

Mark Scheme (Results)

November 2012

GCSE Mathematics Linked Pair Pilot
Application of Mathematics (2AM01)
Higher (Calculator) Paper 2H

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NOTES ON MARKING PRINCIPLES

- 1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- 2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- 3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- 4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- 5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- 6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:
 - i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.
 - ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.
 - iii) *organise information clearly and coherently, using specialist vocabulary when appropriate.*
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g. 3.5 – 4.2) then this is inclusive of the end points (e.g. 3.5, 4.2) and includes all numbers within the range (e.g. 4, 4.1)

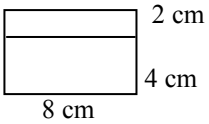
Guidance on the use of codes within this mark scheme

M1 – method mark
A1 – accuracy mark
B1 – Working mark
C1 – communication mark
QWC – quality of written communication
oe – or equivalent
cao – correct answer only
ft – follow through
sc – special case
dep – dependent (on a previous mark or conclusion)
indep – independent
isw – ignore subsequent working

5AM2H 01				
Question	Working	Answer	Mark	Notes
1 QWC	eg $\angle DGF = 60$ (line = 180) $\angle AFG = 80$ (\angle s in $\triangle AFG$) $\angle EFC = 100 = \angle BCA$ (corresponding angles) eg $\angle DGF = 60$ (line = 180) $\angle AFG = 80$ (\angle s in $\triangle AFG$) $\angle DCF = 100$ (opposite \angle s) (co-interior \angle s sum to 180)	Yes with reasons	3	B1 for at least two correct angles given or marked on the diagram C1 for any one reason given from <u>angles on a line = 180</u> <u>angles in a triangle = 180</u> <u>vertically opposite angles are equal</u> <u>angles in a quadrilateral add to 360</u> <u>exterior angle of a triangle = sum of interior opposite angles</u> C1 for Yes with clearly identified angles with fully correct reasons that define the parallel lines e.g. identified <u>alternate angles equal</u> , identified <u>corresponding angles equal</u> , identified <u>allied</u> or <u>co-interior angles</u> sum to <u>180</u>

5AM2H 01

Question	Working	Answer	Mark	Notes														
2	(a) $y = 2x + 10$ <table border="1" data-bbox="481 338 620 587"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>30</td> </tr> <tr> <td>20</td> <td>50</td> </tr> <tr> <td>30</td> <td>70</td> </tr> <tr> <td>40</td> <td>90</td> </tr> <tr> <td>50</td> <td>110</td> </tr> <tr> <td>60</td> <td>130</td> </tr> </tbody> </table>	x	y	10	30	20	50	30	70	40	90	50	110	60	130	Line	3	<p>TABLE OF VALUES</p> <p>M1 for at least 2 correct attempts to find points by substituting values of x</p> <p>M1 ft for plotting at least 2 points (any points plotted from their table must be correct)</p> <p>A1 for correct straight line between $x = 10$ and $x = 50$ (accept dotted line or complete line)</p> <p>NO TABLE OF VALUES</p> <p>M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $2x + 10$ drawn (ignore any additional incorrect segments)</p> <p>(M1 for at least 3 correct points with no more than 2 incorrect points)</p> <p>A1 for correct straight line between $x = 10$ and $x = 50$ (accept dotted line or complete line)</p> <p>USE OF $y = mx + c$</p> <p>M1 for line drawn with gradient of 2</p> <p>M1 for line drawn with a y intercept of 10</p> <p>A1 for correct straight line between $x = 10$ and $x = 50$ (accept dotted line or complete line)</p>
x	y																	
10	30																	
20	50																	
30	70																	
40	90																	
50	110																	
60	130																	

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Question	Working	Answer	Mark	Notes										
2	(b) $y = x + 25$ <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>0</td> <td>10</td> <td>20</td> <td>30</td> </tr> <tr> <td>y</td> <td>25</td> <td>35</td> <td>45</td> <td>55</td> </tr> </table> OR $2x + 10 = x + 25$ $2x - x = 25 - 10$	x	0	10	20	30	y	25	35	45	55	15	3	Draw Line M2 draw $y = x + 25$ between $x = 10$ and $x = 30$ (M1 for at least 2 correct attempts to find points and plotting them correctly or Line through $(0, 25)$ with positive gradient) A1 (dep on M1) ft for '15' OR Table of values M1 trials at least 3 values in $y = x + 25$ M1 for an attempt at interpolation between $x = 10$ and $x = 20$ A1 cao OR Algebraic Method M1 for $2x + 10 = x + 25$ M1 for $2x - x = 25 - 10$ A1 cao
x	0	10	20	30										
y	25	35	45	55										
3		side elevation	2	B2 for 8 cm by 6 cm side elevation with horizontal line at ht 4 cm (B1 for any rectangle base 8 cm or height 6 cm)										

