



GCSE MARKING SCHEME

APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT)

JANUARY 2014

INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2014 examination in GCSE APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT). 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.

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APPLICATIONS UNIT 1 FOUNDATION TIER

Applications Unit 1 Foundation Tier January 2014	Mark	Comment												
<p>1. (a) Arrow drawn or indicated to 530 (grams)</p> <p>(b) Circle drawn with radius 3.1cm</p>	<p>B3</p> <p>B2</p> <p>5</p>	<p>Accept indication between 520 and 540 exclusive Award B2 for sight of $350 + 180 (=530)$ OR correct evaluation indicated on diagram of $350 + \text{“their 180”}$ Award B1 for sight of 180 OR for $350 + \text{“their 180”}$ e.g. $350 + 190 (=540)$ or $350 + 140 (=490) \pm 2\text{mm}$. Award B1 for circle with radius 6.2cm or attempt of drawing circle with radius 3.1cm</p>												
<p>2. (a) 6 inches = 15 cm 4 inches = 10 cm</p> <p>(b) 15×10 $= 150 \text{ (cm}^2\text{)}$</p> <p>(c) $(15 + 10) \times 0.55$ $= (\text{£})13.75$</p> <p>(d) Attempt to count area Estimate area within range 34 - 40 'Their area' $\times 3$ Answer</p>	<p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>10</p>	<p><i>If 6 and 4 used in (b) and/or (c) penalise -1 once only</i> FT from (a) including use of 6 and 4 (inches). M1 for substitution of values. FT from (a) including use of 6 and 4 (inches). For substitution, accept 25×0.55 FT “their area” Note: for 34 – 40 area is 102 - 120</p>												
<p>3. Rounded values</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Item</th> <th style="text-align: left;">Cost</th> </tr> </thead> <tbody> <tr> <td>Chicken curry</td> <td>£3</td> </tr> <tr> <td>Pizza</td> <td>£3</td> </tr> <tr> <td>Washing Powder</td> <td>£6 or £6.10</td> </tr> <tr> <td>Butter</td> <td>£1 or £1.10</td> </tr> <tr> <td>Bread</td> <td>£1 or 90p</td> </tr> </tbody> </table> <p>Approximate total = £14 or £13.90 or £14.10 or £14.20</p> <p>Suitable explanation e.g. “shopkeeper added £89 not 89 pence”</p>	Item	Cost	Chicken curry	£3	Pizza	£3	Washing Powder	£6 or £6.10	Butter	£1 or £1.10	Bread	£1 or 90p	<p>B3</p> <p>B1</p> <p>E1</p> <p>5</p>	<p>Award B3 for all 5 values rounded Award B2 for 3 or 4 values rounded Award B1 for 1 or 2 values rounded</p> <p>FT their approximated values if at least B2 awarded. If added up prices to give £14.12 and gives approximate value to be £14 award final B1</p> <p>Accept “he forgot the decimal point for the 89 pence”</p>
Item	Cost													
Chicken curry	£3													
Pizza	£3													
Washing Powder	£6 or £6.10													
Butter	£1 or £1.10													
Bread	£1 or 90p													
<p>4. (a) longest jump = 4.41 (m) Shortest jump = 4.08 (m)</p> <p>(b) Adding numbers (= 34) $34 \div 8$ Mean = 4.25(m) In order 4.08, 4.10, 4.17, <u>4.25</u>, <u>4.27</u>, 4.36, 4.36, 4.41 Median = 4.26(m) Mode = 4.36(m) Range = 0.33(m) or 33(cm)</p>	<p>B1</p> <p>B1</p> <p>M1</p> <p>m1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>B1</p> <p>9</p>	<p>Award B1 for correct answers in incorrect place.</p> <p>Attempt to add numbers FT ‘their 34’ CAO Accept sight of only 4.25 and 4.27</p> <p>FT their values in part (a)</p>												

Applications Unit 1 Foundation Tier January 2014	Mark	Comment
<p>5. (a) (2 adults & 1 child Upper Circle row C) Sight of 30 and 30 and 15 (= $2 \times (\text{£})30 + (\text{£})15 = 75$) (2 senior citizens Mid Stalls row F) Sight of 30 and 30 (= $2 \times (\text{£})30 = 60$)</p> <p>(4 adults & 3 children Balcony A) Sight of 4 lots of 25 and 3 lots of 12.5(0) (= $4 \times (\text{£})25 + 3 \times (\text{£})12.5(0) = 137.50$)</p> <p>Intention of adding their appropriate costs Total cost of tickets = $(\text{£})272.5(0)$</p> <p><u>Notes:</u> QWC2 can only be awarded if the correct unit is shown in the final answer and the zero is included in the final answer. QWC2 requires words (labels) throughout the response not just connected to the final answer.</p> <p>Look for</p> <ul style="list-style-type: none"> • spelling • clarity of text explanations, labels • the use of notation (watch for the use of ‘=’, ‘£’ and ‘0’ appropriately used) <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>(b) length of each rectangular hall = $225 \div 3$ = 75 Area of Flower Hall = 75×52 = $3900 \text{ (m}^2\text{)}$ Mark final answer</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>M1 A1</p> <p>QWC 2</p> <p>M1 A1 M1 A1 11</p>	<p>CAO</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><i>Alternative Method</i> <i>Total area of rectangular halls = 225×52 = 11700</i> <i>Area of flower hall = $11700 \div 3$ = $3900 \text{ (m}^2\text{)}$</i></p>
<p>6. D C A</p>	<p>B1 B1 B1 3</p>	

