



GCSE MARKING SCHEME

MATHEMATICS - LINEAR

NOVEMBER 2014

INTRODUCTION

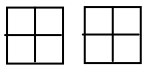
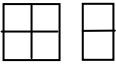
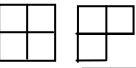
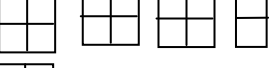
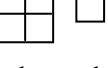


The marking schemes which follow were those used by WJEC for the November 2014 examination in GCSE MATHEMATICS - LINEAR. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken 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.

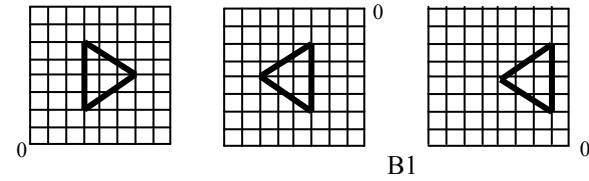
WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

PAPER 1 - FOUNDATION TIER

| GCSE Mathematics - Linear Paper 1 (Non calculator) Foundation Tier November 2014 | Marks | Final Mark Scheme Comments |
|--|--|---|
| 1. (a) (i) 52004 (ii) six million <u>(and)</u> seven hundred thousand (b) (i) 36 and 44 (ii) 37 (iii) 56 (iv) 81 (c) (i) 79600 (ii) 80000 (d) 1, 2, 3, 4, 6, 12 (e) $15/2.97$ OR $15/3$ = 5 | B1 B1 B1 B1 B1 B1 B1 B1 B2 M1 A1 12 | <p><u>Accept six point seven million</u></p> <p>Allow 37+46 etc as long as 37 seen</p> <p>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</p> <p>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. Note: We condone $3/15 = 5$ and award M1,A1. If their answer is incorrect, such as $3/15 = 4$ then award M0,A0.</p> |
| 2. (a) 7 hundred(s) OR 700 OR hundred(s) (b) 23 OR 29 (c) (Disha spends) (£)5.60 OR 560 (p) (Number of pineapples =) $560/80$ = 7 (pineapples) Look for <ul style="list-style-type: none"> • spelling • clarity of text explanations, • the use of notation (watch for the use of ‘=’, £, p) <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, with words explaining process or steps <p>AND</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, with words explaining process or steps <p>OR</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer | B1 B1 B1 M1 A1 QWC 2 7 | <p><u>Do not accept 100</u></p> <p>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.</p> <p>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.</p> <p>QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar</p> |
| 3. (a) Delivery charge = $250 - 5 \times 40$ Delivery charge = (£)50 (b) Number of days = $(350 - 30)/40$ = 8 (days) | M1 A1 M1 A1 4 | <p>Correctly substituted shown by correct attempt to evaluate.</p> <p>For correct substitution with subtraction Allow embedded references to the correct answer.</p> |

| <p style="text-align: center;">GCSE Mathematics - Linear Paper 1 (Non calculator) Foundation Tier November 2014</p> | <p style="text-align: center;">Marks</p> | <p style="text-align: center;">Final Mark Scheme Comments</p> |
|---|---|--|
| <p>4. (a)</p> <p>E </p> <p>AF </p> <p>AS </p> <p>AM </p> <p>AU </p> <p>(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.</p> <p>Uniform scale for the frequency axis starting at 0.</p> <p>Five bars at correct heights (bars must be of equal width).</p> <p>(c) (The) America(s) OR (AM)</p> <p>(d) 30/200 OR 3/20 OR 15% OR equivalent I.S.W.</p> | <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B2</p> <p>B1</p> <p>B2</p> <p>B1</p> <p>B2</p> <p>11</p> | <p>Penalise –1 once only for contiguous or fragmented symbols</p> <p>For Africa AND America. Accept other configurations of the 2 squares, for example </p> <p>Accept other configurations of the 3 squares for example </p> <p>Accept 'Number' OR 'Athletes' for frequency.</p> <p>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.</p> <p>B1 for any 3 or 4 correct bars.</p> <p>Accept 70 and (The) America(s) OR (AM), but B0 for 70 only.</p> <p>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'</p> |
| <p>5. (a) Missing side segments = 4 Perimeter = 7+3+7+4+3+7+3+4+7+3 = 48 (cm)</p> <p>(b) Area = 3 × 7 × 3 = 63 cm²</p> | <p>S1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>U1</p> <p>6</p> | <p>May be implied by correct working.</p> <p>Attempt to add all sides of the shape. M0 if 7 OR 3 used instead of 4</p> <p>C.A.O.</p> <p>OR equivalent</p> <p>C.A.O.</p> <p>Independent of all other marks.</p> |
| <p>6. (a) (-3,1) (b) 3 (c) (-1, 2)</p> | <p>B1</p> <p>B1</p> <p>B2</p> <p>4</p> | <p>Accept (3, ...)</p> <p>B1 for any point with coordinates that add up to 1 with one negative.</p> <p>B0 for (x -1, y 2) but B1 for x= -1, y=2</p> |
| <p>7. 25% of 20 = 5 John and Denise share 15 cubes Maximum for Denise = 7</p> | <p>B1</p> <p>B1</p> <p>B1</p> <p>3</p> | <p>May be indicated on the diagram</p> <p>F.T. '20 – their 5'</p> <p>F.T. 'their 15' if possible.</p> <p>For example, suppose John and Denise share 14 cubes then maximum for Denise is 6 (with John 8).</p> |
| <p>8. There are 5 (red biros) Red biros cost = 225(p) OR (£)2.25 3 black biros costs 75(p) Each costs = 25 (p)</p> | <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>4</p> | <p>F.T. 'their 5' × 45 evaluated correctly (provided 'their 5' ≠ 3)</p> <p>F.T. '£3 - their 225' evaluated correctly</p> <p>F.T. 'their 75' ÷ 3. B0 for 0.25p</p> |