5AM2H 01																								
Question	Working	Answer	Mark	Notes																				
4	<p>12 are red. $\frac{1}{3}$ are red $12 \times 3 =$</p> <p>OR 2 blue for 1 red 24 blue for 12 red $24 + 12 =$</p>	36	3	<p>M1 for $P(\text{red}) = \frac{1}{3}$ M1 for $\frac{1}{3} \times 36 = 12$ red or 12×3 A1 for 36 cao</p> <p>OR M1 for 2 blue for 1 red M1 for 24 blue for 12 red or $24 + 12$ A1 for 36 cao</p>																				
5	<p>$x + x - 5 + 2x < 30$ $x + x + 2x < 30 + 5$ $4x < 35$ $x < 35 \div 4$</p> <p>OR</p> <table border="1"> <tr> <td>S</td> <td>10</td> <td>9</td> <td>8</td> </tr> <tr> <td>M</td> <td>5</td> <td>4</td> <td>3</td> </tr> <tr> <td>J</td> <td>20</td> <td>18</td> <td>16</td> </tr> <tr> <td>Sum</td> <td>35</td> <td>31</td> <td>27</td> </tr> <tr> <td></td> <td>no</td> <td>no</td> <td>yes</td> </tr> </table>	S	10	9	8	M	5	4	3	J	20	18	16	Sum	35	31	27		no	no	yes	8	4	<p>M1 for $x - 5$ for Martin or $2x$ for James M1 (dep on M1) for $x + 'x - 5' + '2x' < 30$ (or = 30) M1 (dep on M2) for complete correct method to solve their equality or inequality or 8.75 oe seen A1 cao</p> <p>OR for trial and improvement method</p> <p>M1 for $x - 5$ for Martin or $2x$ for James (can be implied by 1 correct trial)</p> <p>M1 for 3 trials with correct ages (totals not needed) or 2 trials with correct ages and totals</p> <p>M1 for a trial total < 30 and a trial total > 30 or 8, 3, 16 identified as answer</p> <p>A1 cao</p>
S	10	9	8																					
M	5	4	3																					
J	20	18	16																					
Sum	35	31	27																					
	no	no	yes																					

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Question	Working	Answer	Mark	Notes
6	<p>Area cross section is</p> $\frac{1}{2} (1.2 + 1.8) \times 1.5$ $= 1.5 \times 1.5 = 2.25$ <p>OR</p> $1.5 \times 1.2 + \frac{1}{2} 1.5 \times (1.8 - 1.2)$ $1.8 + 0.45 = 2.25$ <p>OR</p> $1.5 \times 1.8 - \frac{1}{2} 1.5 \times (1.8 - 1.2)$ $2.7 - 0.45 = 2.25$ <p>Volume = $2.25 \times 2 =$</p> <p>OR</p> <p>Cuboid volume is</p> $1.2 \times 2 \times 1.5 = 3.6$ <p>Triangular prism volume is</p> $\frac{1}{2} \times 1.5 \times (1.8 - 1.2) \times 2 = 0.9$ $3.6 + 0.9$ <p>OR</p> <p>Outer cuboid volume is</p> $2 \times 1.5 \times 1.8 = 5.4$ <p>Triangular prism volume is</p> $\frac{1}{2} \times 1.5 \times (1.8 - 1.2) \times 2 = 0.9$ $5.4 - 0.9$	4.5	4	<p>Volume from Area of cross section \times length</p> <p>M2 for $\frac{1}{2} (1.2 + 1.8) \times 1.5$ oe</p> <p>or $1.5 \times 1.2 + \frac{1}{2} 1.5 \times (1.8 - 1.2)$</p> <p>or $1.5 \times 1.8 - \frac{1}{2} 1.5 \times (1.8 - 1.2)$</p> <p>or 2.25 given as cross sectional area</p> <p>(M1 for $(1.2 + 1.8) \times 1.5$ or $1.5 \times 1.2 + 1.5 \times (1.8 - 1.2)$ or $1.5 \times 1.8 - 1.5 \times (1.8 - 1.2)$)</p> <p>M1 for “2.25” \times 2 A1cao</p> <p>SC: B2 for answer of 9 if this method is used</p> <p>OR Volume from cuboid volume + triangular prism volume</p> <p>M1 for $1.2 \times 2 \times 1.5$ or 3.6 given as volume of cuboid</p> <p>M1 for $\frac{1}{2} \times 1.5 \times (1.8 - 1.2) \times 2$ or 0.9 given as volume of triangular prism</p> <p>M1 for “3.6” + “0.9” where “3.6” and “0.9” are volumes A1cao</p> <p>SC: B2 for answer of 5.4 if this method is used</p> <p>OR Volume from cuboid volume – triangular prism volume</p> <p>M1 for $2 \times 1.5 \times 1.8$ or 5.4 given as volume of outer cuboid</p> <p>M1 for $\frac{1}{2} \times 1.5 \times (1.8 - 1.2) \times 2$ or 0.9 given as volume of triangular prism</p> <p>M1 for “5.4” – “0.9” where “5.4” and “0.9” are both volumes A1cao</p> <p>SC: B2 for answer of 3.6 if this method is used</p>

