missing side segments = 4
    Perimeter = 7+3+7+4+3+7+3+4+7+3
 	
                  = 48 (cm)
	S1
	M1
	
	A1
		May be implied by correct working.
		Attempt to add **all** sides of the shape. **M0 if 7 OR 3 used instead of 4**
		C.A.O.

(b) Area = $3 \times 7 \times 3$
                = 63
                      cm^2
	M1
	A1
	U1
	6
		OR equivalent
		C.A.O.
		Independent of all other marks.

6. (a) (−3,1)
    (b) 3
    (c) (−1, 2)
	B1
	B1
	B2
	
	4
		Accept (3, ...)
		B1 for any point with coordinates that add up to 1 with one negative.
		B0 for (x −1, y 2) but B1 for x= -1, y=2

7. 25% of 20 = 5 John and Denise share 15 cubes Maximum for Denise = 7	B1 B1 B1 3	**May be indicated on the diagram** F.T. '20 − their 5' F.T. 'their 15' if possible. **For example, suppose John and Denise share 14 cubes then maximum for Denise is 6 (with John 8).**
8. There are 5 (red biros) Red biros cost = 225(p) OR (£)2.25 3 black biros costs 75(p) Each costs = 25 (p)	B1 B1 B1 B1 4	F.T 'their 5' $\times$ 45 evaluated correctly (provided 'their 5'$\neq$ 3) F.T. '£3 - their 225' evaluated correctly F.T. 'their 75' ÷ 3. **B0 for 0.25p**

GCSE Mathematics - Linear Paper 1 (Non calculator) Foundation Tier November 2014	Marks	Final Mark Scheme Comments	
9. (a) $x + 3y$	B2	B1 for the x OR (+) 3y	
(b) $5t = 15$	B1		
$(t =)$ 3	B1	F.T from one error. Accept embedded answers.	
(c) 4	B2	B1 for the −6 OR (+)10. **−6p +10q gets B0.**	
	6		
10. **Use Overlay** Correct use of the scale on any line OR First correct line	B1	**For any 1 correct line drawn OR All 3sides 8cm,10cm and 12cm corectly calculated.** **Arcs must be shown.**	
Method for finding intersection of the other 2 sides Completed drawing	M1 A1	Allow B1, SC1 if their triangle is within the tolerances of the overlay but no arcs shown.	
	3		
11. (a) (0).13 +(0).14 + (0).04	M1		**NOTES:**
(0).31 OR equivalent, e.g. 31%	A1		(1) There is no F.T. for the use of any probabilities outside the range 0 to 1 inclusive.
(b) (0).31 of 200	M1	F.T 'their 0.31'	(2) Penalise −1 once only for consistent use of words such as "31 out of 100", "31 in 100" OR "31:100".
= 62	A1	62 out of 200 gets M1, A1 $\frac{62}{200}$ gets M1, A0.	(3) When fraction and wrong notation seen, DO NOT penalise wrong notation.
(c) $200 \times 70p - 62 \times £1.50$ $(=140 - 93)$	M1	F.T. 'their 62', OR rounded up or down figure. **OR** **Profit =** **138×70(p)−62×80(p)** **= (£)96.60 - (£)49.60** **= (£)47**	(4) If incorrect reduction of fractions, then give the full marks at that point, but if they go on to use the incorrect fraction in part (b), penalise −1.
Profit =(£)47 OR 4700 (p)	A1		
	6		
12. (a) $\angle ABC = 46$ (°) $x = 180 - 46(°) - 59(°)$ OR $180 - 105(°)$ $x = 75(°)$	B1 M1 A1	Look at diagram also	
(b) Interior angle = 55 $360 - 117 - 141 - 55$ OR $360 - 313$	B1 M1	55 on its own gets this B1, even as y = 55. Angle sum of quadrilateral. Note that $360 - 117 - 141 - (180 - 125)$ is equivalent to $180 + 125 - (117 + 141)$	
$y = 47$ (°)	A1	For finding 4th angle. Also look in their diagram. F.T. 'their 55'	
	6		
13. (a) 11:47	B1		
(b) $14:19 - 13:25$	M1	**For the intent to subtract 13:25 from 14:19**	
$= 54$ minutes	A1		
	3		
14.	M1	For a method that produces 2 prime factors from the set {2, 2, 2, 2, 3, 5 } before their second error. If their 2nd prime and 2nd error occur at the same 'level' then allow M1.	
2, 2, 2, 2, 3, 5	A1	C.A.O. for the six correct factors. (Ignore 1s).	
$2^4 \times 3 \times 5$	B1	F.T. their answer if at least one index form used with at least a square. Ignore prime number requirement for this B mark. Use of brackets $(2^4)(3)(5)$ OR dot $2^4.3.5$ gets the B1. The inclusion of any 1s as factors, for example, $2^4 \times 3 \times 1 \times 5$ in their index form gets B0. Note that $2^4 \times 3^1 \times 5^1$ gets B1.	
	3		

GCSE Mathematics - Linear Paper 1 (Non calculator) Foundation Tier November 2014	Marks	Final Mark Scheme Comments
15.(a) Reflection (in) y = 1 OR rotation 180° about (-4, 1) OR rotation 180° about origin or (0, 0) followed by translation $\begin{pmatrix} -8 \\ 2 \end{pmatrix}$ OR **or enlargement -1 with centre (-4, 1)** **OR equivalent .** (b) Correct rotation B1 **H1**	E2 (b) B2	Do not accept informal or imprecise language such as 'flipped' or 'mirror' or 'translation' for E2 E1 for 'rotation' or ('turn around') 180° with (-4, 1) indicated, OR 'reflection' and an attempt to indicate a horizontal line (accept incorrect lines) or reflection in x=1, OR for 'flipped in y=1' 'mirror in y=1' but do not allow 'flipped' or 'mirror' with y=1 drawn but not described, OR E1 for rotation 'about (0, 0)' or '180°' and translate $\begin{pmatrix} -8 \\ 2 \end{pmatrix}$. B1 for anticlockwise 90° about the origin **(2nd diagram)** OR 90° clockwise about origin of triangle B **(3rd diagram)**
(c) Correct enlargement	B2 6	B1 for any 3 correct vertices **OR completely correct with a different scale factor (≠1)**
16.(a) Use of distance /time (35/2.5) 35/2.5 14(mph) (b) 10(kg) **or 11(kg)** (c) (In Glasgow time flight arrives San Francisco at) 13:40 add 4h 25 min add 13 h (7:05 on Thursday/next day) (To find San Francisco time) subtract 8 h Day Wednesday Time 23(:)05 **OR 11:05 pm** **OR 11:05 Wednesday night** **OR equivalent** **H4**	B1 B1 B1 B1 M1 M1 A1 7	For example, accept 35/2.3**(0) or 35/150** *An answer of 15.2…. implies this first B1* C.A.O. *Alternative: 70÷5 B2 then 14(mph) B1, or* *35/5 = 7 with 7+7 B2, then 14(mph) B1* *(35/7 is insufficient to convince distance/time)* All times and periods and attempt addition forward May be in stages. Accept 4.25 as indication of 4hr 25mins Intention 8 hours back from their intention of addition of 4h 25min or 13 h to 13:40 CAO An answer of 23:05 without stating Wednesday is M1, M1, A0. Allow 23(:)05 pm, but do not allow 23(:)05 am Accept 11(:)05 pm. Allow 11(:)05 Wednesday night

