## $\frac{\text { WJEC }}{\text { CBAC }}$

## GCSE MARKING SCHEME

MATHEMATICS - WALES PILOT

SUMMER 2011

## INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2011 examination in GCSE MATHEMATICS - WALES 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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GCSE MATHEMATICS - WALES PILOT

PAPER 1 - FOUNDATION TIER

| 2011 Summer Paper 1 (Non calculator) |
| :--- | :--- | :--- |
| Wales Pilot Foundation Tier |$\quad$ Marks $\quad$ Comments


| 2011 Summer Paper 1 (Non calculator) Wales Pilot Foundation Tier | Marks | Comments |
| :---: | :---: | :---: |
| 7. (a) Missing side $=3$ <br> Perimeter $=42(\mathrm{~cm})$ <br> (b) Area $=10 \times 4$ $\begin{gathered} \times 2=80 \\ \mathrm{~cm}^{2} \end{gathered}$ | $\begin{gathered} \hline \text { B1 } \\ \text { B1 } \\ \\ \text { M1 } \\ \text { A1 } \\ \text { U1 } \\ 5 \\ \hline \end{gathered}$ | $\text { F.T. } 39+\text { 'their 3' }$ <br> For the area of 1 rectangle Watch out for $10 \times 4$ then $\times 3$ which gets M0. Independent of all other marks |
| 8. (a) Plots <br> Line(s) or curve <br> (b) Any correct strategy, e.g. 3 times value at 10 fluid ounces Their answer | P1 <br> B1 <br> M1 <br> A1 <br> 4 | Allow 55-60, 140-145, 195-200 inclusive (small square). <br> Allow vertical line graphs, but bars get P0. <br> This mark is for connecting the points to allow interpolation. At least as long as fluid ounces from 2 to 7 . <br> Any correct method using graph or table. <br> F.T. their graph. <br> Unsupported answers in the range $825-875$ get M1, A1. |
| 9. (a) 8 x <br> (b) $(x=) 4$ $\text { (c) } \begin{aligned} 35 & =5 \times 4+3 \mathrm{H} \\ 3 \mathrm{H} & =15 \\ \mathrm{H} & =15 / 3 \text { ISW } \quad(=5) \end{aligned}$ | $\begin{gathered} \hline \text { B1 } \\ \text { B1 } \\ \\ \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ \\ \hline \end{gathered}$ | C.A.O. <br> Allow embedded answers such as $7 \times 4=28$ <br> Correct substitution. $35=54+3 \mathrm{H}$ gets B0. <br> Isolating the H <br> F.T. $\mathrm{aH}=\mathrm{b} \quad(\mathrm{a} \neq 1)$ <br> Allow embedded answers. |
| 10. Man 5 to 7 ft OR $1 \cdot 5$ to $2 \cdot 5$ metres <br> Man $1 \mathrm{~cm} \quad$ Whale $=15 \mathrm{~cm}$ <br> Multiplying factor $=15$ <br> Length $=$ man's estimate $\times$ their SF (10-18) <br> SC1 for answers which: <br> (a) only give man's height as 1 cm and length of whale as 15 cm OR <br> (b) a proper attempt at 'dividing' the length of the whale into equal parts | B1 <br> B1 <br> M1 <br> A1 <br> 4 |  |
| 11. (a) (i) 10 <br> (ii) e.g. 4 (4-rods) with 3 (3-rods) 3 above/below them $(16-9)$ <br> (iii) e.g. a (3-rod) and a (4-rod) (4-3) <br> (b) (i) e.g. 3 (5-rod) with 2 (7-rods) <br> $(15-7)$ <br> (ii) 3 ( 7 rods) -4 ( 5 rods) $(21-20)$ | $\begin{gathered} \mathrm{B} 1 \\ \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ 5 \end{gathered}$ |  |
| $\text { 12. } \mathrm{Q}$ | B3 $3$ | B2 for any 2 or 3 correct <br> B1 for any 1 correct <br> Allow correct names or diagrams. |
| $\begin{array}{llll} \hline 13.11,890 \sim 12000 & 39 \sim 40 & 5.96 \sim 6 & 52 \sim 50 \end{array}$ $\begin{aligned} & 12000 / 40=(300 \text { galls }) \\ & 300 \times 6=(£ 1800) \\ & 1800 / 50 \end{aligned}$ | $\begin{gathered} \hline \text { B2 } \\ \\ \text { M1 } \\ \text { M1 } \\ \text { M1 } \\ \text { A1 } \\ 6 \\ \hline \end{gathered}$ | B1 for any 2 estimates. <br> Accept other reasonable values such as 10,000 etc Use of 12 and 4 is acceptable as the estimate for 52 <br> Division of 'their 12000 ' by 'their 40 ' <br> Multiplication by 'their 6' <br> Division by 'their 50' <br> F.T. their estimates <br> Unsupported (£)36 gets the final 4 marks only. |