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Question	Working	Answer	Mark	Notes
7		$T = 36x + 24y$	3	B3 for $T = 36x + 24y$ oe (B2 for $36x + 24y$ or $T = Ax + By$ with A and $B > 1$) (B1 for $T =$ an expression in x and/or y eg $T = x + y$ or $36x$ or $24y$ seen)
8	(a) $16^2 - 13^2 = 256 - 169 = 87$ $\sqrt{87} = 9.327379\dots$	9.33	3	M1 for $16^2 - 13^2$ (= 87) M1 for $\sqrt{87}$ A1 for 9.327...
	(b) $28 \div \sqrt{87} = 3$ $16 \div 8 = 2$ $26 \div 13 = 2$ $3 \times 2 \times 2 \times 2$ OR Big V = $26 \times 16 \times 28 = 11648$ Small V = $\frac{1}{2} \times 13 \times 8 \times \sqrt{87} = 485.0237\dots$ $11648 \div 485.0237\dots = 24.01532\dots$	24	3	M1 for two of $16 \div 8$ $26 \div 13$ $28 \div 'x'$ or $'3' \times 2 \times 2$ M1 for $('3' \times '2' \times '2') \times 2$ A1 cao OR M2 for $26 \times 16 \times 28 \div \frac{1}{2} \times 13 \times 8 \times \sqrt{87}$ (M1 for $26 \times 16 \times 28$ or 11648 or $\frac{1}{2} \times 13 \times 8 \times \sqrt{87}$ or 485. ...) A1 cao

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Question	Working	Answer	Mark	Notes
9	$4 \rightarrow 80 \quad 5 \rightarrow 145$ $4.5 \rightarrow 109.125$ $4.4 \rightarrow 102.784$ $4.3 \rightarrow 96.707$ $4.35 \rightarrow 99.712\dots$	4.4	4	B2 for a trial between 4 and 5 exclusive (B1 for any correct trial $x \neq 0$) B1 for a different trial between 4.3 and 4.4 exclusive B1 (dep on at least one previous B1) for 4.4 only NB Trials where x has 1 dp or more should be rounded or truncated to at least 3 s.f.
10	$D = 1.25 \times 0.4 = 0.5$ $h = 1.5 \times 0.4 = 0.6$ $V = [2(0.6)(0.5)^2 - 0.6(0.4)^2] \div 4$ $= [0.3 + 0.096] \div 4$ OR $V = \frac{2(1.5d)(1.25d)^2 + (1.5d)d^2}{4}$ $= [4.6875d^3 + 1.5d^3] \div 4$ $= 6.1875d^3 \div 4$ $= 1.546875 \times 0.4^3 \div 4$	0.099	4	M3 for $\{ 2(1.5 \times 0.4)(1.25 \times 0.4)^2 + (1.5 \times 0.4)0.4^2 \} \div 4$ (M2 for $2(1.5 \times 0.4)(1.25 \times 0.4)^2$ or 0.3 or $(1.5 \times 0.4)0.4^2$ or 0.096 or 0.396) (M1 for $h = 1.5 \times 0.4$ or 0.6 or $D = 1.25 \times 0.4$ or 0.5) A1 cao (accept 99000 cm ³ with m ³ crossed out) OR M2 for $['2(1.5d)(1.25d)^2' + '(1.5d)d^2'] \div 4$ (M1 for $2(1.5d)(1.25d)^2$ or $(1.5d)d^2$) M1 dep on M1 for substituting $d = 0.4$ eg 1.25×0.4 or 0.5 or 1.5×0.4 or 0.6 A1 cao (accept 99000 cm ³ with m ³ crossed out)

