

**MS2**  
**£2.00**

**WELSH JOINT EDUCATION COMMITTEE**  
**CYD-BWYLLGOR ADDYSG CYMRU**

**General Certificate of Secondary Education**

**Tystysgrif Gyffredinol Addysg Uwchradd**

**MARKING SCHEMES**

**SUMMER 2006**

**MATHEMATICS PILOT SCHEME**

**WJEC**  
**CBAC**

## **INTRODUCTION**

The marking schemes which follow were those used by the WJEC for the 2006 examination in GCSE Mathematics Pilot Scheme. 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.

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

GCSE Pilot 2006 Mathematics Foundation Tier Paper 1	Mark	Final Mark Scheme Comments
<b>1.</b> (a) 12 22 102 122 202 212 221  (b) (i) 111 (ii) 34 (iii) 72 (iv) 8  (c) (£) 115,750 (·00)	B1  B1 B1 B1 B1  B1 6	CAO  CAO CAO CAO CAO  CAO
<b>2.</b> (a) 4 correct lines  (b) Complete figure	B2  B2 4	B1 for 2 correct lines only. B1 for 4 correct lines + additional line(s) –1 for each incorrect vertex, max. –2
<b>3.</b> (a) Friday  (b) 19  (c) Tuesday and Wednesday  (d) 20, 14, 6, 19, 23,  82	B1  B1  B1  M1  A1 5	CAO  CAO  CAO  Attempt to add at least 4 of the numbers  FT for 63 + 'their (b)'
<b>4.</b> (a) (i) 24 (ii) 11  (b) (i) $4 \times 8 + 45$ (£) 77 (ii) $8N = 61 - 45$ $N = (2 \text{ hours})$	B1 B1  M1 A1 M1 A1 6	CAO CAO  Must attempt to multiply <b>and</b> add CAO CAO
<b>5.</b> (a) (i) 49 (ii) 17 (iii) 32  (b) $20 \times 60 / 100$ OR $10\% = (£)6$ (£) 12 ISW $20\% = (£)12$  (c) (i) (0) ·75 (0) ·6(0) (ii) $60\% \ 0.7 \ \frac{3}{4}$	B1 B1 B1  M1 A1  B1 B1 B1 8	CAO CAO CAO  CAO  FT from (i)
<b>6.</b> 120 125 125 125 130 130 134 145 155 Mode (£) 125 Median (£) 130 Range (£) 35	M1 B1 A1 B1 4	CAO CAO CAO
<b>7.</b> Angle CAB = 57° Angle ACB = 63°  AB = 11·6cm	B1 B1  B1 3	±2° <i>Give B1 if <b>both</b> angles are correct</i> ±2° <i>but reversed.</i>  ± 2mm FT from their diagram