| 2011 Summer Paper 1 (Non calculator) Wales Pilot Foundation Tier | Marks | Comments |  |
| :---: | :---: | :---: | :---: |
| $\begin{array}{llll}\text { 14. (a) } & 9 & 15 & \\ & 6 & & 12\end{array}$ <br> (b) $\frac{6}{16}$ <br> (c) $\frac{6}{16}$ of 160 $=60$ <br> (d) $160 \times 50(\mathrm{p})$ $\begin{gathered} -60 \times(\mathfrak{f}) 1 \quad \text { OR } \\ =£ 20.00 \end{gathered}$ $(£) 80-(£) 60$ | B2 <br> B2 <br> M1 <br> A1 <br> M1 <br> A1 <br> 8 | C.A.O. <br> B1 for any 2 correct entries <br> F.T. their table <br> B1 for a numerator of 6 in a fraction less than 1. <br> B1 for a denominator of 16 in a fraction $<1$ <br> F.T. 'their (b)' if a fraction $<1(\neq 1 / 2)$ <br> 60/160 gets M1, A0 <br> 60 out of 160 gets M1, A1 <br> Full method <br> F.T. 'their 60' | NOTES <br> Penalise -1 for use of words such as " 6 out of 16 ", " 6 in 16 " OR " $6: 16$ ". <br> When fraction and wrong notation seen, DO NOT penalise wrong notation. |
| 15. (a) 200 <br> (b) $\frac{5}{8}-\frac{2}{8}$ $=\frac{3}{8}$ <br> (c) 3 | B2 <br> M1 <br> A1 <br> B1 <br> 5 | B1 for 8 OR 25 <br> Any correct method <br> Accept 375 OR 37.5 \% <br> Do not accept $3^{3}$ |  |
| 16.(a) 170 (cm) <br> (b) $50(\mathrm{~kg})$ <br> (c) Positive <br> (d) Suitable line, with some points above and below <br> (e) F.T. their line of best fit. <br> H2 | $\begin{gathered} \hline \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ \\ \hline 5 \end{gathered}$ | Do not accept a description <br> No requirement to pass through th Accept answers in the range $>55$ | means <br> but $\leq \leq 2(\mathrm{~kg})$ |
| 17. Correct region shaded, both sides of AB H6 | B3 3 | Mark intention. B1 for line, FT similar region, arc centre final B1. | arc, B1 for shading. d a line crossing AB for the |
|  | $\begin{gathered} \hline \text { B2 } \\ 2 \end{gathered}$ | B1 for sight of 6 and 3 |  |
| $\text { 19.(a) } \begin{aligned} & 8 x+12+9 x-24 \\ &=17 x-12 \end{aligned}$ | $\begin{aligned} & \hline \text { B1 } \\ & \text { B1 } \end{aligned}$ | FT until second error |  |
| b) $y^{4}+7 y$ | B2 | B1 for each term as part of a Do not accept $\mathrm{y} \times \mathrm{y}^{3}$. <br> Accept ' $+\mathrm{y} \times 7$ ' or ' $+7 \times \mathrm{y}$ ' or ' | erm expression. |
| c) $x+7 \times 3=12 \times 3$ OR $x / 3=12-7$ $x=15$ | $\begin{aligned} & \text { M1 } \\ & \text { A1 } \end{aligned}$ | Accept embedded answer FT until $2^{\text {nd }}$ error |  |
| $\text { (d) } 2 \mathrm{y}+5=45 / 3 \quad \mathrm{y}=5 \mathrm{OR} 6 \mathrm{y}+15=45$ | $\begin{gathered} \text { B1 } \\ \text { B1 } \\ 8 \end{gathered}$ | Accept $\mathrm{y}=30 / 6$ or $10 / 2 \mathrm{ISW}$. | cept embedded answer. |

PAPER 2 - FOUNDATION TIER

| 2011 Summer Paper 2 (Calculator allowed) Wales Pilot Foundation Tier | Marks | Comments |
| :---: | :---: | :---: |
| 1. (a) $(48.62)$ <br>  35.97 <br>  21.96 <br>  3.35 <br>  $109.9(0)$ <br> (b) (i) (£) 10.99 <br> (ii) Cost $=(£) 109.90-10.99$ $=$ (£) 98.91 | B1 <br> B1 <br> B1 <br> B1 <br> B1 <br> M1 <br> A1 <br> 7 | C.A.O. <br> C.A.O. <br> C.A.O. <br> F.T. their figures for one error <br> F.T. from (a). Award B1 for sight of (£)10.99 in (ii). <br> F.T. their $10 \%$ |
| 2. (a) Evidence of square counting $\begin{aligned} & 53-57 \\ & 530-570 \quad\left(\mathrm{~m}^{2}\right) \end{aligned}$ <br> (b) diameter tangent <br> (c) parallelogram trapezium cone | $\begin{gathered} \text { M1 } \\ \text { A1 } \\ \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ 8 \end{gathered}$ | e.g. dots in the squares <br> F.T. their area $\times 10$ <br> C.A.O. <br> C.A.O. <br> C.A.O. <br> C.A.O. <br> C.A.O. |
| 3. (a) $14,15,5,6$ <br> (b) L (abour) <br> (c) C, L, D, P <br> Uniform scale starting at 0 <br> Four bars at correct heights | B2 <br> B1 <br> B1 <br> B1 <br> B2 <br> 7 | B1 for any two/three correct frequencies <br> If frequencies score 0 , then give B1 for all 4 correct tallies. <br> F.T. their table of frequencies <br> Allow L(abour) and 15, but B0 for 15 only <br> F.T. their table of frequencies <br> If no scale then B 0 , <br> Allow one square to represent 1 <br> B1 for any 2 correct bars on F.T. |
| 4. (a) Cost $=33 \times 9.5(0)+150$ $=(£) 463.5(0)$ <br> (b) Number of students $\times 9.50=(372-125)$ Number of students $=26$ | $\begin{gathered} \text { M1 } \\ \text { A1 } \\ \text { M1 } \\ \text { A1 } \\ 4 \end{gathered}$ | For correct substitution C.A.O. <br> For correct substitution and subtraction Allow embedded references to the correct answer. |
| 5. (a) 1 line of symmetry <br> (b) 1 line of symmetry <br> (c) 2 lines of symmetry | $\begin{gathered} \hline \text { B1 } \\ \text { B1 } \\ \text { B2 } \\ \\ 4 \\ \hline \end{gathered}$ | Allow B1 for any 1 line of symmetry and no incorrect lines OR for 2 lines of symmetry and 1 incorrect line. |
| 6. (a) <br> (b) $5,12,8$ <br> (c) 11 <br> (d) Stage 5 <br> (i) 6 <br> (ii) 10 | B1 <br> B1 <br> B1 <br> B1 <br> B1 <br> B1 <br> 6 | OR for 6 in (i) or for 10 in (ii) <br> F.T. 'their stage' +1 <br> F.T. 'their stage' $\times 2$ |
| 7. (a) $-6\left({ }^{\circ} \mathrm{C}\right)$ <br> (b) $5\left({ }^{\circ} \mathrm{C}\right)$ <br> (c) $24\left({ }^{\circ} \mathrm{C}\right)$ | $\begin{gathered} \hline \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ 3 \\ \hline \end{gathered}$ | C.A.O. <br> Accept -5 <br> Accept -24 |