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

| <p align="center">GCSE Mathematics - Linear Paper 1 (Non calculator) Foundation Tier November 2014</p> | <p align="center">Marks</p> | <p align="center">Final Mark Scheme Comments</p> |
|---|--|---|
| <p>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 enlargement -1 with centre $(-4, 1)$ OR equivalent.</p> <p>(b) Correct rotation</p>  <p>H1</p> <p>(c) Correct enlargement</p> | <p>E2</p> <p>(b)</p> <p>B2</p> <p>B2</p> <p>6</p> | <p>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°’ 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)</p> <p>B1 for any 3 correct vertices OR completely correct with a different scale factor ($\neq 1$)</p> |
| <p>16.(a) Use of distance /time $(35/2.5)$</p> <p align="center">$35/2.5$ $14(\text{mph})$</p> <p>(b) $10(\text{kg})$ or $11(\text{kg})$</p> <p>(c) (In Glasgow time flight arrives San Francisco at) $13:40$ add $4\text{h } 25\text{ min}$ add 13 h ($7:05$ on Thursday/next day) (To find San Francisco time) subtract 8 h</p> <p align="center">Day Wednesday Time $23(:)05$ OR $11:05\text{ pm}$ OR $11:05\text{ Wednesday night}$ OR equivalent</p> <p>H4</p> | <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>7</p> | <p>For example, accept $35/2.3$ (0) or $35/150$ <i>An answer of $15.2\dots$ implies this first B1</i></p> <p>C.A.O. <i>Alternative: $70 \div 5$ B2 then $14(\text{mph})$ B1, or $35/5 = 7$ with $7+7$ B2, then $14(\text{mph})$ B1 ($35/7$ is insufficient to convince distance/time)</i></p> <p>All times and periods and attempt addition forward May be in stages. Accept 4.25 as indication of $4\text{hr } 25\text{mins}$ Intention 8 hours back from their intention of addition of $4\text{h } 25\text{min}$ or 13 h to $13:40$</p> <p>CAO An answer of $23:05$ without stating Wednesday is M1, M1, A0. Allow $23(:)05\text{ pm}$, but do not allow $23(:)05\text{ am}$ Accept $11(:)05\text{ pm}$. Allow $11(:)05\text{ Wednesday night}$</p> |
| <p>17. (a) $(5x - 12 =)$ $3x + 18$ $5x - 3x = 18 + 12$ or $2x = 30$ $x = 15$</p> <p>(b) $9x < 72$ or $x < 72/9$ OR $9x < 77 - 5$ $x < 8$</p> <p>H2c&d</p> | <p>B1</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>5</p> | <p>For clearing the bracket correctly. FT until 2nd error.</p> <p>If FT leads to a whole number, answer must be given as whole number, otherwise allow as an improper fraction</p> <p>A0 for a final answer ‘$x=7$’, however ignore continuation to state $x = 7, 6, 5, \dots$ with $x < 8$ seen award A1 No marks for use of ‘=’ throughout, unless finally replaced to give $x < 8$ then award M1 A1. <i>SC1 for $x < 82/9$ ISW</i></p> |
| <p>18. Area triangle ADC $\frac{1}{2} \times 12 \times AD = 60$ or equivalent $AD = 10\text{ (cm)}$</p> <p>Area triangle XBC = $\frac{1}{2} \times 2.5 \times AD$</p> <p align="center">$12.5\text{ (cm}^2\text{)}$</p> <p>H6</p> | <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>4</p> | <p>FT ‘their AD’ and/or FT consistent use of ‘their area formula’.</p> <p><i>Alternative:</i> <i>(Using ratio of base) Area XBC = $60 \times 2.5/12$ M1, A1, M1</i> <i>= $12.5(\text{cm}^2)$ A1</i></p> <p><i>OR in parts: $60/12$ M1 (NOT labelled AD)</i> <i>= 5 A1</i></p> <p><i>Area 2.5×5 M1</i> <i>= $12.5(\text{cm}^2)$ A1</i></p> |

PAPER 1 - HIGHER TIER

| GCSE Mathematics - Linear Paper 1 Higher Tier November 2014 | Marks | Final Mark Scheme Comments |
|---|---|--|
| <p>1.(a) Reflection (in) $y = 1$ OR rotation 180° about $(-4, 1)$ OR rotation 180° about origin or $(0, 0)$ followed by translation $\begin{matrix} -8 \\ 2 \end{matrix}$ or enlargement -1 with centre $(-4, 1)$ or equivalent</p> <p>(b) Correct rotation</p> | <p>E2</p> <p>B2</p> <p>4</p> | <p>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 $\begin{matrix} -8 \\ 2 \end{matrix}$</p> <p>B1 for anticlockwise 90° about the origin OR 90° clockwise about origin of triangle B</p> |
| <p>2.</p> <p>(a) $x = 36 \times 4/3$ or $3x = 144$ or $x/4 = 12$ or $x = 12 \times 4$ $x = 48$</p> <p>(b) $x = \frac{1}{2}$ or 0.5 or $9/18$ or equivalent</p> <p>(c) $(5x - 12 =) 3x + 18$ $5x - 3x = 18 + 12$ or $2x = 30$ $x = 15$</p> <p>(d) $9x < 77 - 5$ or $9x < 72$ or $x < 72/9$ $x < 8$</p> <p>(e) $x > 45/4$ or $x > 11.25$ or $x > 11\frac{1}{4}$ 12</p> <p>(f) $100x^3$</p> | <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>11</p> | <p>Accept embedded answers in parts (a), (b) & (c) Do not accept $3x = 36 \times 4$, 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</p> <p>Mark final answer</p> <p>FT until 2nd error</p> <p>If FT leads to a whole number, answer must be given as whole number, otherwise allow as an improper fraction</p> <p>A0 for a final answer '$x=7$', however ignore continuation to state $x = 7, 6, 5, \dots$ with $x < 8$ seen award A1 No marks for use of "=" throughout, unless finally replaced to give $x < 8$ then award M1 A1. <i>SC1 for $x < 82/9$ ISW</i></p> <p>Or sight of $4 \times 11 = 44$ with $4 \times 12 = 48$ Accept unsupported 12, or a unique answer of 12 from a trial and improvement method. Do not accept $x > 12$ or $x \geq 12$</p> |
| <p>3.(a) Prime numbers are 5, 7 and 11</p> <p style="text-align: right;">Sum 23</p> <p>(b) HCF 8 or $2 \times 2 \times 2$ or 2^3</p> <p style="text-align: right;">HCF 2^3</p> | <p>B2</p> <p>B1</p> <p>B2</p> <p>B1</p> <p>6</p> | <p>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</p> <p>FT sum of 3 PRIMES provided previous B1 awarded and provided their product of 3 primes is > 100</p> <p>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 <i>B0 for factors 4, 6 and 4, 10</i></p> <p>FT for their HCF provided index notation required and used correctly. <i>Do not accept as embedded in product of factors of 24 and 40, needs to be as identified HCF</i></p> |

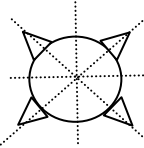
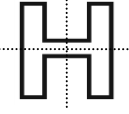
| GCSE Mathematics - Linear Paper 1 Higher Tier November 2014 | Marks | Final Mark Scheme Comments |
|---|---|---|
| <p>4.(a) Use of distance /time (35/2.5)</p> <p style="text-align: center;">35/2.5 14(mph)</p> <p>(b) 10(kg) or 11(kg)</p> <p>(c) (In Glasgow time flight arrives San Francisco at) 13:40 add 4h 25 min add 13 h (7:05 on Thursday/next day) (To find San Francisco time) subtract 8 h</p> <p>23(:)05 on Wednesday (same day)</p> <p>Look for:</p> <ul style="list-style-type: none"> • spelling • clarity of text explanations, where and in which time zone Glasgow or San Francisco • the use of notation and units <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, maybe with diagrams and words explaining process or steps <p>AND</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, maybe with diagrams and words explaining process or steps <p>OR</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer | <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>QWC 2</p> <p>9</p> | <p>For example, accept 35/2.3(0) or 35/150 <i>An answer of 15.2.... implies this first B1</i></p> <p>CAO <i>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)</i></p> <p>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 <u>or</u> 13 h to 13:40</p> <p>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</p> <p>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.</p> <p>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.</p> <p>QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.</p> |
| <p>5.(a) CD length is 10cm (±2mm) and attached to DE at D Arcs to show construction of 60° and bisection arcs to show 30° constructed, tolerance ±2° Accurate measure of their DE (±2mm)with intention ×4 cm</p> <p>(b) Measures either <GFE (107°) and <FGH (73°) or <FEH (102°) and <GHE (78°) or an appropriate pair of alternate angles, to accuracy ±2°</p> <p>Conclusion that it is safe with reason based on parallel lines alternate, (corresponding) or allied angle facts</p> | <p>B1</p> <p>B2</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>E1</p> <p>7</p> | <p>B1 for the appropriate arcs and construction of 60°(±2°)</p> <p><i>Approximately 6cm</i> Units must be given. FT their DE×4 evaluated correctly <i>Approximately 24cm</i></p> <p>Measures alternate or corresponding angles for a straight line intersecting with a pair of parallel lines</p> <p><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.</p> |