GCSE Pilot 2006 Mathematics Foundation Tier Paper 1	Mark	Final Mark Scheme Comments
<p><b>8.</b> Estimate for height of man Five equal spaces shown above the man <b>OR</b> height of man = 3 cm height of tower = 18cm <b>OR</b> ratio 18:3 6:1 3:18 1:6 seen.</p> <p>6 × their height Height of tower</p>	<p>B1</p> <p>B1</p> <p>M1 A1 4</p>	<p>1.5 m to 2.5 m (5ft to 7ft)</p> <p>Allow ±2mm for the height of man and height of tower</p> <p>FT for their height. <b>Answer only B0 B0 M0 A0.</b></p>
<p><b>9.</b> (a) <math>x = 70^\circ</math> <math>y = (180^\circ - 140^\circ)</math> <math>y = 40^\circ</math></p> <p>(b) <math>t = 180^\circ - 90^\circ - 76^\circ</math> or <math>90^\circ - 76^\circ</math> <math>t = 14^\circ</math></p> <p>(c) <math>360^\circ - (50^\circ + 110^\circ + 125^\circ)</math> <math>75^\circ</math> <math>p = 105^\circ</math></p>	<p>B1 M1 A1</p> <p>M1 A1</p> <p>M1 A1 A1 8</p>	<p>CAO</p> <p>FT for <math>180^\circ - 2 \times \text{'their } x\text{'}</math></p> <p>CAO</p> <p>CAO FT <b>Answer only 75° SC1</b></p>
<p><b>10.</b> (a) <math>5 - 4 \times 0.86</math> (5 - 3.44) £1.56 1.56 156p</p> <p>(b) <math>10 - (2.25 + 1.28)</math> (10 - 3.53) £6.47 6.47 647p</p> <p>(c) <math>17 \times 8</math> (£) 136</p> <p>(d) <math>217/7</math> 31</p>	<p>M1 A1</p> <p>M1 A1</p> <p>M1 A1</p> <p>M1 A1 8</p>	<p>CAO</p> <p>CAO</p>
<p><b>11.</b> (a) (i) 23 (ii) 24 (iii) <math>3x = 6</math> <math>x = 2</math></p> <p>(b) (i) <math>11y</math> (ii) <math>r + 5s</math> (iii) <math>5d - 11c</math></p> <p>(c) (i) <math>-12 + 14</math> 2 (ii) <math>W = 20 + 12</math> <math>= 32</math></p> <p>(d) <math>3(x + 5)</math></p>	<p>B1 B1 B1 B1</p> <p>B1 B1 B2</p> <p>B2 B2</p> <p>B1 13</p>	<p>Accept embedded answers in parts (i) to (iii)</p> <p>FT if of the form <math>ax = b</math></p> <p>CAO Accept <math>1r + 5s</math> B1 for <math>5d</math> or <math>-11c</math></p> <p>B1 for <math>-12</math> or <math>+14</math></p> <p>B1 for <math>+12</math></p> <p>CAO</p>

GCSE Pilot 2006 Mathematics Foundation Tier Paper 1	Mark	Final Mark Scheme Comments
<b>12.</b> (a) -1  (b) Plot 2 correct points <b>OR</b> 3 correct points taken from their table Draw line	B1  B1  B1 3	CAO  CAO
<b>13.</b> (a) All points plotted correctly  (b) Negative	B1  B1 3	B1 for at least 3 correct plots, B1 for 5 correct points joined by lines B1 if tests reversed. Ignore line of best fit.  Do not accept descriptions.
<b>14.</b> (a) $20 \times 15 \times 10$ 3000 (cm <sup>3</sup> )  (b) 3000/100 30 (cm)	M1 A1  M1 A1 4	CAO  FT from (a)
<b>15.</b> $\frac{1}{2} \times 5 \times 6$ 15 cm <sup>2</sup>	M1 A1 U1 3	Attempt $\frac{1}{2}$ base x height seen e.g. $2.5 \times 6$
<b>16.</b> (a) $20 \times 200/100$ 40 (£) 240  (b) (i) 100/5 Nigel (£)80 Paul (3)20 (ii) No 4:1, OR 36, 9 matches OR Nigel 4, Paul 1, then repeat etc OR NNNNPNNNNP .... OR	M1 A1 A1  M1 A1 B1 E1 7	M1 A1 for $1.2 \times 200$  FT  Accept Nigel (£)20 Paul (£)80 for M1 CAO May be implied in the explanation. FT their (b)(i) logic. 'Nigel should go more' is insufficient.
<b>17.</b> (a) Method that produces at least 2 correct prime factors. Sight of correct factors. (2,2,2,3,3,5) $2^3 \times 3^2 \times 5$ or $2^3.23^2.5$  (b) e.g. odd powers, index 5 is not even, etc.	M1  A1  B1  E1 4	Ignore 1s seen  FT their factors (with at least one index >1 used). Do not ignore 1s
<b>18.</b> (a) Bisector of angle CAB Arc centre B radius 6 cm Shaded area  (b) Enlargement $\frac{1}{2}$ Correct position	B1 B1 B1  B1 B1 5	$\pm 2^\circ$ $\pm 2$ mm FT for the intention of bisector and arc.
<b>19.</b> $0.12 + 0.34$ 0.46 46/100 46%	M1 A1 2	