17. (a) **(5x –12 =)** 3x+18
    5x –3x = 18+12   or   2x=30
                x=15
 	
(b) 9x < 72 or x < 72/9 **OR 9x < 77 - 5**
      x < 8
 	
H2c&d
	B1
	B1
	B1
	
	M1
	A1
	
	5
		For clearing the bracket correctly. FT until 2nd error.
		
		If FT leads to a whole number, answer must be given as whole number, otherwise allow as an improper fraction
		
		A0 for a final answer 'x=7', however ignore continuation to state x = 7, 6, 5, … with x<8 seen award A1
		No marks for use of "=" throughout, unless finally replaced to give x<8 then award M1 A1.
		SC1 for x<82/9 ISW

18. Area triangle ADC ½ ×12×AD = 60 or equivalent
                AD = 10 (cm)
   Area triangle XBC = ½ × 2.5× AD
 	
                12.5 (cm²)
 	
H6
	M1
	A1
	M1
	
	A1
	
	4
		
		FT 'their AD' and/or FT consistent use of 'their area formula'.
		
		Alternative:
		(Using ratio of base) Area XBC = 60 ×2.5/12 M1, A1, M1
		* = 12.5(cm2) A1*
		OR in parts: 60/12 M1 (NOT labelled AD)
		* = 5 A1*
		Area 2.5 × 5 M1
		* = 12.5(cm2) A1*

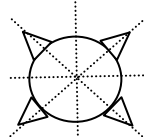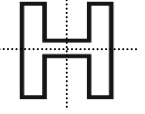| GCSE Mathematics - Linear Paper 1 Higher Tier November 2014	Marks	Final Mark Scheme Comments

1.(a) Reflection (in) y = 1 OR rotation 180° about (-4, 1)
OR rotation 180° about origin or (0, 0) followed by
translation |-8 | or enlargement -1 with centre (-4, 1)
   | 2 | or equivalent
	E2	Do not accept informal or imprecise language such as
		'flipped' or 'mirror' or 'translation' for E2
		E1 for 'rotation' or ('turn around') 180° with (-4, 1)
		indicated, OR 'reflection' and an attempt to indicate a
		horizontal line (accept incorrect lines) or reflection in x=1,
		OR for 'flipped in y=1' or 'mirror in y=1' but do not allow
		'flipped' or 'mirror' with y=1 drawn but not described, OR
		E1 for rotation 'about (0, 0)' or '180°' <u>and</u> translate |-8|
		   | 2|

(b) Correct rotation	B2 4	B1 for anticlockwise 90° about the origin OR 90° clockwise about origin of triangle B
2. (a) x = 36×4/3 or 3x = 144 or x/4 = 12 or x = 12×4 x = 48	B1 B1	Accept embedded answers in parts (a), (b) & (c) Do not accept 3x = 36×4, or x/4 = 36/3 FT from 1 error in calculation to allow maximum B0, B1 An answer of x = 144/3 is B1, B0 as this must be evaluated
(b) x = ½ or 0.5 or 9/18 or equivalent	B1	Mark final answer

(c)   (5x − 12 =) 3x + 18
     5x − 3x = 18 + 12   or   2x = 30
                             x = 15
	B1
	B1
	B1
		FT until 2nd error
		
		If FT leads to a whole number, answer must be given as
		whole number, otherwise allow as an improper fraction

(d) 9x< 77 − 5 or 9x < 72 or x < 72/9 x<8	M1 A1	A0 for a final answer 'x=7', however ignore continuation to state x = 7, 6, 5, ... with x<8 seen award A1 No marks for use of "=" throughout, unless finally replaced to give x<8 then award M1 A1. *SC1 for x<82/9 ISW*
(e) x > 45/4 or x>11.25 or x> 11¼ 12	M1 A1	Or sight of 4×11 = 44 with 4×12 =48 Accept unsupported 12, or a unique answer of 12 from a trial and improvement method. Do not accept x>12 or x ≥ 12
(f) 100x³	B1 11	
3.(a) Prime numbers are 5, 7 and 11 Sum 23	B2 B1	B1 for sight of any 1 correct division by a prime number leaving no remainder before 2nd error, OR for a correct evaluation of the product of a trial of any 3 prime numbers FT sum of 3 **PRIMES** provided previous B1 awarded <u>**and**</u> provided their product of 3 primes is >100
(b) HCF 8 or 2 × 2 × 2 or 2³ HCF 2³	B2 B1 6	B1 for sight of factors of 24 : 2, 2, 2, 3, OR for sight of factors of 40 : 2, 2, 2, 5, OR for sight of factors 8, 3 and 8, 5 (may be in working) without implication of 8 as HCF *B0 for factors 4, 6 and 4, 10* FT for their HCF provided index notation required and used correctly. *Do not accept as embedded in product of factors of 24 and 40, needs to be as identified HCF*

GCSE Mathematics - Linear Paper 1 Higher Tier November 2014	Marks	Final Mark Scheme Comments
4.(a) Use of distance /time (35/2.5)	B1	For example, accept 35/2.3(0) or 35/150 *An answer of 15.2…. implies this first B1*
35/2.5	B1	
14(mph)	B1	CAO *Alternative: 70÷5 B2 then 14(mph) B1, or* *35/5 = 7 with 7+7 B2, then 14(mph) B1* *(35/7 is insufficient to convince distance/time)*
(b) 10(kg) or 11(kg)	B1	
(c) (In Glasgow time flight arrives San Francisco at)	M1	All times and periods and attempt addition forward
13:40 add 4h 25 min add 13 h (7:05 on Thursday/next day)		May be in stages. Accept 4.25 as indication of 4hr 25mins
(To find San Francisco time) subtract 8 h	M1	Intention 8 hours back from their intention of addition of 4h 25min *or* 13 h to 13:40
23(:)05 on Wednesday (same day)	A1	CAO An answer of 23:05 without stating Wednesday is M1, M1, A0. Allow 23(:)05 pm, but do not allow 23(:)05 am Accept 11(:)05 pm. Allow 11(:)05 Wednesday night
Look for: • spelling • clarity of text explanations, where and in which time zone Glasgow or San Francisco • the use of notation and units	QWC 2	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.
QWC2: Candidates will be expected to • present work clearly, maybe with diagrams and words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer		QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar.
QWC1: Candidates will be expected to • present work clearly, maybe with diagrams and words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer		QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.
	9	
5.(a) CD length is 10cm (±2mm) and attached to DE at D	B1	
Arcs to show construction of 60° and bisection arcs to show 30° constructed, tolerance ±2°	B2	B1 for the appropriate arcs and construction of 60°(±2°)
Accurate measure of their DE (±2mm)with intention ×4	M1	*Approximately 6cm*
..… cm	A1	Units must be given. FT their DE×4 evaluated correctly *Approximately 24cm*
(b) Measures either <GFE (107°) **and** <FGH (73°) or <FEH (102°) **and** <GHE (78°) or an appropriate pair of alternate angles, to accuracy ±2°	B1	Measures alternate or corresponding angles for a straight line intersecting with a pair of parallel lines
Conclusion that it is safe with reason based on parallel lines alternate, (corresponding) or allied angle facts	E1	<u>STRICT</u> FT for the conclusion **appropriate** for their angles, i.e. sum 180° conclusion would be parallel, otherwise not Do not accept informal terminology e.g. 'z angles'. A statement of 180° is insufficient.
	7	