| GCSE Mathematics - Linear Paper 1 Higher Tier November 2014 | Marks | Final Mark Scheme Comments | | | | | | | | | | | | | | | |
|--|---|---|-----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|-------------|---|---|
| <p>6. Area triangle ADC $\frac{1}{2} \times 12 \times AD = 60$ or equivalent $AD = 10$ (cm) Area triangle XBC = $\frac{1}{2} \times 2.5 \times AD$ 12.5 (cm²)</p> | <p>M1 A1 M1 A1 4</p> | <p>FT 'their AD' and/or FT consistent use of 'their area formula' <i>Alternative:</i> <i>(Using ratio of base) Area XBC = $60 \times 2.5/12$ M1, A1, M1</i> $= 12.5$(cm²) A1 <i>OR in parts: $60/12$ M1 (NOT labelled AD)</i> $= 5$ A1 <i>Area 2.5×5 M1</i> $= 12.5$(cm²) A1</p> | | | | | | | | | | | | | | | |
| <p>7.(a) Intention to multiply throughout by a multiple of 20 OR correct common denominator for LHS $5(20 + 3x) + 4(5 - x) = 5 \times 13$ or equivalent $11x = -55$ or $x = -55/11$ $x = -5$ (b) $(x - 8)(x - 2)$ $x = 8$ and $x = 2$</p> | <p>M1 M1 A1 A1 B2 B1 7</p> | <p>Intention evidence of at least 2 of the 3 terms LHS must have denominator of 1 FT provided M1 awarded B1 for $(x \dots 8)(x \dots 2)$ FT for their pair of brackets</p> | | | | | | | | | | | | | | | |
| <p>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</p> | <p>B1 B1 M1 A1 B1 B2 B1 8</p> | <p>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 straight line 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)</p> | | | | | | | | | | | | | | | |
| <p>9.(a) Idea, P(at least 1 six) = $1 - P(\text{no sixes})$ $= 1 - 5/6 \times 5/6$ $= 11/36$ (b)(i)</p> <table border="1" data-bbox="177 1379 443 1529"> <tbody> <tr> <td>80</td> <td>90</td> <td>100</td> </tr> <tr> <td>24</td> <td>27</td> <td>29</td> </tr> <tr> <td>24</td> <td>27</td> <td>29</td> </tr> <tr> <td>80</td> <td>90</td> <td>100</td> </tr> <tr> <td>0.3</td> <td>0.3</td> <td>0.29</td> </tr> </tbody> </table> <p>(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'</p> | 80 | 90 | 100 | 24 | 27 | 29 | 24 | 27 | 29 | 80 | 90 | 100 | 0.3 | 0.3 | 0.29 | <p>M1 M1 A1 B1 B1 B1 B2 B1 E1 E1 11</p> | <p>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 $P(2 \text{ sixes}) + P(1 \text{ six \& } 1 \text{ not-six})$ OR 2-way table with the possible 11 outcomes indicated, or list with 11 possible outcomes, or $1/6 \times 1/6 + 1/6 \times 5/6 \times 2$, 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 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 <i>If no marks, SC1 for 0.7 with a clear statement 'tending to' or 'settling', a reason of 'mode' is not acceptable</i></p> |
| 80 | 90 | 100 | | | | | | | | | | | | | | | |
| 24 | 27 | 29 | | | | | | | | | | | | | | | |
| 24 | 27 | 29 | | | | | | | | | | | | | | | |
| 80 | 90 | 100 | | | | | | | | | | | | | | | |
| 0.3 | 0.3 | 0.29 | | | | | | | | | | | | | | | |

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| <p>10. (a) 300 (callers) (b) (40% of 800 =) 320 (callers) (reading to give) 21 (seconds) (Difference) 4 (seconds)</p> <p>(c) First Call and 5 (seconds)</p> <p>(d) First Call 40 – 10 OR Help 4U 35 – 13.5 (±0.5) First Call 30 (seconds) Help 4U 21.5 (±0.5seconds)</p> <p>(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’</p> | <p>B1 M1 M1 A1 B2 M1 A1 A1 E1 10</p> | <p>FT for their 40% of 800. CAO <i>M1 & SC1 for using First Call with an answer of 9 seconds</i> 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</p> <p><i>If answers are reversed in (d) due to misread of labels, then MR-1 and FT accordingly</i> For the intention to calculate UQ- LQ</p> <p>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.</p> |
| <p>11. (Sight of $\angle ABC =$) $3x$ OR Sight of $\angle OAC$ or $\angle OCA$ as $\frac{1}{2}(180 - 6x)$ or equivalent Sight $\angle CAY = 3x$</p> <p>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°’</p> | <p>B1 B1 E1 3</p> | <p><u>Any angles may be indicated on the diagram</u> Allow $6x/2$ Accept intention (without brackets) 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 $\angle CAY =$ ‘their $\angle ABC$’ provided $\neq 6x$</p> |
| <p>12.(a) $5\sqrt{2}$ (b) Sight of 40 and 20 broken down into factors, e.g. $(\sqrt{\quad}) 4 \times 10$ and $(\sqrt{\quad}) 4 \times 5$, or $(\sqrt{\quad}) 2 \times 2 \times 2 \times 5$ and $(\sqrt{\quad}) 2 \times 2 \times 5$ $20\sqrt{2}$ (c) $6 + 4\sqrt{5} - 3\sqrt{5} - 10$ in this simplified form $-4 + \sqrt{5}$ OR $\sqrt{5} - 4$</p> | <p>B1 B1 B2 B2 B1 7</p> | <p>OR $\sqrt{40}$ written as $\sqrt{2} \times \sqrt{20}$ Allow $\sqrt{800}$ for B1 B1 for correct but not fully simplified e.g. $4\sqrt{50}$ B1 for any 3 of the 4 terms correct CAO</p> |
| <p>13.(a) Reflection in the x-axis $(0, 4)$</p> <p>(b) Horizontal translation Correct translation with $(3, 0)$ and $(6, 0)$ indicated on the x-axis</p> | <p>M1 A1 B1 B2 5</p> | <p>Accept 4 indicated correctly on the y-axis</p> <p>Any horizontal translation without including any other transformation 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.</p> |
| <p>14. $(4x + 3)(3x + 1) - (2x - 1)(6x - 5)$ as a numerator Sight of $12x^2 + 9x + 4x + 3$ AND $12x^2 - 6x - 10x + 5$ or $-12x^2 + 6x + 10x - 5$ $29x - 2$ $\frac{29x - 2}{(2x - 1)(3x + 1)}$</p> | <p>B1 M2 A1 A1 5</p> | <p>M1 for either pair of brackets expanded correctly</p> <p>FT provided M1 awarded CAO. Do not ignore further working</p> |