GCSE Pilot 2006 Mathematics Foundation Tier Paper 2	Mark	Final Mark Scheme Comments
<b>1.</b> (a) 39.92 64.65 18.35 122.92  (b) $40 \div 2.56$ 15	B1 B1 B1 B1 M1  A1 6	CAO CAO CAO FT for one error  CAO <i>Answer only 15.6(25) M1 A0</i>
<b>2.</b> (a) Pentagon Hexagon Parallelogram Trapezium  (b) Diameter Tangent Chord	B1 B1 B1 B1 B1 B1 B1 7	<i>Accept names written at the side of the diagrams. Accept a list written in order if completely correct.</i>
<b>3.</b> (a) F H  (b) P S	B1 B1  B1 3	CAO <i>B1 for diagrams F and H clearly marked, with no other diagram marked.</i> CAO CAO
<b>4.</b> (a) Seven thousand(s) nine hundred and four  (b) (i) Shade any four squares (ii) $\frac{7}{16}$ ISW  (c) 8753 3578	B1  B1 B1  B1 B1 5	Words only. <i>B0 for seven thousandths etc.</i>  CAO <i>B1 for seven sixteenths B0 for seven out of sixteen</i> CAO CAO
<b>5.</b> Five days correct (2 3 $1\frac{1}{2}$ $2\frac{1}{4}$ $1\frac{3}{4}$ symbols)	B4    4	<i>-1 once only for use of a different symbol</i> B3 Four days correct B2 Three days correct B1 Two days correct
<b>6.</b> (a) Draw pattern OR $8 + 10 + 12$ 30  (b) $(3 + 8) \times 6$ 66  (c) (i) Plot P (-3,-5) Plot Q (-4,3) (ii) D (2,4)	M1 A1  M1 A1  B1 B1 B1  7	One error allowed for M1 CAO. Answer 6 more gets M1 A0.  CAO  P and Q need not be shown on the diagram. CAO <i>No marks awarded when the coordinates are reversed.</i>



GCSE Pilot 2006 Mathematics Foundation Tier Paper 2	Mark	Final Mark Scheme Comments
<b>11.</b> (a) (i) $057^\circ$ (ii) Actual length = $20 \times 8$ (m) 156 (m) to 164 (m)  (b) Line from A on correct bearing $\pm 2^\circ$ Line from B on correct bearing $\pm 2^\circ$ Lines intersect at P	B1 M1 A1  M1 M1 A1  6	$\pm 2^\circ$ $57^\circ$ is B0 M1 for $20 \times$ 'their length' Allow $\pm 2$ mm in length of TB  One line correct one incorrect and the two lines intersecting gets M0 M1 A1 One point in the correct region gets M1 M1 A1
<b>12.</b> (a) $450 \times 9.8$ 4410  (b) $627.2 \div 9.8$ (£)64	M1 A1  M1 A1 4	CAO  CAO
<b>13.</b> (a) $x = 48^\circ$ $y = 37^\circ$  (b) Exterior angle = $360/8$ (45)  Interior angle = $135^\circ$	B1 B1  M1  A1 4	CAO CAO  M1 for any correct method. $(2 \times 8 - 4) \times 90/8$ , $1080/8$ CAO
<b>14.</b> (a) $2x + 5 + 2x + 5 + 3x + 3x$ $10x + 10$ ISW  (b) $8x + 4x = 7 - 4$ $12x = 3$ $x = \frac{3}{12}$ ISW ( $\frac{1}{4}$ 0.25)  (c) $10x - 15 = 50$ or $2x - 3 = 50/5$ $10x = 65$ $2x = 13$ $x = \frac{65}{10}$ $x = \frac{13}{2}$ ISW ISW (6.5) (6.5)  (d) $2 \times (x - 3)$	M1 A1  B1 B1 B1  B1 B1 B1  B2  10	CAO  <b>Stop at second error</b> FT FT Accept embedded answers for (b) and (c) <b>Stop at second error</b>  FT FT  B1 for partial factorisation $2(x^2 - 3x)$ or $x(2x - 6)$ or $2x(x \dots)$ or $2x(\dots - 3)$
<b>15.</b> $TR^2 = 6.3^2 - 3.7^2$ $TR^2 = 26$ TR = 5.1 or 5 (cm)  <b>OR</b>  $\cos S = 3.7/6.3$ $\sin T = 3.7/6.3$ <b>and</b> TR = $6.3 \sin S$ TR = $3.7 \tan S$ TR = $3.7/\tan T$ TR = 5.1..... TR = 5.1 or 5 (cm)	M1 A1 A1  M1 A1 A1 3	Give M1 for $TR^2 + 3.7^2 = 6.3^2$ CAO FT  Complete method for finding TR must be seen.