Applications Unit 1 Foundation Tier January 2014	Mark	Comment
<p>7. (a) $360 - (90 + 90 + 55)$ $= 125(^{\circ})$ $125(^{\circ})$ is more than $90(^{\circ})$ but less than $180(^{\circ})$ which is an obtuse angle (b) angle of 55° drawn Line of 8cm drawn Shape completed</p> <p>(c) Missing length of shape measured (approx 4.3cm)</p> <p>Length of gold border = $6.5 + 9 + 8 + (4.3)$ $= (27.8)$ (cm)</p>	<p>M1 A1 E1</p> <p>B1 B1 B1</p> <p>B1</p> <p>M1</p> <p>A1 9</p>	<p>Accept “looks more than $90(^{\circ})$ but less than $180(^{\circ})$. Must be a full explanation.</p> <p>$\pm 2^{\circ}$ ± 2mm Award this B1 provided at least B1 awarded previously. ± 2mm. FT their quadrilateral provided not a rectangle. FT their 4.3. Accept measurements ± 2mm for 8cm</p>
<p>8.(a)(i) $4n$ (ii) $8n$</p> <p>(b) $a + 3b$</p>	<p>B1 B2</p> <p>B2</p> <p>5</p>	<p>Accept $n \times 4$ or $n4$ or $n + n + n + n$ Award B1 for a correct expression not fully simplified Award B1 for a correct expression not fully simplified OR B1 for either term correct written as an expression OR both terms correct but not written as an expression.</p>
<p>9.(a) Reason, e.g. ‘outside the juice bar’, ‘mostly younger people use juice bars’</p> <p>(b) Any 2 of: ‘No under 15s’, ‘30 appears in two boxes’, ‘may object to giving their age’</p> <p>(c) (i) Explanation, e.g. ‘vague’, ‘no options’, ‘open question’, ‘can’t display answers easily’, ‘can’t answer if answer to Q2 is NO’, ‘many payment methods’, ‘not same pattern as Q1 & Q2’, ‘no boxes to tick’</p> <p>(ii) States ‘need to give options’, ‘change question to allow for no drink bought’ OR give some options, e.g. card, cash, vouchers from phone, etc</p>	<p>E1</p> <p>E2</p> <p>E1</p> <p>B1</p> <p>5</p>	<p>Accept reference to question 2. Accept reference to age bias</p> <p>E1 for each response. Do not accept: Over 40s in one group, gaps between ages different</p> <p><i>Mark responses in the sections they appear, do not pick out responses in other sections. In all parts ignore additional information given by the candidate once a correct response has been given credit.</i></p>
<p>10. (4, -3) (-3, -5)</p>	<p>B2</p> <p>2</p>	<p>B1 for either or for marking both correct points on the grid. SC1 for (-2.5, 6.5) or (-7, 9)</p>
<p>11.(a) At least 2 sides of a triangle 6 cm (± 2mm) <u>Construction arcs</u> to make at least 1 60° ($\pm 2^{\circ}$) angle Accurate triangle (see overlay)</p> <p>(b) Lines parallel to each side a distance of 2cm (± 2mm) away Arc 2cm (± 2mm) centred on at least one vertex Correct drain placement (as overlay)</p>	<p>M1 M1 A1</p> <p>M1</p> <p>M1 A1</p> <p>6</p>	<p><i>Penalise -1 for incorrect scale in (a), then FT</i></p> <p>Depends on M2 <i>Penalise -1 for incorrect scale in (b), then FT</i></p>

Applications Unit 1 Foundation Tier January 2014	Mark	Comment																								
<p>12.(a) Explanation, e.g. 'no box had less than 200g', or 'no underweight boxes of pasta', 'all other boxes must weigh more (than 205g)', or similar</p> <p>(b)(i)</p> <table border="1"> <tr> <td>(3)</td> <td>(4)</td> <td>7</td> <td>9</td> <td>9</td> <td>9</td> <td>10</td> <td>12</td> </tr> <tr> <td>(30)</td> <td>(40)</td> <td>50</td> <td>60</td> <td>70</td> <td>80</td> <td>90</td> <td>100</td> </tr> <tr> <td>0.1</td> <td>0.1</td> <td>0.14</td> <td>0.15</td> <td>0.128..</td> <td>0.1125</td> <td>0.111..</td> <td>0.12</td> </tr> </table> <p>(ii) Uniform scale on vertical axis Correct plots (allow joined or not joined)</p> <p>(iii) (0.12)</p> <p>Explanation: e.g. "last point plotted", "all data used"</p>	(3)	(4)	7	9	9	9	10	12	(30)	(40)	50	60	70	80	90	100	0.1	0.1	0.14	0.15	0.128..	0.1125	0.111..	0.12	<p>E1</p> <p>B1</p> <p>B1</p> <p>B2</p> <p>B1</p> <p>B2</p> <p>B1</p> <p>E1</p> <p>10</p>	<p>Do not accept 'some of the other boxes weigh more', or 'all boxes weigh more'. Do not accept a repeat of the question</p> <p>FT from their cumulative totals to last row Accept truncation to 2d.p. Accept percentages B1 for any 6 correct, or all truncated to 1d.p.</p> <p>FT from (b)(i) only for r.f.<1, %<100% Need not start at 0. FT to plots if possible B1 for at least 6 correct plots</p> <p>No FT to (iii) for either mark for r.f.>1 Correct response or strict FT from their last relative frequency, but must be ≤ 1</p> <p>Do not accept references to most common, all round to 0.12, etc</p>
(3)	(4)	7	9	9	9	10	12																			
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APPLICATIONS UNIT 1 HIGHER TIER