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Question	Working	Answer	Mark	Notes
*11	<p>(a) $3 + 1 + 3 + 2 + 1 = 10$ $3 \div 10 \times 50$</p> <p>(b) $3 \times 20 + 10 + 3 \times 5 + 2 \times 2 + 1 = 90\text{p}$ $90 \div 10 = 9\text{p}$ $9\text{p} < 10\text{p}$</p> <p>OR Loses $10\text{p} + 10\text{p} + 10\text{p} = 30\text{p}$ Gains $5\text{p} + 5\text{p} + 5\text{p} + 8\text{p} + 8\text{p} + 9\text{p} = 40\text{p}$ $30\text{p} < 40\text{p}$</p> <p>OR In: 50 people = 500p Out: $\frac{3}{10} \times 50 \times 20 + \frac{1}{10} \times 50 \times 10 + \frac{3}{10} \times 50 \times 5$ $+ \frac{2}{10} \times 50 \times 2 + \frac{1}{10} \times 50 \times 1$ $= 300 + 50 + 75 + 20 + 5 = 450\text{p}$ $450\text{p} < 500\text{p}$</p> <p>OR In: 10 people = $10 \times 10\text{p} = 100\text{p}$ Out: each prize happens once $= 3 \times 20 + 10 + 3 \times 5 + 2 \times 2 + 1$ $= 90\text{p}$ $90\text{p} < 100\text{p}$</p>	15	2	<p>M1 for $\frac{3}{'3+1+3+2+1'} \times 50$ oe or $\frac{3}{10}$ oe A1 cao</p>
		Yes reason	3	<p>M1 for $f \times$ prize value oe (at least 3 correct) M1 for $\sum (f \times \text{prize value}) \div 10 (= 9)$ C1 for Yes with a reason from correct calculations eg $9\text{p} < 10\text{p}$</p> <p>OR M1 for $f \times (\text{prize value} - 10)$ oe (at least 3 correct) M1 for $\sum [f \times (\text{prize value} - 10)] \div 10 (= 10)$ C1 for Yes with a reason from correct calculations eg makes 10p every 10 goes; eg $30\text{p} < 40\text{p}$</p> <p>OR M1 for $\frac{f}{10} \times 50 \times$ prize value for out (at least 3 correct) M1 for $\sum (\frac{f}{10} \times 50 \times \text{prize value}) (= 450 \text{ or } 4.5)$ C1 for Yes with a reason from correct calculations eg $450\text{p} < 500\text{p}$</p> <p>OR M1 for $f \times$ prize value oe (at least 3 correct) M1 for $\sum (f \times \text{prize value}) (= 90)$ C1 for Yes with a reason from correct calculations eg $90\text{p} < 100\text{p}$</p>