| 2011 Summer Paper 2 (Calculator allowed) Wales Pilot Foundation Tier | Marks | Comments |
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| 8. (a) $\begin{aligned} & \text { Sum of the numbers (506) } \\ & \text { Sum } / 8 \\ & 63.25\end{aligned}$ <br> (b) 39 <br> (c) $4253 \quad 58 \quad \underline{59} 65737581$ | $\begin{gathered} \hline \text { M1 } \\ \text { m1 } \\ \text { A1 } \\ \text { B1 } \\ \text { M1 } \\ \text { M1 } \\ \text { A } \\ \hline \end{gathered}$ | For attempt to add the numbers <br> For dividing a number in the range $410-590$ inc. by 8 C.A.O. <br> C.A.O. <br> For ordering (ascending or descending) all 8 numbers OR for unsupported 59, 65 OR 65, 59 C.A.O. |
| 9.A at $(-2,-3)$ <br> B at $(-3,2)$ <br> C at $(3,-4)$ | $\begin{gathered} \hline \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ 3 \\ \hline \end{gathered}$ | C.A.O, Reverse coordinates gets 0. <br> C.A.O, Allow plots within a 2mm square inclusive. <br> C.A.O, Accept the letters A,B, C instead of points |
| 10. (a) $\frac{36}{100} \times(£) 158$ $=(\mathfrak{£}) 56.88$ $\begin{gathered} \text { (b) } \frac{(£) 48.24-(£) 16.99}{(£) 6.25} \text { OR } \frac{31.25}{6.25} \\ =5 \\ \text { Number of days hired }=6 \end{gathered}$ | M1 <br> A1 <br> M1 <br> A1 <br> A1 <br> 5 | C.A.O. Penalise -1 for extra work such as adding $£ 158$ to get (£) 214.88 <br> For the complete method <br> C.A.O. <br> F.T. 'their 5 ' +1 if M awarded. <br> Unsupported 6 gets all 3 marks. Unsupported 5 gets 0 |
| 11. 3 or 4 angles correct and correctly labelled. <br> 3 or 4 angles correct, labels not fully correct. <br> 2 angles correct and correctly labelled. <br> 2 angles correct, labels not fully correct. <br> 1 angle correct and correctly labelled. <br> OR <br> If 0 OR 1 for their diagram or no diagram, <br> 360/90 <br> Angles are 20, 168, 132 and 40 | B4 <br> B3 <br> B3 <br> B2 <br> B1 <br> M1 <br> A1 <br> 4 | Use the overlay and allow $\pm 2^{\circ}$. <br> Correct labels (numbers NOT the frequency OR angle). <br> 3 correct labels is enough. <br> Accept labels in the form of a key. <br> If B0 scored for the diagram, check the angles and the method to see if the M1 and the A1 can be awarded. <br> 1 is $4^{\circ}$ gets the M1. <br> If only B 1 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: $5 \cdot 5,46 \cdot 7,36 \cdot 7,11 \cdot 1$ rounded OR truncated. |
| 12. (a) 3 <br> (b) $09: 55-04: 45$ $=5$ hours 10 minutes <br> (c) $11: 55$ $15: 20-11: 55=3 \text { hours } 25 \text { minutes }$ <br> (d) The 07:00 from Swansea because time from Newport to Heathrow is 4 hours and the others are about 3 hours | B1 <br> M1 <br> A1 <br> B1 <br> M1 <br> A1 <br> E2 <br> 8 | C.A.O. <br> For the two correct times subtracted <br> C.A.O. <br> C.A.O. <br> OR F.T. 12:05 (B0) then M1 for 15:20-12:05 and A1 for 3 hours 15 minutes. <br> E1 for identifying the correct bus. <br> If correct bus identified then a further E1 for a good explanation which is less detailed, e.g. 'because it takes longer' |
| 13. (a) Volume $=12 \times 7 \times 11$ $=924\left(\mathrm{~cm}^{3}\right)$ <br> (b) Height $=924 /(6 \times 13)$ $=11.8(\mathrm{~cm})$ | M1 A1 <br> M1 <br> A1 <br> 4 | C.A.O. <br> Allow M1, A0 for an answer made up of the digits, e.g 9.24 or 9240 <br> F.T. 'their 924' |


| 2011 Summer Paper 2 (Calculator allowed) Wales Pilot Foundation Tier | Marks | Comments |
| :---: | :---: | :---: |
| 14. Parallel to the 13 m side <br> Setting up the model (Needing 3 strips along 8 m ) <br> Cost $=13 \times 3$ <br> $\times(£) 25$ <br> $=(£) 975$ <br> Parallel to the 8 m side <br> Setting up the model (Needing 5 strips along 13m) <br> Cost $=8 \times 5$ <br> $\times($ (£) 25 <br> $=(\mathfrak{f}) 1000$ <br> First method is cheaper by (£) 25 | S1 <br> M1 <br> m1 <br> A1 <br> S1 <br> M1 <br> A1 <br> A1 <br> 8 | For the strategy and finding the need for 3 strips of carpet <br> Finding the area of the carpet for their model <br> Finding the cost of the carpet for their model <br> F.T. the area of their carpet $\times(£) 25$ <br> For the strategy and finding the need for 5 strips of carpet <br> Finding the area of the carpet for their model <br> Finding the cost of the carpet for their model <br> F.T. the area of their carpet $\times(£) 25$ <br> Use the 4 for either model and 3 for the other <br> F.T. for finding second cost AND stating which is the cheaper, provided at least S1 awarded. |
| 15. Ship from A travels 120 km <br> Ship from B travels 80 km <br> Arc of a circle centre A radius 12 cm AND arc of a circle centre $B$ radius 8 cm meeting at the 2 correct points. <br> Cannot meet at the left hand intersection because the ship from A cannot cross land. <br> Bearing from their chosen point. <br> (Must be in 3 figure form) <br> $012^{\circ}-016^{\circ}$ for correct point. | B1 <br> B1 <br> B2 <br> E1 <br> B1 <br> 6 | OR implied by their drawing of an arc 12 cm centred at A . Or implied by their drawing of an arc 8 cm centred at B . B1 only for either arc if they do not meet. <br> Allow 11.8-12.2. F.T. their distance $\div 10$ <br> Allow $7.8-8.2$. F.T. their distance $\div 10$ <br> B1 is awarded for the correct position of either point where the ships meet being clearly \& unambiguously marked even if no arcs are drawn. <br> If due to error(s) candidates end up with 2 possible points of meeting then B1 for finding BOTH bearings from position of their points where the ships meet. |
| 16. (a) $70 / 1.66$ <br> (£) 42.17 <br> 46.35 / 1.09 <br> (£) 42.52 <br> (b) E.g. Buy Italy because more expensive, (but only a little) but he can have it straight away OR Buy Switzerland to save (a little) money | M1 <br> A1 <br> M1 <br> A1 <br> E1 <br> 5 | CAO <br> Penalise inappropriate rounding, or not rounding once only <br> Treat reverse of exchange leading to answers of 27.92 and 64.22 as SC2 <br> FT provided M2 awarded in (i) <br> Ignore incorrect calculation of the difference in price |
| 17. (a) $3 n+4$ <br> (b) $5 \mathrm{n}=\mathrm{m}+32 \quad$ OR $\mathrm{m}+32=5 \mathrm{n}$ $n=\frac{m+32}{5}$ <br> (c) Strategy, e.g. attempt to use algebra for the terms or trial from a starting number keeping to difference criteria <br> $a, a+7, a+14, a+21$ or equivalent $4 a+42=6 \text { OR } 4 a=-36$ $-9,-2,5,12$ <br> H5ac | B2 <br> B1 <br> B1 <br> S1 <br> M1 <br> A1 <br> B1 <br> 8 | B1 for $3 \times \mathrm{n}$ seen, (not $\mathrm{n}+3$ ), or "term in n" +4 5 n alone on one side of an equation <br> F.T. until $2^{\text {nd }}$ error. B0 for $m+32 / 5 m+32 \div 5$ <br> OR sight of at least 3 trials keeping to 1 criterion <br> OR B4 for sight of the correct terms $-9,-2,5,12$ |
| 18. Area trapezium $=1 / 2(6+8) \times 5$ <br> Triangle: $\quad 1 / 2 \times 10 \times x=35$ $x=7(\mathrm{~cm})$ | $\begin{gathered} \text { M1 } \\ \text { A1 } \\ \text { M1 } \\ \text { A1 } \\ 4 \end{gathered}$ | Maybe implied in later working <br> FT their area of a trapezium <br> Watch for a correct answer from incorrect working leaving out $1 / 2$ from both formulae this gets SC1 |