GCSE Mathematics - Linear Paper 1 Higher Tier November 2014	Marks	Final Mark Scheme Comments
6. Area triangle ADC ½ ×12×AD = 60 or equivalent AD = 10 (cm) Area triangle XBC = ½ × 2.5× AD 12.5 (cm^2)	M1 A1 M1 A1 4	FT 'their AD' and/or FT consistent use of 'their area formula' *Alternative:* *(Using ratio of base) Area XBC = 60 ×2.5/12 M1, A1, M1* * = 12.5(cm^2) A1* OR *in parts: 60/12 M1 (**NOT** labelled AD)* * = 5 A1* *Area 2.5 × 5 M1* * = 12.5(cm^2) A1*
7.(a) Intention to multiply throughout by a multiple of 20 OR correct common denominator for LHS 5(20 + 3x) + 4(5 − x) = 5×13 or equivalent 11x = -55 or x = -55/11 x = -5 (b) (x − 8)(x − 2) x = 8 **and** x = 2	M1 M1 A1 A1 B2 B1 7	Intention evidence of at least 2 of the 3 terms LHS must have denominator of 1 FT provided M1 awarded B1 for (x … 8)(x … 2) FT for their pair of brackets
8.(a) 14 and 14 (b) Suitably labelled uniform scales **on** both axes At least 3 points plotted accurately All 5 points plotted accurately and joined with a **curve** (c) (0, 2) or follow through from their graph (d) y = 2x + 5 drawn accurately & intersecting the curve Coordinates of both points of intersection	B1 B1 M1 A1 B1 B2 B1 8	 FT from (a) Plots reasonable for the scale and the intention for the curve to pass through all of the points plotted FT from (b), including intersecting 'their curve' B1 for a <u>straight line</u> intersecting the curve **twice** with either the gradient or the intercept correct <u>with</u> gradient >0 FT reasonable for their graphs provided 2 points of intersection, provided at least B1 previously awarded in (d)
9.(a) Idea, P(at least 1 six) = 1 − P(no sixes) = 1 − 5/6 × 5/6 = 11/36 (b)(i) 	M1 M1 A1 B1 B1 B1 	OR alternative full method, e.g. 2-way table with 36 outcomes, or 36 outcomes of 2 throws listed, or tree diagram with correct probabilities on the branches Must be calculations that could lead to a correct answer P(2 sixes) + P(1 six & 1 not-six) OR 2-way table with the possible 11 outcomes indicated, or list with 11 possible outcomes, or 1/6×1/6 + 1/6×5/6× 2, or equivalent CAO CAO FT from 1 error, this error may impact on further cumulative values, this counts only as 1 error, check appropriate FT FT their <u>cumulative</u> fractions as decimals, accuracy to 2 d.p. if appropriate

(b)(i)

80	90	100
24	**27**	**29**
<u>24</u>	<u>27</u>	<u>29</u>
80	**90**	**100**
0.3	**0.3**	**0.29**

	Marks	Comments
(ii) All 10 points plotted accurately (iii) (1 -0.29 =) 0.71 or equivalent Reason, e.g. "last value", "most throws" (iv) Explanation, e.g. 'probability of a fair dice would be 0.1 for each number'	B2 B1 E1 E1 11	FT for their cumulative decimals Ignore joining, tolerance should shown intention to be on grid lines B1 for 7, 8 or 9 points plotted accurately, must be from cumulative results, e.g. first 7 from the table correct, ignore extra workings such as bars FT their final column entry in (i), fraction or decimal Do not accept 'most accurate'. Mark independently of B1 If no estimate given, but statement that 100 throws as more results then award B0, E1 *If no marks, SC1 for 0.7 with a clear statement 'tending to' or 'settling', a reason of 'mode' is not acceptable*

	Marks	Comments
10. (a) 300 (callers)	B1	
(b) (40% of 800 =) 320 (callers)	M1	
(reading to give) 21 (seconds)	M1	FT for their 40% of 800.
(Difference) 4 (seconds)	A1	CAO
		M1 & SC1 for using First Call with an answer of 9 seconds
(c) First Call and 5 (seconds)	B2	Accept unsupported correct response
		B1 for sight of medians Help 4U 25seconds or First Call 20 seconds or unsupported 5 seconds alone
		Do not accept from incorrect working, e.g. 30 – 25 = 5 is B0
(d)		*If answers are reversed in (d) due to misread of labels, then MR-1 and FT accordingly*
First Call 40 – 10 OR Help 4U 35 – 13.5 (±0.5)	M1	For the intention to calculate UQ- LQ
First Call 30 (seconds)	A1	
Help 4U 21.5 (±0.5seconds)	A1	
(e) Choice, First Call, with a reason based on correct interpretation of the data, e.g.'The median is lower for First Call', 'All the calls to First Call were answered within 50 seconds, whereas there were 50 calls to Help4U that took over 50 seconds to be answered', 'First Call had answered more calls than Help4U after 10, 20 and 50 seconds, the same number of calls answered after 30 (and 60) seconds, but fewer calls answered after 40 seconds', 'First Call were faster overall'	E1	Do not accept a reason based solely on the interquartile range.
		Do not accept 'First Call were quicker'
		FT for their appropriate choice with interpretation of their previous median answer.
	10	
11.		Any angles may be indicated on the diagram
(Sight of <ABC =) 3x OR	B1	Allow 6x/2
Sight of <OAC or <OCA as ½ (180 – 6x) or equivalent		Accept intention (without brackets)
Sight <CAY = 3x	B1	Do not accept ambiguous 3x. Must be simplified to 3x.
		An unlabelled answer of 3x is awarded first B1 only as b.o.d.
		FT <CAY = 'their <ABC' provided ≠6x
Reasons, e.g. ' angle at centre is twice the angle at the circumference AND alternate segment theorem', or 'angles in triangle 180° AND radius meets tangent at 90°'	E1	
	3	
12.(a) 5√2	B1	
(b) Sight of 40 and 20 broken down into factors, e.g.	B1	OR √40 written as √2×√20
(√) 4×10 and (√) 4 ×5, or (√) 2×2×2×5 and (√) 2×2×5		Allow √800 for B1
20√2	B2	B1 for correct but not fully simplified e.g. 4√50
(c) 6 + 4√5 - 3√5- 10 in this simplified form	B2	B1 for any 3 of the 4 terms correct
-4 + √5 OR √5 - 4	B1	CAO
	7	
13.(a)Reflection in the x-axis	M1	
(0, 4)	A1	Accept 4 indicated correctly on the y-axis
(b) Horizontal translation	B1	Any horizontal translation without including any other transformation
Correct translation with (3, 0) and (6,0) indicated on the x-axis	B2	Accept indication of 3 and 6 on the x-axis with the correct translation
		B1 for a horizontal translation with 1 ((1, 0))and 4 ((4, 0)) indicated on the x-axis as intersections or translation to show y = g(x) with (-1, 0) and (2, 0) indicated or correct translation but only one of the values 3 and 6 indicated.
	5	
14. (4x + 3)(3x + 1) - (2x -1)(6x – 5) as a numerator	B1	
Sight of 12x² + 9x + 4x + 3 AND	M2	M1 for either pair of brackets expanded correctly
12x² – 6x – 10x +5 or -12x² + 6x +10x – 5		
29x – 2	A1	FT provided M1 awarded
29x -2	A1	CAO. Do not ignore further working
(2x – 1)(3x + 1)		
	5	