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|---|------------------------------|---|
| <p>15. Sketch of sine curve, from the origin clearly showing the symmetry 0° to 180° or to 360°</p> <p>Bethan is correct AND 44° & 136° correctly indicated on the sketch</p> | <p>M2</p> <p>A1</p> <p>3</p> | <p>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 Allow from M1, obviously M0 leads to A0. Allow any unambiguous indication of 44° & 136°, for example unlabelled if given uniquely</p> |

PAPER 2 - FOUNDATION TIER

| <p align="center">GCSE Mathematics - Linear Paper 2 (Calculator allowed) Foundation Tier November 2014</p> | <p align="center">Marks</p> | <p align="center">Final Mark Scheme Comments</p> | | | | | | | | | | | | | | | | | | | | |
|--|--|--|-----------|--------------------|------|----------|--------------------|--------------------|-----------|--------------------|--------------|-----|------|------|------|--------|------|-------|-------|-------|--------------------------------------|--|
| <p>1. (a) (Coffee) (£) 8.92 (Tea) (£)11.61 (Sandwiches) (£) 9.28 Total (£)29.81</p> <p>(b) (£)40 – (£)29.81 = (£) 10.19</p> | <p>B1 B1 B1 B1 M1 A1 6</p> | <p>(£) 29.81 implies B4. <u>F.T. if at least B1 awarded.</u> FT their total <u>– (£) 10.19 gets M1, A0</u></p> | | | | | | | | | | | | | | | | | | | | |
| <p>2.</p> <table border="0"> <tr> <td>Weight</td> <td>65kg</td> <td>65g</td> <td>65mg</td> <td>65km</td> </tr> <tr> <td>Capacity</td> <td>250cm²</td> <td>250cm³</td> <td>250litres</td> <td>250mm³</td> </tr> <tr> <td>Dover/Calais</td> <td>41m</td> <td>41cm</td> <td>41km</td> <td>41mm</td> </tr> <tr> <td>Window</td> <td>210m</td> <td>210cm</td> <td>210mm</td> <td>210km</td> </tr> </table> | Weight | 65kg | 65g | 65mg | 65km | Capacity | 250cm ² | 250cm ³ | 250litres | 250mm ³ | Dover/Calais | 41m | 41cm | 41km | 41mm | Window | 210m | 210cm | 210mm | 210km | <p>B1 B1 B1 B1 4</p> | |
| Weight | 65kg | 65g | 65mg | 65km | | | | | | | | | | | | | | | | | | |
| Capacity | 250cm ² | 250cm ³ | 250litres | 250mm ³ | | | | | | | | | | | | | | | | | | |
| Dover/Calais | 41m | 41cm | 41km | 41mm | | | | | | | | | | | | | | | | | | |
| Window | 210m | 210cm | 210mm | 210km | | | | | | | | | | | | | | | | | | |
| <p>3. (a) Evidence of square counting 57 – 64 <u>inclusive</u></p> <p>(b) (i)  (ii) </p> <p>(c) (i) 4 (ii) 2</p> | <p>M1 A1 B2 B2 6</p> | <p>B1 for each Lines must be at least drawn within the shapes.</p> <p>B1 for each</p> | | | | | | | | | | | | | | | | | | | | |
| <p>4. (a) (i) cylinder (ii) cone</p> <p>(b) (i) tangent (ii) radius</p> <p>(c) Perpendicular</p> <p>(d) Obtuse (Aflem)</p> <p>(e) 12 cm³</p> | <p>B1 B1 B1 B1 B1 B1 U1 8</p> | <p>Do not accept 'circular prism'.</p> <p><u>Allow from right of the 'p' in passes' to the left of the 'r' in 'through' inclusive.</u> <u>Welsh: from the right of 'n' in 'mynd' to the left of 'B' in 'AB'</u></p> <p>Independent</p> | | | | | | | | | | | | | | | | | | | | |
| <p>5. (a) impossible</p> <p>(b) unlikely</p> <p>(c) (an) even(s) (chance)</p> | <p>B1 B1 B1 3</p> | | | | | | | | | | | | | | | | | | | | | |
| <p>6. (a) Value -50 ± 2 (m)</p> <p>(b) Value -70 ± 2 (m)</p> <p>(c) (i) 70 (m) (ii) Their (a) – their (b) <u>OR 20 ± 2 (m)</u></p> | <p>B1 B1 B1 B1 4</p> | <p><u>Units not required, but penalise incorrect units –1 once only.</u></p> <p><u>–70 gets B0.</u> <u>Difference is positive. –20 gets B0.</u></p> | | | | | | | | | | | | | | | | | | | | |