## PAPER 1 - HIGHER TIER

| 2011 Summer Paper 1 Wales Pilot Higher Tier | Mark | Comments |
| :---: | :---: | :---: |
| 1.(a) Sight of any two from: 80 and 400 and 1200 or 1000 <br> 240 or 200 <br> (b) 790 <br> (c) $(45 / 150) \times 100$ $30 \text { (\%) }$ <br> (d) Attempt common format of any 3 of the given values with at least 2 of their manipulations correct <br> All 4 correct in the same format, e.g. 14/40, 15/40, 12/40 with $16 / 40$ (or equivalent) <br> $3 / 8$ or its equivalent | $\begin{aligned} & \text { M1 } \\ & \text { A1 } \\ & \text { B1 } \\ & \text { M1 } \\ & \text { A1 } \\ & \text { M1 } \\ & \text { A1 } \\ & \text { A1 } \\ & 8 \\ & \hline \end{aligned}$ | Maybe implied if correct response is given. <br> OR accept values that will lead to a simple calculation <br> For correct evaluation of their simple calculation <br> This complete method maybe seen in stages <br> All decimals, common denominator or \% <br> Or $0.35,0.375,0.3$ with 0.4 , OR $35(\%), 37.5(\%), 30(\%)$ with 40(\%) <br> FT provided M1 awarded. Accept $3 / 8$ provided M1 awarded Accept where candidates decide to find fractions of their own chosen quantity |
| 2.(a) 170 (cm) <br> (b) $50(\mathrm{~kg})$ <br> (c) Positive <br> (d) Suitable straight line, with some points above and below <br> (e) Follow through their line of best fit | $\begin{gathered} \hline \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ 5 \\ \hline \end{gathered}$ | Do not accept a description <br> No requirement to pass through the means <br> Accept answers in the range $>55(\mathrm{~kg})$ but $\leq 62(\mathrm{~kg})$ |
| 3.(a) (i) $8 x-5$ <br> (ii) $(y+5) / 8$ <br> (b) $-5,-2,3$ | $\begin{gathered} \text { B1 } \\ \text { B2 } \\ \\ \text { B2 } \\ 5 \\ \hline \end{gathered}$ | Accept $8 \times x-5$ or $\times 8-5$. Mark final answer. $8 \times(x-5)$ is B0 B1 for sight of $y+5$ or $(y-5) / 8$ or $y+5 / 8$ or $y / 8+5$ Mark their final answer if B2 is awarded B1 for any two terms correct in the correct position SC1 for $-6,-5,-2$ |
| 4. Perimeter $8+13+8+13$ or equivalent $=42(\mathrm{~m})$ | $\begin{gathered} \text { M1 } \\ \\ \text { A1 } \\ 2 \end{gathered}$ | E.g. drawing an outer rectangle with measurements shown or implied <br> Accept 42 cm |
| $\begin{aligned} & \hline 5 .(\mathrm{a}) \mathrm{a}=40^{\circ} \\ & 180-85-40 \end{aligned}$ $\mathrm{b}=55^{\circ}$ <br> (b) $360 / 8$ $=45\left(^{\circ}\right)$ <br> (c) Correct reflection (in the line $x=2$ ) <br> (d) Correct translation | $\begin{gathered} \hline \text { B1 } \\ \text { M1 } \\ \text { A1 } \\ \text { M1 } \\ \text { A1 } \\ \text { B2 } \\ \text { B2 } \\ 9 \\ \hline \end{gathered}$ | FT their $\mathrm{a}, \mathrm{b}=95-\mathrm{a}$ <br> Or alternative complete method If marked on the diagram needs to be for c B1 for a reflection in any vertical line, or B1 for drawing $\mathrm{x}=2$, or B 1 for reflection in $\mathrm{y}=2$ with(out) line shown. B1 for translation 4 left or 6 down, or correct translation for 3 vertices not joined, or for translation in the appropriate direction but with consistent misread of the scale |
| 6. Correct region shaded, both sides of AB |  | Mark intention. B1 for line, B1 for arc, B1 for shading. FT similar region, arc centre A and a line crossing AB for the final B1 |
| 7.(a) $8 x+12+9 x-24$ $=17 x-12$ <br> (b) $y^{4}+7 y$ <br> (c) $x+7 \times 3=12 \times 3 \quad$ OR $\quad x / 3=12-7$ <br> (d) $2 y+5=45 / 3$ $\begin{aligned} & x=15 \\ & \quad \text { OR } \quad 6 y+15=45 \\ & y=5 \end{aligned}$ | $\begin{gathered} \text { B1 } \\ \text { B1 } \\ \text { B2 } \\ \\ \text { M1 } \\ \text { A1 } \\ \text { B1 } \\ \text { B1 } \end{gathered}$ | FT until second error <br> Mark final answer <br> B1 for each term as part of a 2 term expression. <br> Do not accept yxy ${ }^{3}$. <br> Accept ' $+\mathrm{y} \times 7$ ' or ${ }^{‘}+7 \times \mathrm{y}^{\prime}$ or ${ }^{‘}+\mathrm{y} \times 7$ ' <br> Accept embedded answer <br> FT until $2^{\text {nd }}$ error <br> Accept $\mathrm{y}=30 / 6$ or $10 / 2$ ISW. Accept embedded answer |
| $\begin{aligned} & \text { 8.(a)(i) } \\ & \begin{array}{r} \text { (ii) } 1 / 6 \times 1 / 6 \\ \\ \\ =1 / 36 \end{array} \end{aligned}$ <br> (b)(i) Tree completed correctly $\begin{array}{lll} \text { (ii) } 1 / 6 \times 5 / 6 \begin{array}{ll} \text { OR } & 5 / 6 \times 1 / 6 \\ 1 / 6 \times 5 / 6+5 / 6 \times 1 / 6 & \text { OR } 2(5 / 6 \times 1 / 6) \\ & \\ & \\ & =10 / 36 \quad \text { ISW } \end{array} \end{array}$ | $\begin{gathered} \text { B2 } \\ \text { M1 } \\ \text { A1 } \\ \text { B2 } \\ \text { B1 } \\ \text { M1 } \\ \text { A1 } \\ 9 \end{gathered}$ | B1 for Sight of 6 and 3 <br> B1 for the first throw correct OR all of the second throw correct <br> Evidence of $\mathrm{P}($ not six $)=5 / 6$ <br> FT their tree, provided probabilities are $<1$ |
| 9. (a) -22 and 14 <br> (b) Plots correct, allowing one error or omission <br> (At least 6 correct plots) <br> All 7 correct plots joined with a curve <br> (c) $\mathrm{y}=60$ seen or implied <br> From their graph (about 2.3) | $\begin{gathered} \text { B2 } \\ \text { B1 } \\ \\ \text { C1 } \\ \text { M1 } \\ \text { A1 } \\ 6 \end{gathered}$ | B1 for each correct entry <br> FT from (a). Allow plot within the correct small square <br> FT their graph <br> FT their graph |