GCSE Mathematics - Linear Paper 1 Higher Tier November 2014	Marks	Final Mark Scheme Comments
15. Sketch of sine curve, from the origin clearly showing the symmetry 0° to 180° or to 360°	M2	Ignore missing y-values. M1 for sketch of sine curve with no indication of any values or symmetry. If y-values are given incorrectly but sketch otherwise correct, then award M1
Bethan is correct AND 44° & 136° correctly indicated on the sketch	A1	Allow from M1, obviously M0 leads to A0. Allow any unambiguous indication of 44° & 136°, for example unlabelled if given uniquely
	3	

GCSE Mathematics - Linear Paper 2 (Calculator allowed) Foundation Tier November 2014	Marks	Final Mark Scheme Comments
1. (a) (Coffee) (£) 8.92 (Tea) (£)11.61 (Sandwiches) (£) 9.28 Total (£)29.81 (b) (£)40 – (£)29.81 = (£) 10.19	B1 B1 B1 B1 M1 A1 6	 (£) 29.81 implies B4. **F.T. if at least B1 awarded.** FT their total **– (£) 10.19 gets M1, A0**
2. Weight (65kg) 65g 65mg 65km Capacity 250cm² (250cm³) 250litres 250mm³ Dover/Calais 41m 41cm (41km) 41mm Window 210m (210cm) 210mm 210km	B1 B1 B1 B1 4	
3. (a) Evidence of square counting 57 – 64 **inclusive** (b) (i) (ii) (c) (i) 4 (ii) 2	M1 A1 B2 B2 6	 B1 for each Lines must be at least drawn within the shapes. B1 for each
4. (a) (i) cylinder (ii) cone (b) (i) tangent (ii) radius (c) Perpendicular (d) Obtuse (Aflem) (e) 12 cm³	B1 B1 B1 B1 B1 B1 B1 U1 8	Do not accept 'circular prism'. **Allow from right of the 'p' in passes' to the left of the 'r' in 'through' inclusive.** **Welsh: from the right of 'n' in 'mynd' to the left of 'B' in 'AB'** Independent
5. (a) impossible (b) unlikely (c) (an) even(s) (chance)	B1 B1 B1 3	
6. (a) Value −50 ± 2 (m) (b) Value −70 ± 2 (m) (c) (i) 70 (m) (ii) Their (a) – their (b) **OR 20 ± 2 (m)**	B1 B1 B1 B1 4	**Units not required, but penalise incorrect units −1 once only.** **−70 gets B0.** **Difference is positive. −20 gets B0.**

GCSE Mathematics - Linear Paper 2 (Calculator allowed) Foundation Tier November 2014	Marks	FINAL MARK SCHEME Comments		
7. (a) $2 \times$ (£)1.20	M1			
$= $ (£)2.4(0) **OR 240(p)**	A1	**Mark final answer**		
(b) (1st $90 + 1.60 + 2.30 = $ (£)4.8(0) **OR 480(p)**	B1			
(2nd $69 + 1.40 + 1.90 = $ (£)3.99 **OR 399(p)**	B1	**Accept (£)1.90 only OR 10p change** *Alternative:* *B2 for sight of 21p, 20p and 40p* *OR B1 for any two of these.*		
Difference $= $ (£)0.81 or 81p **SC2 for 70(p) (based on small, large, large letters**	B1	B0 for (0).81p FT their totals provided at least B1 awarded **and 1st class>2nd class.**		
(c) Since width >16.5 OR since thickness>0.5 OR since weight > 100g it is a large letter.	B1	**Accept 'large letter' only. Can be implied by (£)1.90** **STOP PRESS! - Award B3 for sight of £1.90 AND 'yes' OR 'got £2' OR '10p change'.(No need for mention of 1st Class). Award B2 only for a statement that claims she can post the letter 2nd class but does not mention £1.90.**		
Letter weighs 550g which is 1st (£)2.30 2nd (£)1.90 Yes, but only if posted 2nd class.	B1 B1	OR 'She has enough to post 2nd class (but not 1st'.)		
	8			
8. (Number of hours worked =) 39	B1	FT $358.34 - $ their 305.90	**Alternative method** **39**	**B1**
(Pay for first 35 hours =) $35 \times$ (£)8.74	M1		**$39 \times$(£)8.74**	**M1**
$= $ (£)305.9(0)	A1		**(£)340.86**	**A1**
(Pay for extra 4 hours =) (£)52.44	B1	FT $358.34 - $ their 305.90	**358.34–'their 340.86'** **= (£)17.48**	**B1**
(Rate for these extra hours =) (£)52.44/4	M1	FT ('their 52.44')	**17.48/4 = (£)4.37 AND**	
$= $ (£)13.11 **I.S.W.**	A1	('their 39'-35)	**(£)4.37 + (£)8.74**	**M1**
			= (£)13.11 I.S.W.	**A1**

QWC
Look for
  • Spelling
  • Clarity of text explanations
  • The use of notation – watch for '=','£', 'p' being used appropriately.
QWC2: Candidates will be expected to
  • present work clearly, with words explaining their processes or steps
AND
  • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer
QWC1: Candidates will be expected to
  • present work clearly, with words explaining their processes or steps
OR
  • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer
	QWC
	2
		QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.
		QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar.
		OR
		Evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar.
		QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling		