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|--|---|--|--|
| <p>7. (a) $2 \times (\pounds)1.20$ = $(\pounds)2.4(0)$ OR 240(p)</p> <p>(b) (1st $90 + 1.60 + 2.30 = (\pounds)4.8(0)$ OR 480(p) (2nd $69 + 1.40 + 1.90 = (\pounds)3.99$ OR 399(p))</p> <p>Difference = $(\pounds)0.81$ or 81p SC2 for 70(p) (based on small, large, large letters)</p> <p>(c) Since width > 16.5 <u>OR</u> since thickness > 0.5 <u>OR</u> since weight > 100g it is a large letter.</p> <p>Letter weighs 550g which is 1st $(\pounds)2.30$ 2nd $(\pounds)1.90$ Yes, but only if posted 2nd class.</p> | <p>M1 A1 B1 B1 B1 B1 B1 B1 8</p> | <p>Mark final answer</p> <p>Accept $(\pounds)1.90$ only OR 10p change <i>Alternative:</i> <i>B2 for sight of 21p, 20p and 40p</i> <i>OR B1 for any two of these.</i></p> <p>B0 for $(0).81p$ FT their totals provided at least B1 awarded and 1st class > 2nd class.</p> <p>Accept 'large letter' only. Can be implied by $(\pounds)1.90$ STOP PRESS! - Award B3 for sight of $\pounds 1.90$ AND 'yes' OR 'got $\pounds 2$' 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 $\pounds 1.90$.</p> <p>OR 'She has enough to post 2nd class (but not 1st!).'</p> | |
| <p>8. (Number of hours worked =) 39 (Pay for first 35 hours =) $35 \times (\pounds)8.74$ = $(\pounds)305.9(0)$</p> <p>(Pay for extra 4 hours =) $(\pounds)52.44$ (Rate for these extra hours =) $(\pounds)52.44/4$ = $(\pounds)13.11$ I.S.W.</p> | <p>B1 M1 A1 B1 M1 A1</p> | <p>FT $358.34 - \text{their } 305.90$</p> <p><u>FT $358.34 - \text{their } 305.90$</u> <u>(their 52.44)</u> <u>(their 39'-35)</u></p> | <p>Alternative method 39 $39 \times (\pounds)8.74$ $(\pounds)340.86$ $358.34 - \text{their } 340.86$ = $(\pounds)17.48$ $17.48/4 = (\pounds)4.37$ AND $(\pounds)4.37 + (\pounds)8.74$ = $(\pounds)13.11$ I.S.W.</p> <p>B1 M1 A1 B1 M1 A1</p> |
| <p>QWC Look for</p> <ul style="list-style-type: none"> • Spelling • Clarity of text explanations • The use of notation – watch for '=', '£', 'p' being used appropriately. <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, with words explaining their processes or steps <p>AND</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, with words explaining their processes or steps <p>OR</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer | <p>QWC 2 8</p> | <p>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</p> | |
| <p>9. (a) (i) Divide the previous term by 4</p> <p>(ii) Multiply the previous term by 3</p> <p>(b) 0, -11 (c) $8a$</p> <p>(d) $21 + 4n$ Mark final answer.</p> | <p>B1 B1 B2 B1 B2 7</p> | <p>Accept $\div 4$ OR $\times \frac{1}{4}$. B0 for $n/4$ OR 'shared by 4' OR 'halved and halved again'. B0 for $n/4$.</p> <p>Accept $\times 3$ B0 for $n \times 3$</p> <p>B1 for each. F.T. for 'their 0 - 11' if negative. B0 for '9a - a'</p> <p>B1 for sight of $4 \times n$ OR $4n$ if in an expression of the form '$4n + \text{constant (could be 0)}$' 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</p> | |

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|---|---|---|---|--|
| 10. (a) 1550×0.84 $= (\pounds)1302$ (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 $1.19 \text{ €} = \pounds 1$ $\frac{1550}{1.19}$ M1 $= 1302.52$ 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 <u>If 0 OR 1 for their diagram or no diagram,</u> $360/240$ Angles are $150^\circ, 96^\circ, 60^\circ$ and 54° | B4 B3 B3 B2 B1 OR M1 A1 4 | Use the overlay and allow $\pm 2^\circ$. 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 $1\frac{1}{2}^\circ$ 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 $.14 + .57 = .71$ $.29 = 30$ $.29$ $= 103.4$ | B1 B1 B1 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. <i>Accept unsupported 28</i> 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 <i>(If M0, A0 maximum possible is B1)</i> 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. $s^2 = 36^2 + (\text{their (a)})^2$ Penalise -1 once only for incorrect units Unsupported 45 gets all 3 marks. | | |

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|---|--|--|------------------|----------------|--|--|--|--|---|----|--|--|--|--|-----|--------|--|--|--|--|-----|--------|--|--|--|--|------------|---------------|-------------|------------------|--|--|--|--|------|----------|--|--|--|--|------|----------|--|--|--|--|------|----------|--|--|--|--|------|----------|--|--|--|--|-------------|-----------------|--|--|--|--|------|----------|--|--|------------|--------------|--|--|--|--|-----|-------|--|--|--|--|-----|-------|--|--|--|--|-----|-------|--|--|--|--|-----|-------|--|--|--|--|-----|--------|--|--|--|--|---|----|--|--|--|--|
| <p>16. Difference between length and height = Length of one small square = 4</p> <p>Length of large square = $(26 - 4)/2$ = 11 (cm) OR $15 - 4 = 11$ OR $(30 - 8)/2 = 11$</p> | <p>S1</p> <p>M1 A1</p> <p>3</p> | <p>Also look at their diagram</p> <p>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.</p> <p>F.T. 'their 4' if it is clearly 'their length of a small square'.</p> <p>Watch out for embedded answers, e.g. $11+4+11=26$ OR $11+4+11+4=30$.</p> <p>Unsupported 11 gets all 3 marks.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>17. Idea that exterior angle sum is 360° Idea to sum angles, sight of $3x + 2x + x + 38 + 34$ (= $6x + 72$)</p> <p>Equate (their) sum of angles and 360° $x^\circ = 48^\circ$</p> <p>H4</p> | <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>4</p> | <p>Sight of $(360 - 72 =) 288^\circ$ 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 $180^\circ - 72$ provided > 0' (e.g. 108, 288, 468, 648, 828, 1008, ...)</p> <p>C.A.O. Ignore $^\circ$ Award B4 for a correct answer, 48</p> <p><i>Interior sum method:</i> <i>Interior angles</i> $180-3x, 180-2x, 180-x, 180-38$ & $180-34$ <i>AND Sum interior angles</i> $(3 \times 180 =) 540^\circ$ B2 <i>(or B1 for sight of all the interior angle)</i> $180-3x + 180-2x + 180-x + 180-38 + 180-34 = 540$ B1 $x^\circ = 48^\circ$ B1</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>18. (a) $2(3x - 4)$</p> <p>(b) $3 \times 40^2 - 25$ 4775</p> <p>(c) $12n - 5$ OR equivalent</p> <p>Only (b) H6(a) & (c) 6(b)(i)</p> | <p>B1</p> <p>M1 A1</p> <p>B2</p> <p>5</p> | <p>Must be intention $3 \times 40 \times 40$, not for $(3 \times 40)^2$ Allow, e.g. '3×40 squared - 25', provided not contradicted by further incorrect interpretation in a calculation</p> <p><i>Ignore 'n=' throughout (c)</i> Accept unsimplified form. B1 for $12n$</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>19. One correct evaluation, $2 \leq x \leq 3$</p> <p>2 correct evaluations, $2.25 \leq x \leq 2.4$, one either side of 0</p> <p>2 correct evaluations, $2.25 \leq x \leq 2.35$, one either side of 0</p> <p>2.3</p> <p><i>No calculations shown: accept "too high", ">", etc.</i></p> <p>H7</p> | <p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>4</p> | <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%;">x</td> <td style="width:10%;">$x^3 - x - 10$</td> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> </tr> <tr> <td>2</td> <td>-4</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.1</td> <td>-2.839</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.2</td> <td>-1.552</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.3</td> <td>-0.133</td> <td>2.25</td> <td>-0.859375</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2.31</td> <td>0.016391</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2.32</td> <td>0.167168</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2.33</td> <td>0.319337</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2.34</td> <td>0.472904</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2.35</td> <td>0.627875</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2.36</td> <td>0.784256</td> <td></td> <td></td> </tr> <tr> <td>2.4</td> <td>1.424</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.5</td> <td>3.125</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.6</td> <td>4.976</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.7</td> <td>6.983</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.8</td> <td>9.152</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.9</td> <td>11.489</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>14</td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p>An unsupported answer of '2.3' is awarded SC2</p> | x | $x^3 - x - 10$ | | | | | 2 | -4 | | | | | 2.1 | -2.839 | | | | | 2.2 | -1.552 | | | | | 2.3 | -0.133 | 2.25 | -0.859375 | | | | | 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 | | | | |
| x | $x^3 - x - 10$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | -4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.1 | -2.839 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.2 | -1.552 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.3 | -0.133 | 2.25 | -0.859375 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