| 2011 Summer Paper 1 Wales Pilot Higher Tier | Mark | Comments |
| :---: | :---: | :---: |
| 10.(a)(i) Method with least 2 correct prime factors Sight of correct factors ( $2,2,3,3,3,3$ ) $2^{2} \times 3^{4} \text { or } 2^{2} \cdot 3^{4}$ <br> (ii) NO, stated or implied, with valid explanation e.g. "No, 2 has an odd power", ' $2 \times 324$ which is a perfect square' 'Because $25^{2}=625$ and $26^{2}=676$ ' <br> (b)(i) $20 x^{9} y^{7}$ <br> (ii) $5 a^{3} / b^{2}$ OR $5 a^{3} b^{-2}$ | M1 <br> A1 <br> B1 <br> E2 <br> B2 <br> B2 <br> 9 | Must be before $2^{\text {nd }}$ error <br> Ignore 1s seen <br> FT their factors with at least on index $>1$ used. Do not ignore 1 s . <br> FT where possible from their (i) <br> E1 for $2^{3} \times 3^{4}$ but no explanation or conclusion. <br> E2 for "the power of 2 is odd" without statement of NO. <br> E1 for statement "odd power" without saying it is the 2 . <br> Answer 'NO' alone is E0. <br> E1 if one of $25^{2}$ or $26^{2}$ incorrectly evaluated <br> E1 for $25^{2}=625$ and $26^{2}=676$ ' ('no' not implied) <br> Accept " $\times$ " included. B1 for $\ldots x^{9} y^{7}$ or $20 \ldots y^{7}$ or $20 x^{9} \ldots$ <br> B1 for $\ldots a^{3} / b^{2}$ or $\ldots a^{3} b^{-2}$ or $5 \ldots b^{-2}$ or $5 \ldots / b^{2}$ or $5 a^{3} \ldots$ |
| $\begin{aligned} & \text { 11.(a) } \mathrm{x} / 15=7 / 21 \text { OR } \mathrm{x}=15 /(21 / 7) \text { OR } \mathrm{x}=15 / 3 \\ & \quad \mathrm{x}=5(\mathrm{~cm}) \\ & \mathrm{y} / 4.2=21 / 7 \quad \text { OR } \mathrm{y}=(21 / 7) \times 4.2 \\ & \quad \mathrm{y}=12.6(\mathrm{~cm}) \\ & \text { (b) Area scale factor } 4^{2} \text { or } 16 \\ & 3.5 \times 16 \\ & 56\left(\mathrm{~cm}^{2}\right) \end{aligned}$ | $\begin{gathered} \hline \text { M1 } \\ \text { A1 } \\ \text { M1 } \\ \text { A1 } \\ \text { B1 } \\ \text { M1 } \\ \text { A1 } \\ 7 \end{gathered}$ | Or other suitable method, e.g. use of scale factor 3 <br> FT for M1 only incorrect evaluation of $4^{2}$ CAO |
| 12. E D C A B | $\begin{gathered} \hline \text { B4 } \\ 4 \end{gathered}$ | B1 for any one correct OR <br> B2 for any two correct OR B3 any three or four correct |
| 13.(a) $38\left({ }^{\circ}\right)$ <br> Radius meets tangent at a right angle <br> (b) $52\left({ }^{\circ}\right)$ <br> Alternate segment theorem <br> (c) $58\left({ }^{\circ}\right)$ <br> (Isosceles triangle,) angle at centre twice angle at circumference | $\begin{gathered} \text { B1 } \\ \text { E1 } \\ \text { B1 } \\ \text { E1 } \\ \text { B1 } \\ \text { E1 } \\ \hline \end{gathered}$ | The E1 mark depends on the B1 mark <br> Do not accept calculation shown. Accept abbreviations Or alternatives |
| 14. Any 3 of the lines $y=x / 2+4, x+y+6=0, y=4$ and $x=3$ Correct region indicated | $\begin{gathered} \text { B3 } \\ \text { B1 } \\ 4 \end{gathered}$ | Award B2 for any 2 lines OR B1 for any 1 line drawn or indicated CAO |
| $\text { 15.(a) }(3 x+5)(4 x-3)$ <br> $-5 / 3$ and $3 / 4$ <br> (b) $(7 y-10)(7 y+10)$ <br> (c) $1 / 4$ or 0.25 | $\begin{gathered} \hline \text { B2 } \\ \text { B1 } \\ \text { B2 } \\ \text { B1 } \\ 6 \end{gathered}$ | B1 for ( $3 x \ldots 5$ ) ( $4 x \ldots 3$ ) or split mid term and $1^{\text {st }}$ step factor F.T. for pair of brackets <br> B1 for $(7 y \ldots 10)(7 y \ldots 10)$ |
| 16.(a) $3 / 5 \times 2 / 4$ $=6 / 20(=3 / 10)$ <br> (b) Strategy, use of two odds $\begin{aligned} & =2 / 5 \times 1 / 4 \\ & =2 / 20(1 / 10) \end{aligned}$ <br> (c) 1 - their answer in (b), provided S1 awarded in (b) $=18 / 20(=9 / 10)$ | $\begin{gathered} \hline \text { M1 } \\ \text { A1 } \\ \text { S1 } \\ \text { M1 } \\ \text { A1 } \\ \text { M1 } \\ \text { A1 } \\ 7 \end{gathered}$ | ISW <br> ISW <br> Or equivalent full sum of product that would lead to $18 / 20$ ISW |
| 17. (a) $122^{\circ}$ and $238^{\circ}$ with no other values <br> (b) Vertical translation Vertical +1 | $\begin{gathered} \text { B2 } \\ \text { M1 } \\ \text { A1 } \\ 4 \end{gathered}$ | B1 for either angle, or the sum of their 2 angles is 360 with neither angle $>5^{\circ}$ different <br> Mark intention not accuracy, vertical scale need not be marked |
| $\begin{aligned} & \text { 18.(a) } 3 \times 3 x=(x+4)(x+1) \\ & \text { or } 3 \times 3 x-(x+4)(x+1) \text { as a numerator } \\ & \text { Expansion of }(x+4)(x+1)=x^{2}+x+4 x+4 \\ & x^{2}-4 x+4=0 \text { or equivalent } \\ & (x-2)(x-2)=0 \text { or correct use of the formula } \\ & x=2 \\ & \text { (b) } \begin{array}{c} (x-3)(x+2) \\ (x+7)(x+2) \quad \\ \\ \quad \frac{x-3}{x+7} \\ \hline \end{array} \\ & \hline \end{aligned}$ | $\begin{gathered} \hline \text { M1 } \\ \\ \text { A1 } \\ \text { A1 } \\ \text { M1 } \\ \text { A1 } \\ \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ \hline \end{gathered}$ | Or with common denominator shown (maybe incorrect). Mark for intention, i.e. brackets maybe omitted <br> FT for equivalent level of difficulty only <br> CAO. Mark final answer |