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Question	Working	Answer	Mark	Notes
12	$425 \div 17 = 25$ Flour : $8 \times 25 = 200\text{g}$ Butter : $4 \times 25 = 100\text{g}$ Jam : $5 \times 25 = 125\text{g}$ Total weight for 200 rolls: $= \text{total grams} \times 200 \div 1000$ Flour: $200 \times 0.2 = 40\text{ kg}$ Butter : $100 \times 0.2 = 20\text{ kg}$ Jam : $125 \times 0.2 = 25\text{ kg}$ Total cost = $40 \times 40\text{p}$ $+ 20 \times \text{£}2.50 + 25 \times \text{£}1$ $= \text{£}16 + \text{£}50 + \text{£}25$ OR $200 \times 425 (= 85000\text{g} = 85\text{kg})$ $85 \div 17 = 5$ Flour : $8 \times 5 = 40\text{ kg}$ Butter : $4 \times 5 = 20\text{ kg}$ Jam : $5 \times 5 = 25\text{ kg}$ Total cost = $40 \times 40\text{p}$ $+ 20 \times \text{£}2.50 + 25 \times \text{£}1$ $= \text{£}16 + \text{£}50 + \text{£}25$	91	6	M1 for $425 \div '8+4+5'$ or 25 seen M1 for two of $8 \times 25 (=200,)$ $4 \times 25 (=100),$ $5 \times 25 (=125)$ M1 for two of '200' $\times 200 (= 40\ 000),$ '100' $\times 200 (= 20\ 000)$ '125' $\times 200 (= 25\ 000)$ M1 for converting g to kg (at least two ingredients) (= 40, 20, 25) M1 for '40' $\times 40\text{p}$ + '20' $\times \text{£}2.50$ + '25' $\times \text{£}1$ (= $\text{£}16 + \text{£}50 + \text{£}25$) A1 for 91 or 91.00 OR M1 for $200 \times 425 = 85000\text{ (g)}$ M1 for converting g to kg (eg $425 \div 1000$ or $85000 \div 1000$) M1 for $85 \div '8 + 4 + 5'$ M1 for two of $8 \times '5' (= 40)$ $4 \times '5' (= 20)$ $5 \times '5' (= 25)$ M1 for '40' $\times 40\text{p}$ + '20' $\times \text{£}2.50$ + '25' $\times \text{£}1$ (= $\text{£}16 + \text{£}50 + \text{£}25$) A1 for 91 or 91.00

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Question	Working					Answer	Mark	Notes																																																	
13	$\frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$ $1 - \frac{1}{36}$ <p>OR</p> $\frac{1}{6} \times \frac{5}{6} + \frac{5}{6} \times \frac{1}{6} + \frac{5}{6} \times \frac{5}{6}$ $= \frac{5+5+25}{36}$ <p>OR</p> <table border="1"> <tr> <td></td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> </tr> <tr> <td>1</td> <td>1,1</td> <td>1,2</td> <td>1,3</td> <td>1,4</td> <td>1,5</td> <td>1,6</td> </tr> <tr> <td>2</td> <td>2,1</td> <td>2,2</td> <td>2,3</td> <td>2,4</td> <td>2,5</td> <td>2,6</td> </tr> <tr> <td>3</td> <td>3,1</td> <td>3,2</td> <td>3,3</td> <td>3,4</td> <td>3,5</td> <td>3,6</td> </tr> <tr> <td>4</td> <td>4,1</td> <td>4,2</td> <td>4,3</td> <td>4,4</td> <td>4,5</td> <td>4,6</td> </tr> <tr> <td>5</td> <td>5,1</td> <td>5,2</td> <td>5,3</td> <td>5,4</td> <td>5,5</td> <td>5,6</td> </tr> <tr> <td>6</td> <td>6,1</td> <td>6,2</td> <td>6,3</td> <td>6,4</td> <td>6,5</td> <td>6,6</td> </tr> </table>						1	2	3	4	5	6	1	1,1	1,2	1,3	1,4	1,5	1,6	2	2,1	2,2	2,3	2,4	2,5	2,6	3	3,1	3,2	3,3	3,4	3,5	3,6	4	4,1	4,2	4,3	4,4	4,5	4,6	5	5,1	5,2	5,3	5,4	5,5	5,6	6	6,1	6,2	6,3	6,4	6,5	6,6	$\frac{35}{36}$	3	<p>M1 for $\frac{1}{6} \times \frac{1}{6}$ oe</p> <p>M1 for $1 - \frac{1}{6} \times \frac{1}{6}$ oe</p> <p>A1 for $\frac{35}{36}$ or 0.97(2222...) oe</p> <p>OR</p> <p>M1 for $\frac{1}{6} \times \frac{5}{6}$ or $\frac{5}{6} \times \frac{1}{6}$ or $\frac{5}{6} \times \frac{5}{6}$ oe</p> <p>M1 for $\frac{1}{6} \times \frac{5}{6} + \frac{5}{6} \times \frac{1}{6} + \frac{5}{6} \times \frac{5}{6}$ oe</p> <p>A1 for $\frac{35}{36}$ or 0.97(2222...) oe</p> <p>OR</p> <p>M1 for probability space oe that can lead to the answer</p> <p>M1 for $1 - \frac{\text{'number of 6,6'}}{36}$ or $\frac{\text{'number of non 6,6'}}{36}$</p> <p>A1 for $\frac{35}{36}$ or 0.97(2222...) oe</p>
	1	2	3	4	5	6																																																			
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6	6,1	6,2	6,3	6,4	6,5	6,6																																																			
14	$200 \div 7.6$ $= 26.31578$					26.3	3	<p>M1 for $200 \div 7.6$</p> <p>A1 for 26.3 or better</p> <p>B1 (indep) for cm^3</p>																																																	