PAPER 2 - HIGHER TIER

| GCSE Mathematics - Linear Paper 2 Higher Tier November 2014 | Marks | Final Mark Scheme Comments |
|--|---|--|
| 1.(a) Correct grouped frequency diagram (b) $15 < x \leq 20$ (kg) | B2 B1 3 | B1 for 3 correct bars, OR for translated grouped frequency diagram horizontally by one small square. <i>B0 if both grouped frequency diagram and frequency polygon given</i> Accept indication of the <u>group</u> , e.g. '15 to 20' |
| 2.(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 | 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. <i>Accept unsupported 28</i> 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 <i>(If M0, A0 maximum possible is B1)</i> FT from straight lines or curves. |

| GCSE Mathematics - Linear Paper 2 Higher Tier November 2014 | Marks | Final Mark Scheme Comments |
|--|--|--|
| <p>3. (Volume of sitting room) $2.4 \times 8 \times 12$ (= 230.4m^3) (Number of watts is 230.4) $\times 50$</p> <p style="text-align: right;">11520(watts)</p> <p>(Window area is 1.7×1.8 =) $3.06(\text{m}^2)$</p> <p>(As window area is greater than 3m^2 need to increase the number of watts by 11%) 11520×1.11 or equivalent, e.g. $11520 + 11520 \times 11 \div 100$</p> <p>(Total number of watts is) 12787.2(watts)</p> <p>(Number of British thermal units is 12787.2×3.412) 43629.9264 (Btu) OR</p> <p>(Conversion of radiator Btu to watts for both standard and small) (Standard $45000 \div 3.412$ =) 13188.7(...watts) AND (Small $40000 \div 3.412$ =) 11723.3(...watts)</p> <p>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'</p> <p>Look for</p> <ul style="list-style-type: none"> • spelling • clarity of text explanations, • the use of notation and units <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, with words explaining process or steps <p>AND</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, with words explaining process or steps <p>OR</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer | <p>M1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>A1</p> <p>E1</p> <p>QWC 2</p> <p>10</p> | <p>FT 'their volume', which must have been calculated by using at least two of the dimensions 2.4m, 8m and 12m</p> <p>CAO</p> <p>Allow 3.1 or '>3' from correct working</p> <p>FT provided 'their calculation of 1.7×1.8' >3 FT 'their 11520' $\times 1.11$ provided at least M1 previously awarded</p> <p>FT 'their 11520' $\times 1.11$ correctly evaluated</p> <p>CAO, by accepting only answers in the range 43629(Btu) to 43630(Btu)</p> <p>CAO, by accepting also 13188(watts) or 13189(watts)</p> <p><i>(Use of 3.142 (gives 40177(.3824 Btu), or $45000 \div 3.142 = 14322.08$..(watts) and $40000 \div 3.142 = 12730.74$..(watts) is recorded MR-1, A1)</i></p> <p>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'</p> <p><i>Alternative:</i></p> <p><i>(Volume of sitting room) $2.4 \times 8 \times 12$ (= 230.4m^3)</i> M1</p> <p><i>(Window area is 1.7×1.8 =) $3.06(\text{m}^2)$</i> B1</p> <p><i>(Watts per m^3 required) 50×1.11 (or equivalent)</i> M1</p> <p style="text-align: right;"><i>55.5(watts per m^3 required)</i> A1</p> <p><i>(Standard) $(45000 \div 3.412) \div 230.4$</i> <i>= 13188.7(...watts) $\div 230.4(\text{m}^3)$ OR</i></p> <p><i>(Small) $(40000 \div 3.412) \div 230.4$</i> <i>= 11723.3(...watts) $\div 230.4(\text{m}^3)$</i> m1</p> <p><i>(Standard) $57(.24$... watts per m^3)</i> A1</p> <p><i>(Small) 51 or 50.9 or 50.8(... watts per m^3)</i> A1</p> <p><i>Conclusion as above</i> E1</p> <p>*Candidates not considering window area, or their window area $\leq 3\text{m}^2$, (11520×3.412 =) $39306(.24\text{Btu})$ 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</p> <p>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.</p> <p>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.</p> <p>QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.</p> |