Applications Unit 1 Higher Tier January 2014	Mark	Comment																								
<p>1.(a) Reason, e.g. ‘outside the juice bar’, ‘mostly younger people use juice bars’</p> <p>(b) Any 2 of: ‘No under 15s’, ‘30 appears in two boxes’, ‘may object to giving their age’</p> <p>(c) (i) Explanation, e.g. ‘vague’, ‘no options’, ‘open question’, ‘can’t display answers easily’, ‘can’t answer if answer to Q2 is NO’, ‘many payment methods’, ‘not same pattern as Q1 & Q2’, ‘no boxes to tick’</p> <p>(ii) States ‘need to give options’, ‘change question to allow for no drink bought’ OR give some options, e.g. card, cash, vouchers from phone, etc</p>	<p>E1</p> <p>E2</p> <p>E1</p> <p>B1</p> <p>5</p>	<p>Accept reference to question 2. Accept reference to age bias</p> <p>E1 for each response. Do not accept: Over 40s in one group, gaps between ages different</p> <p><i>Mark responses in the sections they appear, do not pick out responses in other sections. In all parts ignore additional information given by the candidate once a correct response has been given credit.</i></p>																								
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<p>3.(a) Explanation, e.g. ‘no box had less than 200g’, or ‘no underweight boxes of pasta’, ‘all other boxes must weigh more (than 205g)’, or similar</p> <p>(b)(i)</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>(3)</td><td>(4)</td><td>7</td><td>9</td><td>9</td><td>9</td><td>10</td><td>12</td> </tr> <tr> <td>(30)</td><td>(40)</td><td>50</td><td>60</td><td>70</td><td>80</td><td>90</td><td>100</td> </tr> <tr> <td>0.1</td><td>0.1</td><td>0.14</td><td>0.15</td><td>0.128..</td><td>0.1125</td><td>0.111..</td><td>0.12</td> </tr> </table> <p>(ii) Uniform scale on vertical axis Correct plots (allow joined or not joined)</p> <p>(iii) (0.12)</p> <p>Explanation: e.g. “last point plotted”, “all data used”</p>	(3)	(4)	7	9	9	9	10	12	(30)	(40)	50	60	70	80	90	100	0.1	0.1	0.14	0.15	0.128..	0.1125	0.111..	0.12	<p>E1</p> <p>B1</p> <p>B1</p> <p>B2</p> <p>B1</p> <p>B2</p> <p>B1</p> <p>E1</p> <p>10</p>	<p>Do not accept ‘some of the other boxes weigh more’, or ‘all boxes weigh more’. Do not accept a repeat of the question</p> <p>FT from their cumulative totals to last row Accept truncation to 2d.p. Accept percentages B1 for any 6 correct, or all rounded or truncated to 1d.p.</p> <p>FT from (b)(i) only for r.f.<1, %<100% Need not start at 0. FT to plots if possible B1 for at least 6 correct plots</p> <p>No FT to (iii) for either mark for r.f.>1 Correct response or strict FT from their last relative frequency, but must be ≤ 1 Do not accept references to most common, all round to 0.12, etc</p>
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<p>4. (4, -3) (-3, -5)</p>	<p>B2</p> <p>2</p>	<p>B1 for either or for marking both correct points on the grid. SC1 for (-2.5, 6.5) or (-7, 9)</p>																								

Applications Unit 1 Higher Tier January 2014	Mark	Comment
<p>5.(a)(i) $[18 + 12 \times 2 + 30 \times 0.25] \times 1.2$ $(=49.5(0) \times 1.2)$ (£)59.4(0) (ii)(£)35.1(0) (b) Sight of $12 \times h$ OR $(0).25 \times m$, $m/4$ $18 + 12 \times h + (0).25 \times m$ OR the product of 1.2 by the sum of at least 2 correct terms $F = 1.2(18 + 12h + 0.25m)$ or equivalent</p> <p>(c) Explanation, e.g. '60×25p is more than the cost per hour', or '£15 paying for an hour charged by the minute, but £12 for the hour', '50×25p (=£12.50) is more than the cost per hour', or 'between 48 and 60 minutes cost more than an hour', or similar</p>	<p>M1 A1 B1 B1 B1 B2 E1 8</p>	<p>Intention $\times 1.2$ however brackets may be missing</p> <p>Or equivalent in pence throughout</p> <p>Accept $F = (18 + 12 \times h + (0).25 \times m) \times 1.2$ B1 for $(F =) 18 + 12 \times h + (0).25 \times m \times 1.2$, i.e. missing brackets or partially in brackets OR $(18 + 12 \times h + (0).25 \times m) \times 1.2$ with any 2 of the 3 terms within the brackets correct <i>Ignore if F is written as T</i></p>
<p>6.(Area 1 slab =) $30 \times 40 + \frac{1}{2} \times 30 \times 40$ (cm^2) (=1800cm^2) (Area 25 slabs =1800) $\times 25$ (=45000cm^2) $(45000 \div 10000 =) 4.5$ (m^2)</p> <p>(Number of tins of sealant =) 6</p> <p>(Paving slabs) $25 \times \text{£}8.25$ ($\text{£}206.25$) $+$ ($+$) (6 tins of sealant) $6 \times \text{£}14.49$ ($\text{£}86.94$)</p> <p>((Total cost = £)293.19</p> <p>Look for</p> <ul style="list-style-type: none"> • use of units, e.g. £, cm^2, m^2 • notation, e.g. '=' • labels for calculations <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 m1 B1 B1 M1 A1 QWC 2 8</p>	<p>OR $\frac{1}{2} \times 40 \times (60 + 30)$ (cm^2) OR 25×0.18, intention their area $\times 25$ Conversion to m^2 or correct use of measures in m with area calculation. 'Their 45000' $\div 10000$ correctly evaluated. This may be done early as each length $\div 100$, or area single slab $\div 10000$</p> <p>FT 'their area' $\div 0.8$ evaluated and rounded up Allow for 'their area' of 1 slab, mark is for the intention to divide by 0.8 and round up the answer. Only award for calculations involving rounding up</p> <p>Their full calculation, FT their whole number of tins of sealant. Must be whole number of tins</p> <p>CAO</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>