	8			
9. (a) (i) Divide the previous term by 4	B1	Accept ÷4 OR × ¼. B0 for n/4 **OR 'shared by 4' OR 'halved and halved again'.** B0 for n/4.		
(ii) Multiply the previous term by 3	B1	Accept ×3 B0 for n × 3		
(b) 0, –11	B2	B1 for each. F.T. for **'their 0 –11' if negative.**		
(c) 8*a*	B1	**B0 for '9a – a'**		
(d) $21 + 4n$ **Mark final answer.**	B2	**B1 for sight of 4 x n OR 4n if in an expression of the form '4n + constant (could be 0)'** **In parts (c) and (d) penalise –1 once only for change of letter** **$3 \times 7 + 4n$ gets B1 only. In (d) allow N for n**		
	7			

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GCSE Mathematics - Linear Paper 2 (Calculator allowed) Foundation Tier November 2014	Marks	FINAL MARK SCHEME Comments	
10. (a) 1550×0.84 = (£)1302 (b) 798/0.84 = 950 (euros)	M1 A1 M1 A1 4	£s not required but A0 for euros. euros not required but A0 for £s.	**Alternative method** **1.19 € = £1** **1550** **M1** **1.19** **= 1302.52** **If not 1302 then A0.**

11.   3 or 4 angles correct **and all 4 sectors correctly labelled.**
 	
3 or 4 angles correct, labels not fully correct.
2 angles correct **and these 2 sectors correctly labelled.**
2 angles correct **and these 2 sectors not corr. labelled**
1 angle correct and correctly labelled.
 	
OR
 	
  If 0 OR 1 for their diagram or no diagram,
   360/240
  Angles are 150°, 96°, 60° and 54°
	B4
	
	B3
	B3
	B2
	B1
	
	OR
	
	M1
	
	A1
	
	4
		Use the overlay and allow $\pm 2°$.
		Correct labels (Letter/word NOT the frequency OR angle).
		
		Accept labels in the form of a key.
		
		If B0 **OR B1** scored for the diagram, check the angles and the method to see if the M1 and the A1 can be awarded **instead of B1**.
		1 is 1½° gets the M1.
		If only B1 is scored for the diagram, and all the angles given correctly, then cancel the B1 and award M1, A1 for 2 marks.
		OR SC1 for all percentages: 41·7, 26·7, 16·7, 15 Or rounded OR truncated.	

| 12.   1/7 + 4/7 = 5/7
2/7 = 30
1/7 = 15
No. of girls = 105 | B1
B1
B1
B1

4 |
F.T. 'their 5/7'
F.T.
F.T. | **Decimals**
.14 + .57 = .71   B1
.29 = 30   B1
30   B1
.29
= 103.4   B1
4 | **Percentages**
14%+57%=71%
etc as for decimals.

If not 105 then B0. |

| 13. 1364
 181.41(2)
  9.07(….)
 190.48(26)
 211.63(26) | B1
B1
B1
B1
B1
5 | C.A.O.
F.T.
F.T.
F.T.
F.T. **Final answer must be 2 decimal places** | |

| 14. (a) All points plotted correctly
(b) (16+32+40+20+34+32+44+6)/8

                28
 Line of best fit through **mean point**, (32, 'their 28')

(c) Positive
(d) From their line of best fit (reading to 1 small square) **OR y in the range 21 to 22 inclusive**
H2 | B2
M1

A1
B2

B1
B1
8 | B1 for 5 correct, or reverse correct for 7 or 8 points
For intention to add y-values and divide by 8
224/8. Allow slip in y-values used
CAO. *Accept unsupported 28*
Only award B2 provided at least M1 previously awarded
Tolerance within half square if mean point plotted, otherwise intention must be clear.
FT 'their 28' provided M1 awarded and their line of best fit has an appropriate skew (but may not have points above and below)
B1 for a straight line of best fit, with points above and below, OR for straight line of best fit through the mean point but skewed
(If M0, A0 maximum possible is B1)

FT from straight lines or curves. | |

| 15. (a) $36 \div 4 \times 3$
= 27 **(inches)**
(b) $s^2 = 36^2 + 27^2$
$s^2 = 1296 + 729 = 2025$
s = 45 **(inches)**   **Mark final answer.** | M1
A1
M1
A1
A1
5 |

F.T. $s^2 = 36^2 + $ (their (a))^2

Penalise −1 once only for incorrect units
Unsupported 45 gets all 3 marks. | |

GCSE Mathematics - Linear Paper 2 (Calculator allowed) Foundation Tier November 2014	Marks	FINAL MARK SCHEME Comments
16. Difference between length and height = Length of one small square = 4	S1	**Also look at their diagram** This is the key step for solving the problem Must signify that 4 is the length of the SMALL square. This could be implied by using the '4' in their further working.
Length of large square = (26 - 4)/2 = 11 (cm) **OR 15 – 4 = 11** OR (30 – 8)/2 = 11	M1 A1	F.T. 'their 4' if it is clearly 'their length of a small square'. Watch out for embedded answers, e.g. 11+4+11=26 OR 11+4+11+4=30. **Unsupported 11 gets all 3 marks.**
	3	
17. Idea that exterior angle sum is 360° Idea to sum angles, sight of 3x + 2x + x + 38 + 34 $\qquad\qquad\qquad\qquad$ (= 6x +72)	B1 B1	Sight of (360 – 72 =) 288(°) implies idea of 360° Allow if implied or given with an incorrect equation, e.g. '6x+ 72 = 0', or '3x+2x+x = 540 – 34 – 38', or '3x+2x+x= 468', accept with 'any multiple of 180'- 72 provided >0 (e.g. 108, 288, 468, 648, 828, 1008, …)
Equate (their) sum of angles and 360° $\qquad$ x° = 48(°)	B1 B1	**C.A.O.** Ignore ° Award B4 for a correct answer, 48 *Interior sum method:* *Interior angles 180-3x, 180-2x, 180-x, 180-38 & 180-34* *AND Sum interior angles (3×180=) 540(°)* $\qquad$ *B2* *(or B1 for sight of all the interior angle)* *180-3x + 180-2x + 180-x + 180-38 + 180-34 = 540* $\quad$ *B1*
H4	4	*x(°) = 48(°)* $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ *B1*
18. (a) 2(3x - 4)	B1	
(b) 3×40² – 25 $\qquad\qquad$ 4775	M1 A1	Must be intention 3×40×40, not for (3×40)² Allow, e.g. '3×40 squared - 25', provided not contradicted by further incorrect interpretation in a calculation
(c) 12n – 5 **OR equivalent**	B2	*Ignore 'n=' throughout (c)* Accept unsimplified form. B1 for 12n
Only (b) H6(a) & (c) 6(b)(i)	5	
19. One correct evaluation, $\quad$ 2 ≤ x ≤ 3	B1	x$\qquad\qquad$ x^3 - x - 10 2$\qquad\qquad$ -4 2.1$\qquad\quad$ -2.839 2.2$\qquad\quad$ -1.552
$\quad$ 2 correct evaluations, $\quad$ 2.25 ≤ x ≤2.4, one either side of 0	B1	$\qquad\qquad\qquad\qquad$ **2.25$\quad$ -0.859375** **2.3$\qquad$ -0.133**
$\quad$ 2 correct evaluations, $\quad$ 2.25 ≤ x ≤2.35, one either side of 0	M1	$\qquad\qquad\qquad\qquad$ 2.31$\quad$ 0.016391 $\qquad\qquad\qquad\qquad$ 2.32$\quad$ 0.167168 $\qquad\qquad\qquad\qquad$ 2.33$\quad$ 0.319337 $\qquad\qquad\qquad\qquad$ 2.34$\quad$ 0.472904
$\quad$ 2.3 *No calculations shown: accept "too high","＞", etc.*	A1	$\qquad\qquad\qquad\qquad$ **2.35$\quad$ 0.627875** $\qquad\qquad\qquad\qquad$ 2.36$\quad$ 0.784256 **2.4$\quad$ 1.424** 2.5$\qquad$ 3.125 2.6$\qquad$ 4.976 2.7$\qquad$ 6.983 2.8$\qquad$ 9.152 2.9$\qquad$ 11.489 3$\qquad$ 14 An unsupported answer of '2.3' is awarded SC2
H7	4	