5AM2H_01					
Question		Working	Answer	Mark	Notes
15	(a)		32 – 33	1	B1 for 32 – 33
	(b)		0.7 – 0.9 4.1 – 4.4	2	B2 for 0.7 – 0.9 and 4.1 – 4.4 (B1 for 0.7 – 0.9 or 4.1 – 4.4) OR 0.7 – 0.9 and 4.1 – 4.4 seen)
	(c)		4.9	3	M1 for tangent drawn at $t = 2$ M1 for $\frac{y}{x}$ A1 for 4.5 to 5.3 or f.t. from ‘tangent’ (dep on 1 st M1)
16	(a)	$\sin 16^\circ = BC \div 12$ $BC = 12 \sin 16^\circ = 3.307648$	3.31	3	M1 for $\sin 16 = BC \div 12$ oe M1 for $12 \sin 16$ oe A1 for 3.30 – 3.31 SC: Award B2 for an answer of $\pm 3.45\dots$ or $2.98\dots$
	(b)	$RQ = 27 - 3.307648$ $= 23.6923$ $\tan RBQ = 23.6923 \div 18$ $= 1.31623$ $\angle QBR = \text{inv tan } 1.31623$ $= 52.7746$	52.8	3	M1 for $\tan RBQ = (27 - '3.307648') \div 18$ or $\tan BRQ = 18 \div (27 - '3.307648')$ M1 for $\text{inv tan } '27 - 3.307648' \div 18$ or $\text{inv tan } BRQ = 18 \div (27 - '3.307648')$ A1 for 52.7 – 52.8 SC: Award B2 for angle $BRQ = 37.2 - 37.3$ SC: Award B2 for an answer of $0.918\dots$ or $59.05\dots$ or 59.1

5AM2H_01											
Question		Working						Answer	Mark	Notes	
17	(a)	R	2	4	6	8	10	12	3, 1.5, 1	2	B2 for all 3 correct (B1 for 1 or 2 correct)
	(b)	I	6	3	2	1.5	1.2	1			
									graph	2	B2 for fully correct graph (B1ft for 6 'points' plotted correctly \pm 1 square B1 for smooth curve plotted through all '5 or 6' plotted points provided B1 awarded in (a))