| GCSE Mathematics - Linear Paper 2 Higher Tier November 2014 | Marks | Final Mark Scheme Comments | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--|-----------------|----------------|--|--|--|--|---|----|--|--|--|--|-----|--------|--|--|--|--|-----|--------|--|--|--|--|------------|---------------|--|--|--|--|--|--|------|----------|--|--|--|--|------|----------|--|--|--|--|------|----------|--|--|--|--|------|----------|--|--|--|--|-------------|-----------------|--|--|--|--|------|----------|--|--|------------|--------------|--|--|--|--|-----|-------|--|--|--|--|-----|-------|--|--|--|--|-----|-------|--|--|--|--|-----|-------|--|--|--|--|-----|--------|--|--|--|--|---|----|--|--|--|--|
| <p>4. Idea that exterior angle sum is 360° Idea to sum angles, sight of $3x + 2x + x + 38 + 34$ (= $6x + 72$)</p> <p>Equate (their) sum of angles and 360° $x^\circ = 48^\circ$</p> | <p>B1 B1 B1 B1 4</p> | <p>Sight of $(360 - 72 =) 288^\circ$ 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 $180^\circ - 72$ provided > 0' (e.g. 108, 288, 468, 648, 828, 1008, ...)</p> <p>Ignore $^\circ$. CAO Award B4 for a correct answer, 48</p> <p><i>Interior sum method:</i> <i>Interior angles 180-3x, 180-2x, 180-x, 180-38 & 180-34</i> <i>AND Sum interior angles (3x180=) 540(°)</i> B2 <i>(or B1 for sight of all the interior angles)</i> <i>180-3x + 180-2x + 180-x + 180-38 + 180-34 = 540</i> B1 <i>x(°) = 48(°)</i> B1</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>5.(a) $7800 - 7800 \times 23/100$ or 7800×0.77 6006 (metres)</p> <p>(b) $8 \times 27 \div 9$ (Rita's share) (£)24</p> | <p>M1 A1 M1 A1 4</p> | <p>Or equivalent complete method</p> <p>Complete calculation may be in stages Unambiguous or unlabelled. Do not accept if labelled 'Tomos's share'</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>6.(a) $3 \times 40^2 - 25$ 4775</p> <p>(b)(i) $12n - 5$ (ii) $-2n + 50$</p> | <p>M1 A1 B2 B2 6</p> | <p>Must be intention $3 \times 40 \times 40$, not for $(3 \times 40)^2$ Allow, e.g. '$3 \times 40 \text{ squared} - 25$', provided not contradicted by further incorrect interpretation in a calculation</p> <p><i>Ignore 'n=' throughout (b)</i> Accept unsimplified form. B1 for sight of $12n$ Accept unsimplified form. B1 for sight of $-2n$</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>7. One correct evaluation, $2 \leq x \leq 3$</p> <p>2 correct evaluations, $2.25 \leq x \leq 2.4$, one either side of 0</p> <p>2 correct evaluations, $2.25 \leq x \leq 2.35$, one either side of 0</p> <p>2.3 <i>No calculations shown: accept "too high", ">", etc.</i></p> | <p>B1 B1 M1 A1 4</p> | <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">x</td> <td style="width: 15%;">$x^3 - x - 10$</td> <td style="width: 15%;"></td> <td style="width: 15%;"></td> <td style="width: 15%;"></td> <td style="width: 15%;"></td> </tr> <tr> <td>2</td> <td>-4</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.1</td> <td>-2.839</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.2</td> <td>-1.552</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.3</td> <td>-0.133</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2.31</td> <td>0.016391</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2.32</td> <td>0.167168</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2.33</td> <td>0.319337</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2.34</td> <td>0.472904</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2.35</td> <td>0.627875</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2.36</td> <td>0.784256</td> <td></td> <td></td> </tr> <tr> <td>2.4</td> <td>1.424</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.5</td> <td>3.125</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.6</td> <td>4.976</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.7</td> <td>6.983</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.8</td> <td>9.152</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.9</td> <td>11.489</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>14</td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p>An unsupported answer of '2.3' is awarded SC2</p> | x | $x^3 - x - 10$ | | | | | 2 | -4 | | | | | 2.1 | -2.839 | | | | | 2.2 | -1.552 | | | | | 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 | | | | |
| x | $x^3 - x - 10$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | -4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.1 | -2.839 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.2 | -1.552 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| GCSE Mathematics - Linear Paper 2 Higher Tier November 2014 | Marks | Final Mark Scheme Comments |
|---|--|--|
| <p>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 Sight or use of 5 miles approximately 8 km or equivalent, e.g. $8 \times 170/5$ (km)</p> $\frac{8 \times 170}{5 \times 5}$ <p style="text-align: right;">54(.4 cm)</p> <p>(b) 170 $\div 44$ or $\div 38$ $\div 0.219$ $\times 1.56$ Finding a difference at any stage, depends on $\div 44$ and $\div 38$ (£)4.34 or (£)4.35 or amount round to either amount</p> | <p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>9</p> | <p>Allow 1 mile \approx 1500 metres to 1650 metres, e.g. 5 miles \approx 7.5 km</p> <p>Ignore place value errors with digits '5'</p> <p>FT conversions of miles to km involving multipliers $\times 1.5$ to $\times 1.65$ inclusive, e.g. $1.5 \times 170 \div 5$, for M1 only</p> <p>CAO. Do not FT from 1mile \approx 1500m etc. (insufficient accuracy), only FT from 5 miles \approx 8km</p> <p><i>Alternative:</i> $170 \text{ miles} \times 8 \div 5 = 272 \text{ km}$ <i>B1 (For 5miles\approx8km)</i> $272 \text{ km} \times 100000 = 27200000 \text{ cm}$ & sight of 500000 <i>B1</i> $27200000/500000$ <i>M1 (Ignore place value error)</i> $= 54(.4 \text{ cm})$ <i>A1 (Do not ignore place value error)</i></p> <p>Methods in any order and may be embedded</p> <p>Allow ≈ 0.22</p> <p>CAO</p> <p>Do not accept £4.32 or £4.33 from use of 1litre \approx 0.22 gallons</p> <p><i>Alternative embedded examples:</i> $44 \times 0.219 (= 9.636)$ <i>OR</i> $38 \times 0.219 (= 8.322)$ <i>M1</i> $170/9.636 (=17.642 \text{ litres})$ <i>OR</i> $170/8.322 (=20.43 \text{ litres})$ <i>M1</i> (Here M1 & M1 for equivalent $\div 44$ or $\div 38$ and $\div 0.219$, then) (£) $1.56 \times 17.642 (=£27.52)$ <i>OR</i> (£) $1.56 \times 20.43 (=£31.87)$ <i>M1</i> Finding a difference at any stage, depends on embedded $\div 44$ and $\div 38$ <i>M1</i> (£)4.34 or (£)4.35 or amount round to either amount <i>A1</i> <i>CAO</i></p> <p><i>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</i></p> |

Useful values:

At 50mph: $170/44$ (≈ 3.8636 ...gallons)

At 60mph: $170/38$ (≈ 4.4736 ...gallons)

(Difference $170/38 - 170/44$) (≈ 0.61gallons)

1gallon fuel costs (£)1.56/ 0.219 (\approx £7.123...)

Number of litres: $170/44 \div 0.219$ (≈ 17.642 ...) and $170/38 \div 0.219$ (≈ 20.4277 ...)

Costs: $17.642 \dots \times 1.56$ and $20.4277 \dots \times 1.56$

(Cost) $170/g \times 1.56/0.219$

where $g = 44, 38$ or $(170/44 - 170/38) \times 1.56/0.219$

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 102.5 152.5×102.5 $= 15631(.25)$ mm^2 | B1 M1 A1 U1 | Allow 152.49° and 152.49° (i.e. with recurring 9) ISW. If no marks allow SC1 for answers between 15628.7... and 15630.999... only 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 $2 \times 50.5 + 6 \times 150.5 + 16 \times 250.5 + 34 \times 350.5 + 12 \times 450.5$ or equivalent $(=22335)$ $\text{their } \Sigma fx/70$ or equivalent $319(.07\dots \text{ pages})$ | B1 M1 m1 A1 | *FT their mid points from within or at the bounds of the appropriate groups FT their $\Sigma fx/70$ correctly evaluated |
| (ii) $319(.07\dots) \times 1100$ $3.5(09\dots) \times 10^5$ or 3.51×10^5 | M1 A2 | FT their (i) or a value in the range 200 to 400 inclusive A1 for 350978, or answers in the range 350900 to 351000, or correct value incorrectly expressed FT for 'their 319(.07...)' $\times 1100$ correctly evaluated for either A2 or A1 appropriately |
| | 11 | |