GCSE Mathematics - Linear Paper 2 Higher Tier November 2014	Marks	Final Mark Scheme Comments
1.(a) Correct grouped frequency diagram	B2	B1 for 3 correct bars, OR for translated grouped frequency diagram horizontally by one small square. *B0 if both grouped frequency diagram and frequency polygon given*
(b) 15< x ≤ 20 (kg)	B1 3	Accept indication of the <u>group</u>, e.g. '15 to 20'
2.(a) All points plotted correctly	B2	B1 for 5 correct, or reverse correct for 7 or 8 points
(b) (16+32+40+20+34+32+44+6)/8	M1	For intention to add y-values and divide by 8 224/8. Allow slip in y-values used
28	A1	CAO. *Accept unsupported 28*
Line of best fit through mean point, (32, 'their 28')	B2	Only award B2 provided at least M1 previously awarded Tolerance within half square if mean point plotted, otherwise intention must be clear FT 'their 28' provided M1 awarded and their line of best fit has an appropriate skew (but may not have points above and below) B1 for a straight line of best fit, with points above and below, OR for straight line of best fit through the mean point but skewed *(If M0, A0 maximum possible is B1)*
(c) Positive	B1	
(d) From their line of best fit (reading to 1 small square) OR y in the range 21 to 22 inclusive	B1 8	FT from straight lines or curves.

| --- | --- | --- |
3. (Volume of sitting room) 2.4×8×12 (= 230.4m³)	M1	
(Number of watts is 230.4) ×50	M1	FT 'their volume', which must have been calculated by using at least two of the dimensions 2.4m, 8m and 12m
11520(watts)	A1	CAO
(Window area is 1.7×1.8 =) 3.06(m²)	B1	Allow 3.1 or '>3' from correct working
(As window area is greater than 3m² need to increase the number of watts by 11%) 11520 × 1.11 or equivalent, e.g. 11520 + 11520×11÷100	M1	FT provided 'their calculation of 1.7×1.8' >3 FT 'their 11520' ×1.11 provided at least M1 previously awarded
(Total number of watts is) 12787.2(watts)	A1	FT 'their 11520' ×1.11 correctly evaluated
(Number of British thermal units is 12787.2×3.412) 43629.9264 (Btu) **OR** (Conversion of radiator Btu to watts for both standard **and** small) (Standard 45000 ÷ 3.412 =) 13188.7(…watts) <u>AND</u> (Small 40000 ÷ 3.412 =) 11723(.3…watts)	A1	CAO, by accepting only answers in the range 43629(Btu) to 43630(Btu) CAO, by accepting also 13188(watts) or 13189(watts) *(Use of 3.142 (gives 40177(.3824 Btu), or 45000÷3.142=14322.08..(watts) and 40000÷3.142=12730.74..(watts) is recorded MR-1, A1)*
Conclusion, (need to buy), e.g. 'Standard (radiator) as slightly larger (could be turned down)', or 'Standard as others would give far too much heat or not enough', or 'Small as the next size too hot, rarely have a radiator on full', or 'Small as standard may overheat the room', or 'Small as just slightly less', or 'Standard as just above requirement'	E1	Depends on first 2 method marks and working with Btu in the range 32500Btu to 50000Btu or with watts in the range 9525watts to 14655watts (see also * below). FT conclusion as appropriate for their Btu or watts. Accept an answer of 'Small' with an appropriately clear and suitable reason, although it is 'Standard' that meets all the criteria. Do not accept insufficient reasons, e.g. 'standard should be fine', 'small is okay', without saying why it is 'fine' or 'okay' *Alternative:* *(Volume of sitting room) 2.4×8×12 (= 230.4m³) M1* *(Window area is 1.7×1.8 =) 3.06(m²) B1* *(Watts per m³ required) 50 × 1.11 (or equivalent) M1* * 55.5(watts per m³ required) A1* *(Standard) (45000 ÷ 3.412)÷230.4* * = 13188.7(…watts) ÷ 230.4(m³) OR* *(Small) (40000 ÷ 3.412)÷230.4* * = 11723(.3…watts) ÷ 230.4(m³) m1* *(Standard) 57(.24… watts per m³) A1* *(Small) 51 or 50.9 or 50.8(… watts per m³) A1* *Conclusion as above E1*

Look for
  • spelling
  • clarity of text explanations,
  • the use of notation and units
 	
QWC2: Candidates will be expected to
  • present work clearly, with words explaining process or steps
AND
  • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer
QWC1: Candidates will be expected to
  • present work clearly, with words explaining process or steps
OR
  • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer
	QWC 2	*Candidates not considering window area, or their window area ≤3m², (11520×3.412 =) 39306(.24Btu) with a reason for selecting the Small radiator are awarded E1. Their maximum possible mark (for simplified problem) would be:
		 M1, M1, A1, B0, M0, A0, A0, E1
		
		QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.
		
		QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar
		OR
		evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar.