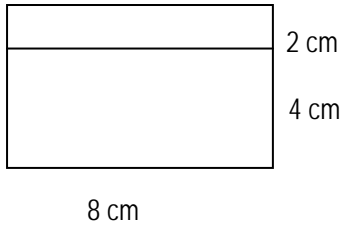
5AM2H_01				
Question	Working	Answer	Mark	Notes
18	$PP + YY + BB$ $= \frac{7}{30} \times \frac{6}{29} + \frac{13}{30} \times \frac{12}{29} + \frac{10}{30} \times \frac{9}{29}$ $= \frac{42 + 156 + 90}{870}$ <p>OR</p> $PY + PB + YP + YB + BP + BY$ $= \frac{7}{30} \times \frac{13}{29} + \frac{7}{30} \times \frac{10}{29} + \frac{13}{30} \times \frac{7}{29}$ $+ \frac{13}{30} \times \frac{10}{29} + \frac{10}{30} \times \frac{7}{29} + \frac{10}{30} \times \frac{13}{29}$ $= \frac{91 + 70 + 91 + 130 + 70 + 130}{870}$	$\frac{582}{870}$	5	<p>M1 for use of 29 as denominator for 2nd probability</p> <p>M1 for $\frac{7}{30} \times \frac{6}{29}$ or $\frac{13}{30} \times \frac{12}{29}$ or $\frac{30-13-7}{30} \times \frac{30-13-7-1}{29}$ oe</p> <p>M1 for $\frac{7}{30} \times \frac{6}{29} + \frac{13}{30} \times \frac{12}{29} + \frac{10}{30} \times \frac{9}{29}$ (= $\frac{288}{870}$)</p> <p>M1 for $1 - \frac{288}{870}$</p> <p>A1 for $\frac{582}{870}$ oe (eg $\frac{97}{145}$, 0.66896..., 0.669 with method identified)</p> <p>OR</p> <p>M1 for use of 29 as denominator for 2nd probability</p> <p>M1 for $\frac{7}{30} \times \frac{13}{29}$ or $\frac{7}{30} \times \frac{10}{29}$ or $\frac{13}{30} \times \frac{7}{29}$ or $\frac{13}{30} \times \frac{10}{29}$ or $\frac{10}{30} \times \frac{7}{29}$ or $\frac{10}{30} \times \frac{10}{29}$ oe</p> <p>M2 for $\frac{7}{30} \times \frac{13}{29} + \frac{7}{30} \times \frac{10}{29} + \frac{13}{30} \times \frac{7}{29} + \frac{13}{30} \times \frac{10}{29} + \frac{10}{30} \times \frac{7}{29} + \frac{10}{30} \times \frac{13}{29}$ (M1 for at least 3 of these pairs added)</p> <p>A1 for $\frac{582}{870}$ oe (eg $\frac{97}{145}$, 0.6689 to 0.669 with method identified)</p> <p>SC: B2 for $\frac{582}{900}$ oe or for $\frac{582}{840}$ (B1 for $\frac{7}{30} \times \frac{6}{30} + \frac{13}{30} \times \frac{12}{30} + \frac{10}{30} \times \frac{9}{30}$ oe or $\frac{7}{30} \times \frac{6}{28} + \frac{13}{30} \times \frac{12}{28} + \frac{10}{30} \times \frac{9}{28}$ oe)</p>

5AM2H 01				
Question	Working	Answer	Mark	Notes
19	$\pi 76^2 - \pi 24^2$ $= 18145.839... - 1809.557...$ $80 \div 360 \times 16336.282...$ $= 3630.1284...$ <p>OR</p> $\frac{80}{360} \times \pi 76^2 - \frac{80}{360} \times \pi 24^2$ $= 4032.40... - 402.12...$ $= 3630.1284...$	3630	4	M1 for $\pi 76^2$ or $\pi 24^2$ or $\frac{80}{360}$ oe seen M1 dep for ' $\pi 76^2$ ' - ' $\pi 24^2$ ' M1 dep on M1 for $\frac{80}{360} \times (\pi 76^2 - \pi 24^2)$ A1 for 3630 - 3631
20 QWC	$\sqrt{45^2 + 20^2} = \sqrt{2425} = 49.24...$ $\sqrt{30^2 + 20^2} = \sqrt{1300} = 36.05...$ $\sqrt{45^2 + 30^2} = \sqrt{2925} = 54.08...$ $\sqrt{45^2 + 20^2 + 30^2} = \sqrt{3325}$ $= 57.66281297$ <p>OR</p> $30^2 + 20^2 + 45^2$ $= 900 + 400 + 2025 = 3325$ $\sqrt{3325} = 57.66281297$	No with working	4	M1 for $45^2 + 20^2$ or $20^2 + 30^2$ or $45^2 + 30^2$ M1 for $\sqrt{45^2 + 20^2}$ or $\sqrt{20^2 + 30^2}$ or $\sqrt{45^2 + 30^2}$ M1 for $\sqrt{45^2 + 20^2 + 30^2}$ (= $\sqrt{3325}$) C1 for No AND $57.6 - 57.7 < 60$ oe <p>OR</p> M2 for $30^2 + 20^2 + 45^2$ (= $900 + 400 + 2025 = 3325$) M1 for $\sqrt{3325}$ C1 for No AND $57.6 - 57.7 < 60$ oe