Applications Unit 1 Higher Tier January 2014	Mark	Comment						
<p>7. Any common multiple of any 2 of 40, 24 and 16 OR $40 = 2 \times 2 \times 2 \times 5$ OR $24 = 2 \times 2 \times 2 \times 3$ Working towards a common multiple of 40, 24 and 16, looking at multiples, allowing 1 error in 1 sequence of multiples OR $40 = 2 \times 2 \times 2 \times 5$ and $24 = 2 \times 2 \times 2 \times 3$ and $16 = 2 \times 2 \times 2 \times 2$ $2 \times 2 \times 2 \times 2 \times 3 \times 5$ (= 240) or any multiple of 240 Table completed correctly, or sight of correct number of boxes in working, e.g.</p> <table border="1"> <tr> <td>Springs</td> <td>6 boxes</td> </tr> <tr> <td>Washers</td> <td>10 boxes</td> </tr> <tr> <td>Rods</td> <td>15 boxes</td> </tr> </table> <p>Or answers $6n$, $10n$, $15n$ when n is an integer and $n > 0$</p>	Springs	6 boxes	Washers	10 boxes	Rods	15 boxes	<p>M1 M1 A1 A1 4</p>	<p>Numbers do not need to be prime, accept e.g. $40 = 8 \times 5$ OR $24 = 8 \times 3$ Accept $40 = 8 \times 5$ and $24 = 8 \times 3$ and $16 = 8 \times 2$</p>
Springs	6 boxes							
Washers	10 boxes							
Rods	15 boxes							
<p>8.(a) Journey 800 km seen or implied Length on map measured, answers in the range 9cm to 10.5cm inclusive $800 \div \dots$ Sentence completed or implied by correct evaluation (b) Both bearings correct $273^\circ \pm 2^\circ$ and $030^\circ \pm 2^\circ$ (c) 2.5×10^{-1} (d) $(T =) d/s + b$ or $(T =) \frac{d+bs}{s}$ or equivalent</p>	<p>B1 B1 M1 A1 B2 B2 B2 10</p>	<p>FT $800 \div$ 'their measurement in cm' B1 for either bearing correct $\pm 2^\circ$, or both correct $\pm 3^\circ$, or for $270 \pm 3^\circ$ with $30 \pm 2^\circ$ B1 for 0.25(km), or for 'their answer' in km correctly expressed in standard form, provided 'their answer' < 1 or 'their answer' > 10 SC1 for 2.5×10^4 (25000 in standard form) B1 for $(T =) t + b$ with sight of d/s elsewhere</p>						

Applications Unit 1 Higher Tier January 2014	Mark	Comment																																
9.(a)(i) Mid points 2.5, 5.5, 8.5, 11.5 $2.5 \times 32 + 5.5 \times 26 + 8.5 \times 14 + 11.5 \times 2 = 365$ $\div 74$ (£)4.93(2...)	B1 M1 m1 A1	FT their mid-points (within & including bounds) Their $\Sigma fx \div 74$. Accept reasonable rounding from correct working																																
(ii) (£)11.99 (b)(i) 60, 61, 63, 69 (ii) Correct plots at mid interval points Solid trend line shown (iii) Any 2 suitable comments about number of visitors (not the lines) one comment on time series and one comment on the trend line	B1 B3 P2 L1 E1 E1 13	Allow (£)12 B2 for any two correct entries, B1 for correct method seen, or 1 correct entry FT for their values from (b)(i) P1 for any 2 correct plots or a consistent translation for all correct values to labelled season (bounds) FT from P1. Allow a dotted line FT from (b)(i) and their trend line Do not accept descriptions of the lines Accept 'summer more popular' Do not accept 'steeper' (refers to the line not visitors)																																
10. <table border="1" style="margin-left: 20px;"> <tr> <td>$1000^{2/3}$</td> <td>10^2</td> <td>1×10^2</td> </tr> <tr> <td>1000^4</td> <td>10^{12}</td> <td>1×10^{12}</td> </tr> <tr> <td>$1000^{-1/3}$</td> <td>10^{-1}</td> <td>1×10^{-1}</td> </tr> <tr> <td>1000^{-8}</td> <td>10^{-24}</td> <td>1×10^{-24}</td> </tr> </table>	$1000^{2/3}$	10^2	1×10^2	1000^4	10^{12}	1×10^{12}	$1000^{-1/3}$	10^{-1}	1×10^{-1}	1000^{-8}	10^{-24}	1×10^{-24}	B4 B2 6	B1 for each of 10^2 , 1000^4 , 10^{-1} and 1000^{-8} in the correct cell For standard form entries, FT from their penultimate column written in standard form, OR B1 for at least one standard form correct or FT																				
$1000^{2/3}$	10^2	1×10^2																																
1000^4	10^{12}	1×10^{12}																																
$1000^{-1/3}$	10^{-1}	1×10^{-1}																																
1000^{-8}	10^{-24}	1×10^{-24}																																
11. Strategy: use of ratio and πr^2 Use of A : B is 2 : 3 or sight of 2/5 Area circle = $\pi \times 1.5^2$ Area A = $(2/5) \times \pi \times 1.5^2$ $= 2.8(27.. \text{cm}^2)$	S1 B1 B1 M1 A1 5	May included use of a three stage ratio, e.g. 2 parts of 7 Mark final answer																																
12.(a) 5 (athletes) (b) 15 (athletes) (c) $45 - 25 = 20$ (seconds) (d) <table border="1" style="margin-left: 20px;"> <tr> <td>t</td> <td>0</td> <td>10</td> <td>15</td> <td>20</td> <td>25</td> <td>30</td> <td>40</td> </tr> <tr> <td>to</td> <td>10</td> <td>15</td> <td>20</td> <td>25</td> <td>30</td> <td>40</td> <td>50</td> </tr> <tr> <td>f</td> <td>0</td> <td>5</td> <td>0</td> <td>5</td> <td>5</td> <td>5</td> <td>20</td> </tr> <tr> <td>f.d.</td> <td>0</td> <td>1</td> <td>0</td> <td>1</td> <td>1</td> <td>0.5</td> <td>2</td> </tr> </table> Axes labelled 'frequency density' and 'time' with appropriate scales, with at least 1 correct bar Correct histogram (as acetate)	t	0	10	15	20	25	30	40	to	10	15	20	25	30	40	50	f	0	5	0	5	5	5	20	f.d.	0	1	0	1	1	0.5	2	B1 B1 M1 A1 B1 B1 B1 M1 A1 9	Indication of groups Allow 20 to 30 taken as one group Correct frequency. FT for their groups, provided there are at least 4 groups Frequency density, FT from a total of 1 or 2 errors in groups and/or frequencies FT from their frequency densities, but not from raw data (frequency) and not cumulative data (cumulative frequency) <i>If M0, A0, allow SC1 for correct histogram with correct groups, but axes not labelled</i>
t	0	10	15	20	25	30	40																											
to	10	15	20	25	30	40	50																											
f	0	5	0	5	5	5	20																											
f.d.	0	1	0	1	1	0.5	2																											