	10	QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.

	Marks	Comments
4. Idea that exterior angle sum is 360°	B1	Sight of (360 − 72 =) 288(°) implies idea of 360°
Idea to sum angles, sight of $3x + 2x + x + 38 + 34$ $(= 6x +72)$	B1	Allow if implied or given with an incorrect equation, e.g. '6x+ 72 = 0', or '3x+2x+x = 540 − 34 − 38', or '3x+2x+x= 468', accept with 'any multiple of 180'- 72 provided >0 (e.g. 108, 288, 468, 648, 828, 1008, …)
Equate (their) sum of angles and 360°	B1	
$x° = 48(°)$	B1	Ignore °. CAO Award B4 for a correct answer, 48 *Interior sum method:* *Interior angles 180-3x, 180-2x, 180-x, 180-38 & 180-34* *AND Sum interior angles (3×180=) 540(°)* B2 *(or B1 for sight of all the interior angles)* *180-3x + 180-2x + 180-x + 180-38 + 180-34 = 540* B1 *x(°) = 48(°)* B1
	4	
5.(a) $7800 – 7800 × 23/100$ or $7800 × 0.77$	M1	Or equivalent complete method
6006 (metres)	A1	
(b) $8× 27÷9$	M1	Complete calculation may be in stages
(Rita's share) (£)24	A1	Unambiguous or unlabelled. Do not accept if labelled 'Tomos's share'
	4	
6.(a) $3×40^2 – 25$	M1	Must be intention 3×40×40, **not for** $(3×40)^2$ Allow, e.g. '3×40squared - 25', provided not contradicted by further incorrect interpretation in a calculation
4775	A1	*Ignore 'n=' throughout (b)*
(b)(i) $12n – 5$	B2	Accept unsimplified form. B1 for sight of 12n
(ii) $– 2n + 50$	B2	Accept unsimplified form. B1 for sight of -2n
	6	
7. One correct evaluation, $2 \leq x \leq 3$	B1	
2 correct evaluations, $2.25 \leq x \leq 2.4$, one either side of 0	B1	
2 correct evaluations, $2.25 \leq x \leq 2.35$, one either side of 0	M1	
2.3 *No calculations shown: accept "too high", ">", etc.*	A1	
	4	

Evaluation table for question 7:

x	$x^3 - x - 10$		
2	-4		
2.1	-2.839		
2.2	-1.552		
		2.25	-0.859375
2.3	**-0.133**		
		2.31	0.016391
		2.32	0.167168
		2.33	0.319337
		2.34	0.472904
		2.35	**0.627875**
		2.36	0.784256
2.4	**1.424**		
2.5	3.125		
2.6	4.976		
2.7	6.983		
2.8	9.152		
2.9	11.489		
3	14		

An unsupported answer of '2.3' is awarded SC2

GCSE Mathematics - Linear Paper 2 Higher Tier November 2014	Marks	Final Mark Scheme Comments
8.(a) Sight or use of 1 cm : 500 000 cm is 1 cm: 5km or equivalent, e.g. 10 cm for each 50 km, or 1cm to 5000m	B1	
Sight or use of 5 miles approximately 8 km or equivalent, e.g. 8 × 170/5 (km)	B1	Allow 1 mile ≈ 1500 metres to 1650 metres, e.g. 5 miles ≈ 7.5 km
$\dfrac{8 \times 170}{5 \times 5}$	M1	Ignore place value errors with digits '5' FT conversions of miles to km involving multipliers ×1.5 to ×1.65 inclusive, e.g. 1.5 × 170 ÷ 5, for **M1 only**
54(.4 cm)	A1	CAO. Do not FT from 1mile ≈1500m etc. (insufficient accuracy), only FT from 5 miles ≈ 8km *Alternative:* *170 miles ×8 ÷ 5 = 272 km B1 (For 5miles≈8km)* *272 km × 100000 = 27200000 cm & sight of 500000 B1* *27200000/500000 M1 (Ignore place value error)* * = 54(.4 cm) A1 (Do not ignore place value error)*
(b) 170		Methods in any order and may be embedded
÷ 44 or ÷ 38	M1	
÷ 0.219	M1	Allow ÷0.22
× 1.56	M1	
Finding a difference at any stage, depends on ÷44 and ÷38	M1	
(£)4.34 or (£)4.35 or amount round to either amount	A1	CAO Do not accept £4.32 or £4.33 from use of 1litre≈ 0.22 gallons *Alternative embedded examples:* *44 × 0.219 (= 9.636) OR 38 × 0.219 (= 8.322) M1* *170/9.636 (=17.642 litres) OR 170/8.322 (=20.43 litres) M1* *(Here M1 & M1 for equivalent ÷44 or ÷38 and ÷0.219, **then**)* *(£)1.56× 17.642 (=£27.52) OR (£)1.56×20.43 (=£31.87) M1* *Finding a difference at any stage, depends on embedded* *÷44 and ÷38 M1* *(£)4.34 or (£)4.35 or amount round to either amount A1* * CAO* *The first 3 M marks must be in order shown, they are for method not calculation, and must follow in the order shown, e.g. M0, M1 makes no sense, nor does M1, M0, M1*
	9	

Useful values:
At 50mph: 170/44 (=3.8636…gallons)
At 60mph: 170/38 (=4.4736 …gallons)
(Difference 170/38 -170/44) (= 0.61……gallons)
1gallon fuel costs (£)1.56/ 0.219 (= £7.123...)
Number of litres: 170/44 ÷ 0.219 (=17.642…) and 170/38 ÷ 0.219(=20.4277…)
          Costs: 17.642… ×1.56 and 20.4277…×1.56
(Cost) 170/g ×1.56/0.219
          where g = 44, 38 or (170/44-170/38) ×1.56/0.219
Difference is cost is (£)4.34 or £4.35 or an amount rounding to 4.34 or 4.35

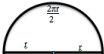| GCSE Mathematics - Linear Paper 2 Higher Tier November 2014	Marks	Final Mark Scheme Comments
9(a) Sight of 152.5 and 102.5	B1	Allow 152.49˙and 152.49˙ (i.e. with recurring 9)
$\qquad$ 152.5 × 102.5	M1	
$\qquad\qquad$ = 15631(.25)	A1	ISW. *If no marks allow SC1 for answers between 15628.7... and 15630.999... only*
$\qquad\qquad\qquad$ mm^2	U1	Independent mark. Accept also equivalents for work with cm or m
(b)(i) Mid points 50.5, 150.5, 250.5, 350.5, 450.5	B1	
2×50.5 + 6×150.5 + 16×250.5 + 34 ×350.5 + 12×450.5	M1	*FT their mid points from within or at the bounds of the appropriate groups*
$\qquad$ or equivalent $\qquad\qquad$ (=22335)		
$\qquad\qquad\qquad$ their Σ*fx*/70 $\quad$ or equivalent	m1	
$\qquad\qquad$ 319(.07… pages)	A1	FT their Σ*fx*/70 correctly evaluated
(ii) 319(.07…) × 1100	M1	FT their (i) or a value in the range 200 to 400 inclusive
$\quad$ 3.5(09…) × 10^5 or 3.51 × 10^5	A2	A1 for 350978, or answers in the range 350900 to 351000, or correct value incorrectly expressed *FT for 'their 319(.07...)' × 1100 correctly evaluated for either A2 or A1 appropriately*
	11	