\begin{tabular}{|c|c|c|}
\hline 2011 Summer Paper 2 Wales Pilot Higher Tier \& Mark \& Comments \\
\hline \begin{tabular}{l}
1.(a) \(3 \times 10.5 / 5\)
\[
=6.3 \text { (litres) }
\] \\
(b) \(16 \times 45 / 100\) or \(0.45 \times 16\) or other method \\
(£) \(7.2(0)\) \\
(£) 23.2(0) \\
(c) Small brush \(40(\mathrm{p})\) or ( \(£ 0) .4(0)\) \\
Fine brush \((80 / 100) \times 40\) or \(0.8 \times 40\) 32 (p)
\end{tabular} \& \[
\begin{gathered}
\hline \text { M1 } \\
\text { A1 } \\
\text { M1 } \\
\text { A1 } \\
\text { A1 } \\
\\
\text { B1 } \\
\text { M1 } \\
\text { A1 } \\
\hline
\end{gathered}
\] \& \begin{tabular}{l}
FT their \(45 \%+16\) if M1 awarded. \\
(Alternative \(145 \% \times 16 \mathrm{M} 2\), (£)23.2(0) A1) \\
FT their cost of a small brush if \(<£ 1\) CAO
\end{tabular} \\
\hline \begin{tabular}{l}
2.(a)Line from Milan \\
Line from Rome \\
Lines intersecting \\
(b)(i) \(70 / 1.66\) \\
(£) 42.17 \\
46.35 / 1.09 \\
(£) 42.52 \\
(ii) E.g. Buy Italy because more expensive, (but only a little) but he can have it straight away OR Buy Switzerland to save (a little) money
\end{tabular} \& \[
\begin{gathered}
\hline \text { M1 } \\
\text { M1 } \\
\text { A1 } \\
\text { M1 } \\
\text { A1 } \\
\text { M1 } \\
\text { A1 } \\
\text { E1 } \\
8 \\
\hline
\end{gathered}
\] \& \begin{tabular}{l}
Angles are \(\pm 2^{\circ}\) \\
FT if at least M1 given \\
Penalise inappropriate rounding, or not rounding once only \\
Treat reverse of exchange leading to answers of 27.92 and 64.22 as SC2 \\
FT provided M2 awarded in (i) \\
Ignore incorrect calculation of the difference in price
\end{tabular} \\
\hline \begin{tabular}{l}
3.(a) Sight of 12 or +15 within a full substitution 9 \\
(b) Sight of \((6 \times 9)^{3}\) or equivalent
\[
157464
\]
\end{tabular} \& \[
\begin{gathered}
\hline \text { B1 } \\
\text { B1 } \\
\text { B1 } \\
\text { B1 } \\
4
\end{gathered}
\] \& \begin{tabular}{l}
CAO \\
Allow B1 for sight of \(\mathbf{- 1 5 7 4 6 4}\) CAO
\end{tabular} \\
\hline \begin{tabular}{l}
4. (a) Area trapezium \(=1 / 2(6+8) \times 5\) \\
Triangle: \(\quad 1 / 2 \times 10 \times x=35\)
\[
\mathrm{x}=7(\mathrm{~cm})
\] \\
(b) Least 19.5 (cm) \\
Greatest \(20.5(\mathrm{~cm})\) (accept 20.49 recurring) \\
(c) \(x+85+107+3 x=360\)
\[
\begin{aligned}
\& 4 x+192=360 \\
\& 4 x=168 \\
\& \quad x=42^{(0)}
\end{aligned}
\]
\end{tabular} \& \begin{tabular}{l}
M1 \\
A1 \\
M1 \\
A1 \\
B2 \\
B1 \\
B1 \\
B1 \\
B1 \\
10
\end{tabular} \& \begin{tabular}{l}
Maybe implied in later working \\
FT their area of a trapezium \\
Watch for a correct answer from incorrect working leaving out \(1 / 2\) from both formulae this gets SC1 \\
B1 for each correct answer \\
Equation maybe given in stages FT until \(2^{\text {nd }}\) error \\
Where 180 (or similar) is used:
\[
\begin{array}{cc}
\mathrm{x}+85+107+3 \mathrm{x}=180 \& \mathrm{~B} 1 \\
4 \mathrm{x}=-12 \& \text { B1 }
\end{array}
\] \\
Do not FT for negative answer \\
Answer correct, no equation formed or shown, including trial \& improvement, award B2. \\
If the only equation seen is ' \(x=42\) ' then max B 2 only
\end{tabular} \\
\hline \begin{tabular}{l}
5.(a) \(3 n+4\) or equivalent correct answer \\
(b) E.g. second difference found to be 2 OR sight of \(\mathrm{n}^{2}\)
\[
n^{2}+1
\] \\
(c) Strategy, e.g. attempt to use algebra for the terms or trial from a starting number keeping to either difference criterion or sum criterion \(\mathrm{a}, \mathrm{a}+7, \mathrm{a}+14, \mathrm{a}+21\) or equivalent
\[
4 a+42=6 \text { OR } 4 a=-36
\]
\[
-9,-2,5,12
\]
\end{tabular} \& B2
M1
A1
S1