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<p>13.(a) $(10) \times 60 \times 60$ $\div 1000$ 36 (km/h)</p> <p>(b) Tangent at t = 30 Use of difference in v / difference in t Acceleration (reasonable for their tangent) m/s² or ms⁻²</p> <p>(c) Use of area under the curve from 0 to 30 seconds Correct method, including $\frac{1}{2} \times 4 \times 30$ or $\frac{1}{2} \times 5 \times 30$ Correct answer to calculation, e.g. 60(m) to 75(m)</p> <p>(d) Attempt to find at least one point, i.e. value of v for a value of t between 10 and 50 At least 2 correct plots or 2 appropriate values of v Suitable curve between 30 and 40 or 3 values of v evaluated in the interval $30 \leq t \leq 40$ (t is) 35 or 36 seconds (to the nearest second)</p>	<p>M1 M1 A1 M1 M1 A1 U1</p> <p>S1 M1</p> <p>A1</p> <p>S1 P1 C1</p> <p>B1 14</p>	<p>Accept with or without sight of a tangent Must be evaluated from their tangent Independent</p> <p><i>Treat area 0 to 50 seconds as MR-1 then FT</i> Accept any suitable calculation for 1 or more blocks of area If units are given they must be correct <i>Trapezium rule (approximate values)</i> $10 \times [0 + 4.4 + 2(1.75 + 3.4)] / 2 = 73.5(m)$</p> <table border="1"> <tr> <td>t</td> <td>10</td> <td>20</td> <td>30</td> <td>40</td> <td>50</td> </tr> <tr> <td>v</td> <td>0.4</td> <td>1.6</td> <td>3.6</td> <td>6.4</td> <td>10</td> </tr> </table> <p>CAO Allow B4 for a correct answer resulting from a substitution or trial method</p>	t	10	20	30	40	50	v	0.4	1.6	3.6	6.4	10
t	10	20	30	40	50									
v	0.4	1.6	3.6	6.4	10									

Applications Unit 2 Foundation Tier January 2014	Mark	Comment
<p>5.(a) 700×11 $= 7700$ (kr) Left 1506 (kr) $1506 \div 11$ $= (\pounds)136.91$</p> <p>(b)(i) (Thursday) -2 ($^{\circ}\text{C}$) (ii) Saturday (iii) 10 ($^{\circ}\text{C}$)</p>	<p>M1 A1 B1 M1 A2</p> <p>B1 B1 B1</p> <p>9</p>	<p>FT “their 7700” FT “their 1506” provided not 6194 Award A1 for $(\pounds)136.90(9090\dots)$ or $(\pounds)137$ <i>Alternative marksheme</i> $6194 \div 11$ M1 $= (\pounds)563.09$ A2 Award A1 for 563.0909.... $700 - 563.09$ M1 $(\pounds)136.91$ A2 Award A1 if answer not to nearest penny</p> <p>Do not accept -9 Accept -10. FT from their Thursday temperature if lowest or highest.</p>
<p>6. (a) (Type A $=$) $(\pounds)50 + 12 \times (\pounds)34.99$ $= (\pounds)469.88$ (Type B $=$) $(12 \times (\pounds)39 =)$ $(\pounds)468$ (Type C $=$) $(\pounds)30 + 3 \times (\pounds)30 + 9 \times (\pounds)37.99$ $= (\pounds)461.91$ (Cheapest $=$) type D</p> <p>Suitable explanation e.g “ She could get injured and would lose all the money if she doesn’t go” “a lot of money to lose if she doesn’t enjoy it or doesn’t go regularly” “easier to pay in instalments” “a lot of money in one go” “ she has to pay $\pounds 449$ in one payment” etc</p> <p>Look for</p> <ul style="list-style-type: none"> • spelling • clarity of text explanations, • the use of notation (watch for the use of ‘=’, \pounds being appropriate) <p>Notes: QWC2 requires words throughout the response not just connected to the final answer.</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 <p>(b) Correct diagram</p> <p>(c) 4 or 5 angles correct and correctly labelled.</p> <p>4 or 5 angles correct, labels not fully correct. 2 or 3 angles correct and correctly labelled. 2 or 3 angles correct, labels not fully correct. 1 angle correct and correctly labelled.</p>	<p>M1 A1 B1 M1 A1 B1</p> <p>E1</p> <p>QWC 2</p> <p>B2</p> <p>B4</p> <p>OR (B3) (B3) (B2) (B1)</p>	<p>FT their calculations</p> <p>FT provided a suitable explanation given</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>B1 for complete shape with only 1 incorrect vertex or for sight of all correct vertices (may be joined incorrectly or not joined at all)</p> <p>Use the correct overlay and allow $\pm 2^{\circ}$. Correct labels (Words NOT the frequency OR angle) 4 correct labels are enough.</p> <p>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.</p>