*For information


9(b)(i) Use of 50, 150, ... leads to $22300/70 = 318.57\dots$

(ii) Multiples of 1100:

| | |
|--------|--------|
| 318 | 349800 |
| 318.5 | 350350 |
| 318.57 | 350427 |

| | |
|-------|--------|
| 318.6 | 350460 |
| 319 | 350900 |
| 320 | 352000 |

| | | |
|--|--|--|
| 10.(a) $(x^2 =) 6.7^2 + 8.4^2$ $x^2 = 115.45$ OR $x = \sqrt{115.45}$ $10.7(447\dots)$ | M1 A1 A1 | |
| (b) $\tan y = 8.4/6.7$ OR $\sin y = 8.4/x$ OR $\cos y = 6.7/x$ OR $8.4^2 = 6.7^2 + x^2 - 2 \times 6.7 \times x \times \cos y$ OR $\cos y = \frac{6.7^2 + x^2 - 8.4^2}{2 \times 6.7 \times x}$ $51(.423\dots^\circ)$ | M1 A2 6 | FT their value of x, must show a value substituted for M1 A1 for $\tan^{-1}1.25\dots$ or $\sin^{-1}0.78\dots$ or $\cos^{-1}0.62\dots$ (FT from $x = 10.7\text{cm}$ using \sin gives 51.7° or 52°) (FT from $x = 10.7\text{cm}$ using \cos gives 51.2° or 51°) |
| 11.(a) Method, equating coefficients or alternative First variable correct Method to find second variable Second variable correct (b) $p - g = 3h/f$ OR $fp = 3h + fg$ $f(p - g) = 3h$ OR $fp - fg = 3h$ $h = f(p - g)/3$ OR $h = (fp - fg)/3$ | M1 A1 m1 A1 B1 B1 B1 | Allow 1 slip, but not in equated coeffs. $x = \frac{1}{2}$ $y = 6$ FT their first variable <u>FT until second error, if equivalent level of difficulty</u> Mark final answer $fp = 3h + g$ to give $h = \frac{fp - g}{3}$ OR $p = 3h + fg$ to give $h = \frac{p - fg}{3}$ -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 $A/\sqrt{y} = \sqrt{x}$ $x = A^2/y$ | B1 B1 9 | Allow $x = (A/\sqrt{y})^2$ or $x = A^2 \div y$ |
| 12. Scale factor (smaller to larger) 1.4 or 3.5/2.5 or 7 : 5 1.4^2 or $(3.5/2.5)^2$ or 25 : 49 Use of 1.4^2 or $(3.5/2.5)^2$ or $25/49$ $18.55 \div 1.4^2$ or $18.55 \times (2.5/3.5)^2$ or $18.55 \times 25/49$ or equivalent (£)9.46(42...) | B1 M1 m1 A1 | OR 1.4^3 or $(3.5/2.5)^3$ OR scale factor larger to smaller $0.714\dots$ or $2.5/3.5$ or $5:7$ or $(0.714\dots)^2$ or $(2.5/3.5)^2$ or $(0.714\dots)^3$ or $(2.5/3.5)^3$ Allow (£)9.50 from correct working. Allow B1 & SC1 for an answer of (£)6.76(...) (Sight of £13.25 implies first B1 only) |
| | 4 | |

| GCSE Mathematics - Linear Paper 2 Higher Tier November 2014 | Marks | Final Mark Scheme Comments |
|--|--|--|
| <p>13. $8(2x + 3) + x \times 2x = 212.5$</p> $2x^2 + 16x + 24 = 212.5$ $2x^2 + 16x - 188.5 = 0$ $x = \frac{-16 \pm \sqrt{(16^2 - 4 \times 2 \times -188.5)}}{2 \times 2}$ $x = \frac{-16 \pm \sqrt{1764}}{4}$ $x = 6.5 \text{ (and } x = -14.5)$ <p>(Area of the smaller rectangle =) 84.5 (cm²)</p> | <p>M2</p> <p>A1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>B1</p> <p>8</p> | <p>M1 if necessary brackets omitted or for the expression only, i.e. $8(2x + 3) + x \times 2x$</p> <p>FT from M1 provided a quadratic is formed</p> <p>Must equate to zero</p> <p>FT for their quadratic $ax^2 + bx + c = 0$ where a & b & c are $\neq 0$</p> <p>Allow 1 slip in the substitution, not incorrect formula</p> <p>Allow unsupported 6.5(cm) following sight of quadratic equation</p> <p>As a single answer. Depends on the award of all previous M marks</p> <p>FT $2x^2$ correctly evaluated provided all M marks are awarded</p> <p><i>For trial and improvement method allow, as appropriate, the first M2, A1 marks for sight of working with equation (or expression)</i></p> <p><i>Factorises: $4x^2 + 32x - 377 = 0, (2x + 29)(2x - 13) = 0$ M2</i></p> <p><i>$x = 6.5$ A1</i></p> |
| <p>14.(a) $BC^2 = 5.4^2 + 7.9^2 - 2 \times 5.4 \times 7.9 \times \cos 82^\circ$</p> $BC^2 = 79.69575 \dots$ $BC = 8.9(272 \dots \text{ cm})$ <p>(b) Area = $\frac{1}{2} \times 5.4 \times 7.9 \times \sin 82^\circ$</p> $21(122 \dots \text{ cm}^2)$ | <p>M1</p> <p>A1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>5</p> | <p>Accept 9(cm) from correct working</p> <p><i>If the candidate has calculated other angles or sides incorrectly but uses appropriately in evaluating their $\frac{1}{2} ab \sin C$ accurately then award SC1</i></p> |
| <p>15. Overall strategy, a complete tree diagram (e.g. 1st Meg & Lotti, 2nd goal & not goal)</p> $0.7 \times 0.6 + 0.3 \times 0.1$ $= (0.42 + 0.03)$ <p style="text-align: right;">0.45</p> | <p>S1</p> <p>M2</p> <p>A1</p> <p>4</p> | <p>Or sight of sum of two products of probabilities</p> <p>M1 for sight of either $0.7 \times 0.6 (=0.42)$ or $0.3 \times 0.1 (=0.03)$, or $70 \times 0.6 + 30 \times 0.1$, or equivalent</p> <p><i>Alternative</i></p> <p><i>$1 - P(\text{being goalkeeper})$ as overall strategy S1</i></p> <p><i>$1 - (0.7 \times 0.4 + 0.3 \times 0.9)$ M2</i></p> <p><i>(M1 either 0.7×0.4 or 0.3×0.9 within $1 - \dots$ calculation, or for $1 - (70 \times 0.4 + 30 \times 0.9)$)</i></p> <p><i>0.45 A1</i></p> |
| <p>16.</p> <p>$\frac{2\pi r}{2} + 2r$ or diagram showing  $2\pi r/2, r \text{ \& } r$</p> <p>$\pi r + 2r = 16$ or equivalent</p> <p>$r(\pi + 2) = 16$ or $r = \frac{16}{\pi + 2}$ or $5.14(2 \dots) \times r = 16$</p> <p>or $r = 3.1(1 \dots \text{ cm})$</p> <p>Area semi-circle = $0.5 \times \pi \times r^2$</p> $15(211 \dots \text{ cm}^2)$ | <p>S1</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>5</p> | <p>FT for the correct manipulation of their equation with r in two terms, equivalent level of difficulty</p> <p>FT 'their r' provided S1 and B1 previously awarded</p> <p><i>Award SC2 for simplified problem $\pi r = 16$ or equivalent, leading to area $(\frac{1}{2} \times \pi \times (16/\pi)^2 =) 40.7(\dots \text{ cm}^2)$, or SC1 for 'this full method' but leading to an incorrect answer</i></p> |



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