*For information

$\quad$ 9(b)(i) Use of 50, 150, … leads to 22300/70 = 318.57…
$\qquad$ (ii) Multiples of 1100:

318	349800		318.6	350460
318.5	350350		319	350900
318.57	350427		320	352000

10.(a) (x^2 =) 6.7^2 + 8.4^2	M1	
$\qquad$ x^2 = 115.45 $\;$ OR $\;$ x = √115.45	A1	
$\qquad\qquad\qquad$ 10.7(447…)	A1	
(b) tan y = 8.4/6.7 OR sin y = 8.4/x $\;$ OR cos y = 6.7/x	M1	FT their value of x, must show a value substituted for M1
$\quad$ OR $\quad$ 8.4^2 = 6.7^2 + x^2 - 2×6.7×x×cos y		
$\quad$ OR $\quad$ cos y = $\dfrac{6.7^2 + x^2 - 8.4^2}{2×6.7×x}$		
$\qquad\qquad\qquad$ 51(.423…°)	A2	A1 for tan^{-1}1.25… or sin^{-1}0.78… or cos^{-1}0.62… *(FT from x= 10.7cm using sin gives 51.7° or 52°)*
	6	*(FT from x= 10.7cm using cos gives 51.2° or 51°)*
11.(a) Method, equating coefficients or alternative	M1	Allow 1 slip, but not in equated coeffs.
First variable correct	A1	$\quad$ **x = ½** $\quad$ **y = 6**
Method to find second variable	m1	FT their first variable
Second variable correct	A1	
(b) p – g = 3h/f $\qquad$ OR $\qquad$ fp = 3h + fg	B1	_FT until second error, if equivalent level of difficulty_
$\quad$ f(p – g) = 3h $\qquad$ OR $\qquad$ fp – fg = 3h	B1	
$\quad$ h =f(p – g)/3 $\quad$ OR $\qquad$ h = (fp – fg)/3	B1	Mark final answer *fp=3h+g to give h =$\dfrac{fp-g}{3}$ OR p = 3h + fg to give h = $\dfrac{p-fg}{3}$* *-errors are **not** equivalent difficulty, award SC1 for a correct FT from either of these errors, i.e. for responses shown*
(c) A^2 = xy $\;$ or A/√y = √x	B1	
$\qquad\qquad$ x = A^2/y	B1	Allow x = (A/√y)^2 or x = A^2÷y
	9	
12. Scale factor (smaller to larger) 1.4 or 3.5/2.5 or 7 : 5	B1	OR 1.4^3 or (3.5/2.5)^3 OR scale factor larger to smaller 0.714… or 2.5/3.5 or 5:7 or (0.714…)^2 or (2.5/3.5)^2 or (0.714…)^3 or (2.5/3.5)^3
$\qquad$ 1.4^2 or (3.5/2.5)^2 $\;$ or 25 : 49		
$\qquad\qquad$ Use of 1.4^2 $\;$ or $\;$ (3.5/2.5)^2 $\;$ or 25/49 18.55 ÷	M1	
1.4^2 or 18.55×(2.5/3.5)^2 or 18.55×25/49 or equivalent	m1	
$\qquad\qquad$ (£)9.46(42…)	A1	Allow (£)9.50 from correct working. *Allow B1 & SC1 for an answer of (£)6.76(...)* *(Sight of £13.25 implies first B1 only)*
	4	

	Marks	**Final Mark Scheme** **Comments**
13. $8(2x + 3) + x \times 2x = 212.5$	M2	M1 if necessary brackets omitted or for the expression only, i.e. $8(2x + 3) + x \times 2x$
$2x^2 + 16x + 24 = 212.5$	A1	FT from M1 provided a quadratic is formed
$2x^2 + 16x - 188.5 = 0$	A1	Must equate to zero
$x = \dfrac{-16 \pm\sqrt{(16^2 - 4\times2\times-188.5)}}{2\times2}$	M1	FT for their quadratic $ax^2+bx+c=0$ where a & b & c are $\neq 0$ Allow 1 slip in the substitution, not incorrect formula
$x = \dfrac{-16\pm\sqrt{1764}}{4}$	A1	
$x = 6.5$ (and $x = -14.5$)	A1	Allow unsupported 6.5(cm) following sight of quadratic equation
(Area of the smaller rectangle =) 84.5 (cm^2)	B1	As a single answer. Depends on the award of all previous M marks FT $2x^2$ correctly evaluated provided all M marks are awarded *For trial and improvement method allow, as appropriate, the first M2, A1 marks for sight of working with equation (or expression)* *Factorises: $4x^2 + 32x - 377 = 0$, $(2x + 29)(2x - 13)=0$ M2* *$x = 6.5$ A1*
	8	
14.(a) $BC^2 = 5.4^2 + 7.9^2 - 2\times5.4\times7.9\times\cos82°$	M1	
$BC^2 = 79.69575…$	A1	
$BC = 8.9(272.. \text{ cm})$	A1	Accept 9(cm) from correct working
(b) Area $= ½ \times5.4\times7.9\times\sin82°$	M1	
$21(.122…\text{cm}^2)$	A1	*If the candidate has calculated other angles or sides incorrectly but uses appropriately in evaluating their ½ absinC accurately then award SC1*
	5	
15. Overall strategy, a complete tree diagram (e.g. 1st Meg & Lotti, 2nd goal & not goal)	S1	Or sight of sum of two products of probabilities
$0.7\times0.6 + 0.3\times0.1$ $(= 0.42 + 0.03)$	M2	M1 for sight of either 0.7×0.6 (=0.42) or 0.3×0.1 (=0.03), or $70\times0.6 + 30\times0.1$, or equivalent
0.45	A1	*Alternative* *1 – P(being goalkeeper) as overall strategy S1* *1 – (0.7 × 0.4 + 0.3 × 0.9) M2* *(M1 either 0.7 ×0.4 or 0.3 × 0.9 within 1 - … calculation, or for 1 -(70 × 0.4 + 30 × 0.9))* *0.45 A1*
	4	
16.		
$\dfrac{2\pi r}{2}$ + 2r or diagram showing $2\pi r/2$, r & r	S1	
$\pi r + 2r = 16$ or equivalent	B1	
$r(\pi + 2) = 16$ or $r = \dfrac{16}{\pi + 2}$ or $5.14(2…)\times r = 16$ or $r = 3.1(1…\text{cm})$	B1	FT for the correct manipulation of their equation with r in two terms, equivalent level of difficulty
Area semi-circle $= 0.5 \times \pi \times r^2$	M1	FT 'their r' provided S1 and B1 previously awarded
$15(.211..\text{cm}^2)$	A1	*Award SC2 for simplified problem $\pi r = 16$ or equivalent, leading to area $(½\times\pi \times(16/\pi)^2 =) 40.7(…\text{cm}^2)$, or SC1 for 'this full method' but leading to an incorrect answer*
	5	