Applications Unit 2 Foundation Tier January 2014	Mark	Comment												
<p>OR <u>If 0 OR 1 for their diagram or no diagram.</u> 360/240</p> <p>Angles are 93, 84, 57, 45, 81.</p> <p>(d) For intention to divide all dimensions by 5</p> <p>4, 3 & 6 $4 \times 3 \times 6$ 72</p>	<p>(M1) (A1) M2 A1 M1 A1 20</p>	<p>If B0 scored for the diagram, check the angles and the method to see if the M1 and the A1 can be awarded. (1 is) 1.5° gets the M1</p> <p>OR SC1 for all the correct percentages 25.8%, 23.3%, 15.8%, 12.5%, 22.5%</p> <p>M1 for intention to divide 1 or 2 of the dimensions by 5</p> <p>FT their 4, 3 & 6 provided at least two of 4, 3 & 6 are correct</p> <p><i>Alternative method</i> <i>Volume of box</i> 5^3 <i>OR Volume of container</i> $20 \times 15 \times 30$ M1 $125 \text{ (cm}^3\text{)}$ A1 $9000 \text{ (cm}^3\text{)}$ A1 <i>Number of boxes</i> $9000 \div 125$ M1* $= 72$ A1 * FT provided at least one of the volumes is correct</p>												
<p>7. Indicates: Mr Roberts, Miss Evans, Miss Abbott, Mr Brett</p>	<p>B2 2</p>	<p>Accept any unambiguous indication B1 for at least 3 correct and no more than 1 incorrect</p>												
<p>8. (a) Use of $\times 48 \div 4$ or $\times 12$ OR realising 55g is 2oz $(12 \times 55) \div 110 \times 4$ OR 2×12 OR equivalent correct calculation 24 (ounces)</p> <p>(b) $150 \text{ fl oz} = 150 \times 25 \text{ (ml)} (=3750 \text{ ml})$ 1 pancake $37.5/4 (= 9.375) \text{ ml water}$ OR notices 3750 is $100 \times$ amount given in the recipe $(3750/9.375$ OR $100 \times 4 =) 400$ (pancakes)</p>	<p>B1 M1 A1 M1 M1 A1 6</p>	<p>(2 oz for 4 pancakes, so 2×12)</p> <p>OR $3750 \div 37.5 = 100$</p>												
<p>9. (a) Choice and reason, e.g. ‘Michelle because of correlation’, ‘Michelle because no very short animals’ (b) Line of best fit on Michelle’s scatter diagram (c)</p> <table border="1"> <thead> <tr> <th></th> <th>Mode</th> <th>Median</th> <th>Range</th> </tr> </thead> <tbody> <tr> <td>Boys’ pets</td> <td>(0)2</td> <td>15</td> <td>40</td> </tr> <tr> <td>Girls’ pets</td> <td>29</td> <td>18</td> <td>25</td> </tr> </tbody> </table> <p>Statement, e.g. ‘Carl not correct as both the mode and the median are greater for girls’ pets’, ‘Carl not correct as the mode for girls is greater and the range is not helpful’</p>		Mode	Median	Range	Boys’ pets	(0)2	15	40	Girls’ pets	29	18	25	<p>E1 B1 B3 E1 6</p>	<p>Accept ‘all close together’</p> <p>Appropriate direction with some points above and below the straight line B2 for 4 or 5 correct B1 for 2 or 3 correct <i>Ignore any extra calculations of the means.</i> Accept statement which includes the means Depends on previous award of at least B2 Statement must include reference to mode, or median (and range) Accept ‘Carl is not correct as the girls’ mode is higher’, ‘Carl is not correct as the girls’ median is higher’ Accept ‘Carl is correct as the range is greater and the medians are similar’, must refer to median and range</p>
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Boys’ pets	(0)2	15	40											
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Applications Unit 2 Foundation Tier January 2014	Mark	Comment
<p>10.(a)(i)</p> <p>Age: Use of non-overlapping groups and no gaps in groups for ages</p> <p>Number of holidays: Use of non-overlapping groups and no gaps in groups given, or list of numbers to indicate (need not start at 0)</p> <p>Number of days: Use of non-overlapping groups and no gaps in groups not exceeding 365 days</p> <p>Type of holiday: List some types (perhaps with option for others), e.g. beach, city break, camping, activity, ..</p> <p>(ii) Reason, e.g. 'helps summarise', or 'smaller number of categories to manage', or 'can't list them all'</p> <p>(b) (Value of insurance sales =) $6000 \times 0.8 \times 130$ (£) 624000 (Number of customers claiming =) $6000 \times 0.8 \times 0.3 (=1440)$ (Typical claim taken as £)450 (Amount paid out in claims $1440 \times 450 = \text{£} 648000$ Loss and (£)24000 or $-(\text{£})24000$</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>E1</p> <p>M1 A1 M1 B1 m1 B1</p> <p>11</p>	<p>Throughout (a) at least 3 response groups or response options are needed as appropriate, any given groups must not overlap or have gaps</p> <p>Must be a single value FT 'their 450' between 400 and 500 inclusive Do not accept 24000 FT provided M1, M1, m1 awarded Use of 400 gives 48000 profit, 500 gives 96000 loss, the final 3 marks are then B0, m1, B1 <i>If 400 & 500 (or 2 other extreme amounts) both considered and then summarised, with equivalent working then all of the final 3 marks may be awarded.</i></p>