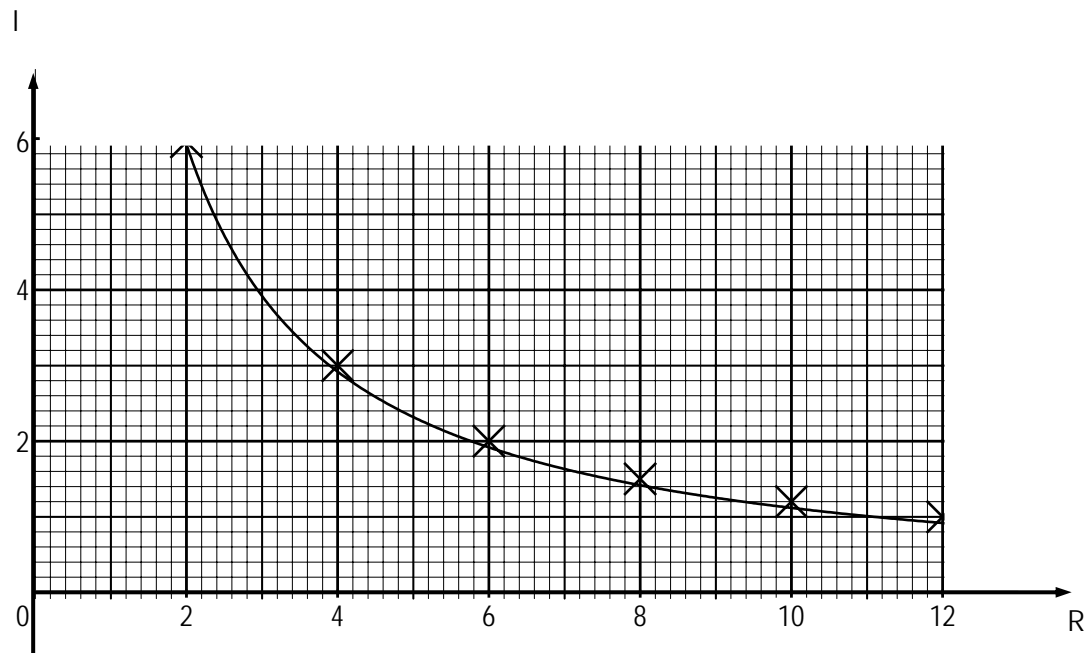
5AM2H 01					
Question	Working	Answer	Mark	Notes	
21	$T = k \sqrt{L}$ $2 = k \sqrt{100}$ $k = 2 \div 10 = 0.2$ $0.2 \times \sqrt{64}$	1.6	4	M1 for $T = k \sqrt{L}$ M1 for $2 = k \sqrt{100}$ oe M1 for $(k =) 2 \div \sqrt{100}$ (= 0.2) A1 for 1.6 cao OR M2 for $2 \times \frac{\sqrt{64}}{\sqrt{100}}$ or $2 \div \frac{\sqrt{100}}{\sqrt{64}}$ oe (M1 for scale factor $\frac{\sqrt{64}}{\sqrt{100}}$ or $\frac{\sqrt{100}}{\sqrt{64}}$ oe) A1 for 1.6 cao	
22	(a)	$5.95 \times 14.5 \times 60$ $= 86.275 \times 60 = 5176.5$ $5176.5 \div 1000$	5.1765	3	B1 for 5.95 or 14.5 seen M1 dep on B1 for 'LB' speed \times 'LB' time eg 5.95×14.5 ($\times 60$) A1 for cao
	(b)	$4.65 \text{ km} = 4650 \text{ m}$ $16.5 \text{ min} = 16.5 \times 60 = 990 \text{ sec}$ $4650 \div 990 = 4.69696969\dots$	4.69	3	B1 for 4.65 or 4650 or 16.5 or 990 seen M1 dep on B1 for 'UB' distance \div 'LB' time eg $4650 \div 990$ eg $4.65 \div 16.5$ A1 for 4.69 or $\frac{155}{33}$ oe (condone 4.6969...)

5AM2H_01				
Question	Working	Answer	Mark	Notes
23	2010: 8400 2011: 8988 2012: 9617 (.16) 2013: 10290 (.36...) 2014: 11010 (.686...) 2015: 11781 (.43...) 2016: 12606 (.134...) 2017: 13488 (.564...) 2018: 14432 (.76...) 2019: 15443 (.057...)	2019	5	M1 for $\left(1+\frac{7}{100}\right)^n$ oe (eg 1.07 seen) or 8988 seen M1 for $8400 \times \left(1+\frac{7}{100}\right)^n$ seen or $8400 \times \left(1+\frac{7}{100}\right)^n$ where $n \geq 2$ eg 9617 seen M1 for $8400 \times \left(1+\frac{7}{100}\right)^n$ where $n \geq 5$ M1 $n=9$ evaluated and bees = 15 443 (.067...) (or bees > 15 000) A1 for 2019

Q3.



Q17.



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Welsh Assembly Government