M1
A1
B1

8 \& | Allow ' $n=3 n+4$ ' for B2. B1 for $3 \times n$ seen, (not $n+3$ ). If B 2 awarded penalise further incorrect working -1 Allow change of letter |
| :--- |
| OR sight of at least 3 trials keeping to 1 criterion |
| OR B4 for sight of the correct terms $-9,-2,5,12$ | <br>

\hline $$

$$ \& \[

$$
\begin{gathered}
\text { M1 } \\
\text { M1 } \\
\text { A1 } \\
\text { A1 } \\
\text { M1 } \\
\text { A1 } \\
\text { A1 } \\
7
\end{gathered}
$$

\] \& | CAO |
| :--- |
| Realising sides are the same length |
| Watch for embedded answer, which is accepted | <br>

\hline
\end{tabular}

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| $\begin{array}{rlrl} \hline \text { 7. (a) } \begin{array}{r} 600.00 \\ \underline{24.00} \\ 624.00 \\ \underline{24.96} \end{array} & \\ & \text { OR } 600(1.04)^{2} \text { M2 } \\ \text { (£) } 648.96 & \text { (£)648.96 } & \text { A1 } \end{array}$ | B1 M1 A1 | For a correct 4\%. (Implied by 48 or 648 or 552) <br> Overall method 2 calculations of $4 \%$ of different amounts. <br> Method NOT accuracy <br> Accept 649. <br> If calculated for more than 2 years, MR-1 <br> (Depreciation answer 576 gets B1 M1 A0) |
| (b) One correct evaluation $6 \leq x \leq 7$ | B1 | $\begin{array}{ll} 6 & -36 \\ 6.1 & -25.219 \end{array}$ |
| 2 correct evaluations $6.25 \leq x \leq 6.4$ one either side of 0 | B1 | $\begin{array}{ll} 6.2 & -14.072 \\ \hline 6.3 & -2.553 \\ \hline \end{array}$ |
| 2 correct evaluations, $6.25 \leq x \leq 6.35$, one either side of 0 OR correct evaluation for 6.35 if previous B1 awarded | M1 | 6.4 9.344 $\mathbf{6 . 2 5}$ $\mathbf{- 8 . 3 5 9 . .}$ <br> 6.5 21.625 $\mathbf{6 . 3 5}$ $\mathbf{3 . 3 4 7 8 7 \ldots}$ <br> 6.6 34.296   <br> 6.7 47.363   |
| Correct conclusion 6.3 <br> Evaluation rounded or truncated to 1 sig. fig. | A1 | $6.8 \quad 60.832$ 6.9 7 7 74.709 If values are not shown DO NOT accept the use of statements, e.g. "greater than 0". Unsupported6.3 gets BO BO MO AO |
| (c) $\begin{aligned} & \begin{aligned} &\left\{-16+\sqrt{ }\left(16^{2}-4 \times 2 \times 23\right)\right\} / 2 \times 2 \\ &=\{-16 \pm \sqrt{ } 72\} / 4 \end{aligned} \\ & -1.88 \text { and }-6.12 \end{aligned}$ | $\begin{aligned} & \text { M1 } \\ & \text { A1 } \\ & \text { A1 } \\ & 10 \\ & \hline \end{aligned}$ | For substitution, allow one slip in sign or substitution CAO |
| 8.(a)(i) Polygon with at least two vertices correct (horizontal \& vertical) <br> All 4 vertices at correct positions | M1 A1 | Ignore bars. Accept the intention of straight lines drawn without a ruler <br> Ignore starting at 0 and right hand end. <br> SC1 for a correct polygon or curve using all 4 vertices but translated horizontally, or SC1 for all vertices plotted corrected but no polygon or points joined with a curve. |
| (ii) $30<\mathrm{t} \leq 40$ <br> (b) Interquartile range $=(36 \text { to } 37)-(23 \text { to } 24) \text { inclusive }$ | $\begin{aligned} & \text { B1 } \\ & \text { M1 } \end{aligned}$ | Accept any indication " 30 to 40 ", but not a single value. Allow M1 for correct intention (using $37.5 \& 12.5$ ) but with incorrect reading of time scale. |
| Correct evaluation <br> (c) Yes with a correct explanation referring to median of the second class and the group containing the median for the first class | $\begin{aligned} & \text { A1 } \\ & \text { E2 } \end{aligned}$ | Median needs to be referenced, once for E1 and for both for E2 <br> Part (b) median is between 30 to 31 inclusive <br> E1 for Yes, explanation refers only to median of the second race E0 for 'Yes' <br> E0 for general discussion of what happens in races |
|  |  |  |
|  | $\begin{gathered} \text { M2 } \\ \text { A1 } \\ \text { M1 } \\ \text { A2 } \\ 6 \end{gathered}$ | M1 for $\sin 57=y / 34.7$ <br> A1 for $w=\cos ^{-1} 0.45(52 \ldots)$ |
| 10. E.g. $x+y=6.6$ <br> $1.85 x+1.62 y=11.29$ or equivalent in pence <br> Method to find first variable <br> First variable found <br> Second variable | B1 <br> B1 <br> M1 <br> A1 <br> A1 <br> 5 | Equate coeffs. or substitution, allow 1 slip $x=2.6(0)$ or $y=4(.00)$ <br> FT 6.6(0) - first variable, only if M1 awarded Award all 5 marks for sight of correct values <br> Trial \& improvement: <br> With totals $6.6(\mathrm{~kg})$ <br> At least 3 trials total cost, $t$ where $10 \leq t \leq 12$ <br> (or M1 for any 2 triasl) <br> At least 2 trials total cost, $t$ where $11 \leq t \leq 11.50$ <br> (or M1 for any 1 trial) <br> Correct values |
| $\begin{aligned} & \text { 11.Strategy, e.g. to consider ratio } 14500 / 9440(=1.536 \ldots) \\ & (14500 / 9440) \times 8.56 \text { (million) } \end{aligned}$ | $\begin{aligned} & \hline \text { S1 } \\ & \text { M1 } \end{aligned}$ | $\begin{aligned} & \text { Or } 8.56 \text { (million)/9440 } \\ & \text { Or }[8.56 \text { (million)/9440] } \times 14500 \end{aligned}$ <br> For S1 \& M1 allow incorrect place value, focus on digits 856, 944 \& 145 and the correct operations |
| Approximately 13 million $1.3(\ldots) \times 10^{7}$ | $\begin{gathered} \text { A1 } \\ \text { A1 } \\ 4 \end{gathered}$ | CAO |