APPLICATIONS UNIT 2 HIGHER TIER

Applications Unit 2 Higher Tier January 2014	Mark	Comment												
1. Indicates: Mr Roberts, Miss Evans, Miss Abbott, Mr Brett	B2 2	Accept any unambiguous indication B1 for at least 3 correct and no more than 1 incorrect												
2(a)(i) Suitable explanation demonstrating knowledge that the size must be increased to be identical (ii) Suitable explanation demonstrating knowledge that similar means same shape / angles, e.g. 'not the same shape', 'one is in italics' (b) States, e.g. 'turn around through half turn', 'turn upside down' (c) Use of either $\frac{5}{7}$ or $\frac{7}{8}$ $\frac{5}{7} \times \frac{7}{8}$ $\frac{5}{8}$ (=35/56) or equivalent	E1 E1 E2 B1 M1 A1 7	e.g. 'double the size', 'enlarge' Do not accept if response implies that they must be the same size Accept 'Rotation (through) 180°' E1 for either turn / rotation or half turn / 180° Do not accept 'flipped' unless 2 appropriate stages are described Accept 0.625 Mark final answer If no marks, SC1 for $(\frac{2}{7} \times \frac{1}{8} =) \frac{2}{56}$ or in decimals <i>Alternative:</i> $1 - (\frac{2}{7} + \frac{5}{7} \times \frac{1}{8})$ B1, M1												
3(a) Choice and reason, e.g. 'Michelle because of correlation', 'Michelle because no very short animals' (b) Line of best fit on Michelle's scatter diagram (c) <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Mode</th> <th>Median</th> <th>Range</th> </tr> </thead> <tbody> <tr> <td>Boys' pets</td> <td>(0)2</td> <td>15</td> <td>40</td> </tr> <tr> <td>Girls' pets</td> <td>29</td> <td>18</td> <td>25</td> </tr> </tbody> </table> <p>Statement, e.g. 'Carl not correct as both the mode and the median are greater for girls' pets', 'Carl not correct as the mode for girls is greater and the range is not helpful'</p>		Mode	Median	Range	Boys' pets	(0)2	15	40	Girls' pets	29	18	25	E1 B1 B3 E1 6	Accept 'all close together' Appropriate direction with some points above and below the straight line B2 for 4 or 5 correct B1 for 2 or 3 correct <i>Ignore any extra calculations of the means.</i> Accept statement which includes the means Depends on previous award of at least B2 Statement must include reference to mode, or median (and range) Accept , for example 'Carl is not correct as the girls' mode is higher' Accept 'Carl is correct as the range is greater and the medians are similar', must refer to median and range
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Boys' pets	(0)2	15	40											
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4(a) Use of $\times 48 \div 4$ or $\times 12$ OR realising 55g is 2oz $(12 \times 55) \div 110 \times 4$ OR 2×12 OR equivalent correct calculation 24 (ounces) (b) 150 fl oz = 150×25 (ml) (=3750 ml) 1 pancake $37.5/4$ (= 9.375) ml water OR notices 3750 is $100 \times$ amount given in the recipe $(3750/9.375)$ OR $100 \times 4 =$ 400 (pancakes)	B1 M1 A1 M1 M1 A1 6	(2 oz for 4 pancakes, so 2×12) OR $3750 \div 37.5 = 100$												
5(a) $1220.18 \div 1.69$ (= 722 (litres)) AND $\div 4.55$ (= 158.681319... (gallons)) AND $\times 42.9$ 6810 (miles) (b) Appropriate use of either 1 litre = 1000cm^3 or $1\text{m}^3 = 1000000\text{cm}^3$ or $1\text{m}^3 = 1000\text{litres}$ or similar $80 \times 1000 \div 1000000$ or $80 \div 1000$ or equivalent 0.08 (m^3)	M3 A2 B1 M1 A1 8	Complete method $((1220.18 \div 1.69) \div 4.55) \times 42.9$ M2 for any 2 of the 3 operations suitable, other omitted or incorrect, OR M1 for $1220.18 \div 1.69$, or $42.9 \div 4.55$, or $4.55 \div 42.9$, or 1.69×4.55 A marks depend on M3 A1 for 6807(.42857... miles) or correct from premature approximation												

Applications Unit 2 Higher Tier January 2014	Mark	Comment
<p>6(a)(i)</p> <p>Age: Use of non-overlapping groups and no gaps in groups for ages</p> <p>Number of holidays: Use of non-overlapping groups and no gaps in groups given, or list of numbers to indicate (need not start at 0)</p> <p>Number of days: Use of non-overlapping groups and no gaps in groups not exceeding 365 days</p> <p>Type of holiday: List some types (perhaps with option for others), e.g. beach, city break, camping, activity, ..</p> <p>(ii) Reason, e.g. 'helps summarise', or 'smaller number of categories to manage', or 'can't list them all'</p> <p>(b) (Value of insurance sales =) $6000 \times 0.8 \times 130$ (£) 624000</p> <p>(Number of customers claiming =) $6000 \times 0.8 \times 0.3 (=1440)$</p> <p>(Typical claim taken as £)450</p> <p>(Amount paid out in claims $1440 \times 450 = \text{£} 648000$)</p> <p>Loss and (£)24000 or $-(\text{£})24000$</p> <p>Look for</p> <ul style="list-style-type: none"> • spelling • clarity of text explanations and/or labels • the use of notation (watch for the use of '=', £, % being appropriate) <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>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>E1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>B1</p> <p>m1</p> <p>B1</p> <p>QWC</p> <p>2</p> <p>13</p>	<p>Throughout (a) at least 3 response groups or response options are needed as appropriate, any given groups must not overlap or have gaps</p> <p>Must be a single value</p> <p>FT 'their 450' between 400 and 500 inclusive</p> <p>Do not accept 24000</p> <p>FT provided M1, M1, m1 awarded</p> <p>Use of 400 gives 48000 profit, 500 gives 96000 loss, the final 3 marks are then B0, m1, B1</p> <p><i>If 400 & 500 (or 2 other extreme amounts) both considered and then summarised, with equivalent working then all of the final 3 marks may be awarded.</i></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</p> <p>OR</p> <p>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>

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<p>10(a) Explains that 'interest is compounded'</p> <p>(b)(i) $(4.8 \div 12 =) 0.4\%$ (ii) 200×1.003^5 (£)203.02 or (£)203.01</p> <p>(iii)(F3=) $(1 + D2 \div 100) \times B2$ or $B2 \times D2 \div 100 + B2$ or equivalent</p> <p>(F14=) $(1 + D2 \div 100)^{12} \times B2$ or equivalent</p>	<p>E1 B1 M1 A2</p> <p>B2</p> <p>B2</p> <p>9</p>	<p>A1 for (£)203.01805... or 203 from compound working Alternative method B1 for a correct 0.3% but not 3% M1 For the overall method (5 stages of adding <u>different</u> 0.3%). Accept inappropriate rounding or truncation for M1 only, A0 (Calculation: 200 $\frac{0.60}{200.60}$ $\frac{0.60(18)}{201.20(18)}$ $\frac{0.60(36054)}{201.805405}$ $\frac{0.60541622}{202.410821}$ $\frac{0.60723246}{203.018053}$)</p> <p>Do not ignore subsequent working, penalise - 1 If no marks, then SC1 for Simple Interest (£)203.00</p> <p><u>Accept / for division , * for multiplication and ^ for index</u> B1 for evidence of $D2 \div 100$, or $D2 \times B2$, or $1.012 \times B2$, or 1.012×400 or equivalent B0 for 404.8(0)</p> <p>Accept cell E14 for indication of '12'. B1 for sight of power 12 linked to cell D2, or for $(1 + D2 \div 100)^x \times B2$, or $(1 + D2/100)^{12} \times B2$, or $(1 + D2/100)^{E14} \times B2$, or equivalent or for their formula for F3 with appropriate index provided equivalent difficulty</p>
<p>11(a) $r \geq 5$ and $c < 2r$ and $30r + 4c \leq 300$</p> <p>(b) Line $r = 5$ drawn correctly Line $c = 2r$ drawn correctly Line $30r + 4c = 300$ drawn correctly The region indicated</p> <p>(c) 8 rugs and 15 cushions (giving $8 \times 30 + 15 \times 4$) (£)300</p>	<p>B4</p> <p>B1 B1 B1 B1</p> <p>M1 A1 10</p>	<p>B3 for any 2 correct inequalities B2 for any 1 correct inequality with at least one other inequality only inaccurate due to incorrect symbol ($>$, \geq, $<$, \leq) B1 for any 1 correct inequality, or B1 for at least two inequalities only inaccurate due to incorrect symbol ($>$, \geq, $<$, \leq)</p> <p>FT their inequalities if possible</p> <p>CAO</p> <p>FT their graph provided at least B2 in (b) 300 alone, without the number of rugs and cushions is M0, A0</p>

Applications Unit 2 Higher Tier January 2014	Mark	Comment
<p>12. $5400 = \frac{1}{2} \times 9.6 \times \dots \times 3(00)$ $\dots = (5400 \times 2) \div (9.6 \times 3(00))$ or equivalent 3.75 (cm)</p> <p>hypotenuse² = $9.6^2 + 3.75^2$</p> <p>hypotenuse = $\sqrt{106.2(225)}$ 10.3(... cm)</p> <p>Confirmation note completed: (9.6 cm), 3.8 (cm), 10.3(cm) and 300(.0 cm)</p>	<p>M1 M1 A1</p> <p>M1</p> <p>A1 A1 B1</p> <p>7</p>	<p>Accept with 3 or 300 Rearrangement Accept 3.7, 3.8 or 4 FT from correct working</p> <p>FT 'their 3.75' provided at least M1 previously awarded Use of 3.7, 3.8, 4 gives 105.85, 106.6, 108.16 Use of 3.7, 3.8, 4 gives 10.288..., 10.32..., 10.4 FT provided all M marks awarded Accept 10.4 instead of 10.3 if FT from appropriate working. <i>N.B. Confirmation note must be completed for this B1, do not accept seen in working</i></p> <p><i>If no marks, SCI for use of their height correctly within Pythagoras' Theorem</i></p>
<p>13. Form and use a right angled triangle with base 55cm and height 50 cm Tan x = 50/55 42(°) or 42.3(°)</p>	<p>S1</p> <p>M1 A3 5</p>	<p>Or alternative FULL method A2 for 42.27....(°) A1 for $\tan^{-1} 0.909\dots$ or $\tan^{-1} (50/55)$</p>
<p>14. Volume = volume outer cone – volume inner cone</p> $= \frac{1}{3} \times \pi \times 17^2 \times 47 - \frac{1}{3} \times \pi \times 15^2 \times 45$ <p>3.62 (litres)</p>	<p>S1</p> <p>M2 A3</p> <p>6</p>	<p>Accept for their incorrect volumes, but must come from 3D substitution M1 for $\frac{1}{3} \times \pi \times 34^2 \times 47 - \frac{1}{3} \times \pi \times 30^2 \times 45$ A2 for 3.619... (litres), 3.622...(litres), 3620 (cm³) or FT from M1 to 14.5 (litres) A1 for answers between 3619 (cm³) and 3622.7 (cm³) inclusive or FT from M1 to 14.48(litres), 14.49(litres) or 14500(cm³) <i>If no marks, SCI for both volume expressions or use of 16 and 46 as appropriate within one volume expression</i></p>



WJEC
245 Western Avenue
Cardiff CF5 2YX
Tel No 029 2026 5000
Fax 029 2057 5994
E-mail: exams@wjec.co.uk
website: www.wjec.co.uk