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| 12.(a) Mid points $5,14,23$ $\begin{array}{r} 5 \times 7+14 \times 28+23 \times 5 \\ \sum f x / 40 \quad(=542 / 40) \end{array}$ <br> (£) 13.55 <br> (b) Strategy, $50 \times$ frequency density $=90$ or equivalent Uniform scale, implied or shown $50 \times 1.8+50 \times 2.6+100 \times 1.6+100 \times 1+200 \times 0.4$ <br> (£) 560 | $\begin{gathered} \hline \text { B1 } \\ \text { M1 } \\ \text { M1 } \\ \text { A1 } \\ \text { S1 } \\ \text { B1 } \\ \\ \text { M2 } \\ \text { A1 } \end{gathered}$ | FT for their mid points from within group including bounds FT for correct sum of their $f x$ terms intention to divide by 40 FT their $\sum f x / 40$ correctly evaluated Or sight of 1.8 <br> Each square 0.2 <br> FT their uniform scale if possible for method marks <br> M1 for any 3 correct products within the overall sum <br> CAO <br> Allow S1 \& B1 marks if scale incorrect but correct answer ( $£$ )560 given, as they was no request to complete the scale |
| 13.(a) $\begin{aligned} & h \propto v^{2} \\ & 5=k \times 10^{2} \text { or } \quad 5 \times \mathrm{c}=10^{2} \end{aligned}$ $h=0.05 v^{2}$ <br> (b) $h=0.05 \times 12^{2}$ <br> $h=7.2(\mathrm{~m})$ or equivalent <br> (c) $\begin{aligned} 16 / 0.05 & =v^{2} \quad(=320) \\ v & =17.88854 \ldots(\mathrm{~m} / \mathrm{s}) \end{aligned}$ | B1 M1 A1 M1 A1 M1 A1 7 | FT non linear only in all parts <br> Accept for $k=5 / 100, k=0.05$, or $\mathrm{c}=20$ provided used in (b) <br> Maybe seen in (b) or (c). Ignore incorrect use of $\propto$ <br> FT incorrect k for M marks only <br> Accept rounded or truncated |
| $\text { 14.(a) } x^{1 / 2} y^{2}$ <br> (b) $(x+4)(x+1)$ | B2 B2 4 | ```B1 for \(x^{1 / 2}\) or \(y^{2}\) or \(y^{2 / 1}\) (do not accept if not simplified to these) B1 for \(x^{2 / 4} y^{4 / 2}\) B1 for \((x+4)\{(x+4)-3\}\) OR \(\quad x^{2}+5 x+4\) Mark final answer``` |
| 15. Radius of the cylinder $=0.5 \mathrm{~cm}$ OR diameter $=1 \mathrm{~cm}$ Idea height of cylinder approx. circumference of ring <br> Ring $\mathrm{C}=2 \times \pi \times$ value between 8 and 9 inclusive Volume $=\pi \times 0.5^{2} \times$ ring C <br> Volume in the range 39.5 to $44.4\left(\mathrm{~cm}^{3}\right)$ inclusive Statement about assumption, e.g. mid value for radius, or used smaller radius so volume will be greater, or used larger radius so volume will be less | $\begin{aligned} & \text { B1 } \\ & \text { S1 } \\ & \\ & \text { M1 } \\ & \text { M1 } \\ & \text { A1 } \\ & \text { E1 } \end{aligned}$ | Maybe shown on the diagram <br> Maybe internal, external or somewhere in between. <br> Accept sight of $8 \times \pi$ or $9 \times \pi$ for S1 <br> CAO <br> Accept 'circumference of the ring is the same as the length of plastic', 'radius doesn't change as bend around' <br> Do not accept 'radius is 0.5 ' |
| $\begin{aligned} & \text { 16. } \mathrm{SQ}^{2}=8.8^{2}+10.9^{2}-2 \times 8.8 \times 10.9 \times \cos 37 \\ & \mathrm{SQ}^{2}=43.03976 \ldots . . \\ & \mathrm{SQ}=6.5(6 \ldots .) \text { or } \\ & \underline{\mathrm{Use} \text { of angle } \mathrm{P}=76^{\circ}} \\ & \mathrm{PQ}=\underline{\mathrm{SQ}} \\ & \mathrm{Sin} 46 \quad \underline{\sin 76} \\ & \mathrm{PQ}=\underline{\mathrm{SQ} \times \sin 46} \\ & \mathrm{se} 76 \\ & \mathrm{sQ} \text { answers between } 4.86 \text { to } 4.9(\mathrm{~cm}) \text { inclusive } \end{aligned}$ | $\begin{gathered} \text { M1 } \\ \text { A1 } \\ \text { A1 } \\ \text { B1 } \\ \text { M1 } \\ \text { A1 } \\ \text { A1 } \\ 7 \end{gathered}$ | FT their angle P , not 46 or 58 <br> FT candidate's SQ <br> CAO |

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