GCSE Pilot 2006 Mathematics Foundation Tier Paper 2	Mark	Final Mark Scheme Comments
<p><b>16.</b> Mid points 154, 161, 168  <math>154 \times 18 + 161 \times 37 + 168 \times 25</math></p> <p>12929</p> <p>161.6(125)</p>	<p>B1 M1</p> <p>A1</p> <p>A1</p> <p>4</p>	<p>FT for their mid points from within groups (not bounds).</p> <p>FT for correct sum of their <math>fx</math> terms.</p> <p>FT for their <math>\Sigma fx / 80</math> correctly evaluated. Do not allow 161. <i>Unsupported 161.6125 awarded all 4 marks.</i> <i>SC1 for bounds with correct FT answer (lower 158.6125 upper 164.6125).</i></p>
<p><b>17.</b> (a) <math>\frac{1}{2} \times \pi \times 6.4^2</math> 64.(33....cm<sup>2</sup>)</p> <p>(b) Area <math>\times</math> length = <math>2.5 \times 1.6 \times (100)</math> Change of units e.g. 160 or <math>\times 100</math> shown 400 (cm<sup>3</sup>)</p>	<p>M1 A1</p> <p>M1 M1</p> <p>A1 5</p>	<p>SC1 for 128.(...), 257.(...)</p> <p>Change of units not necessarily shown</p> <p>CAO</p>

GCSE Pilot 2006 Mathematics Higher Tier Paper 1		Mark	Mark Scheme Comments
1.	(a) All points plotted correctly  (b) Negative	B2  B1 3	B1 for at least 3 correct plots, or B1 if tests reversed Ignore line of best fit, <i>Penalise joined point to point -1</i>  <i>Do not accept descriptions.</i>
2.	$3a + 6b + \dots$ 10a -2b	B1 B1 B1 3	Expansion of brackets FT for their expansion FT for their expansion
3.	(a) $x = 2$ (cm) and $y = 5$ (cm)  (b) $11+8+4+x+y+7+2+3$ $= 42$ (cm)  (c) $8 \times 4 + 5 \times 10 + 2 \times 3$ or $3 \times 11 + 7 \times 9 - 4 \times 2$ or equivalent  $88$ (cm <sup>2</sup> )	B2  M1 A1  M2  A1  7	B1 for one correct or methods for finding both shown  FT their x and y values from (a), $35 + x + y$ for M & A marks  FT their x & y for M marks only. M1 for attempt showing total area with 1 area correct CAO
4.	(a) $a = 70^\circ$ , $b = 70^\circ$ , $c = 110^\circ$ , $d = 35^\circ$  (b) (i) Bearing $329^\circ \pm 2^\circ$ (ii) $036^\circ \pm 2^\circ$ from D $285^\circ \pm 2^\circ$ from E G indicated or implied by point	B4  B1 M1 M1 A1 8	B1 for each, FT from previous answers when logical    Depends on at least 1 M mark
5.	$\frac{1}{2} \times 5 \times 6$ $= 15$ (cm <sup>2</sup> )	M1 A1 2	Attempt $\frac{1}{2}$ base $\times$ height seen, e.g. $2.5 \times 6$
6.	(a) Correct reflection in the line $y = -1$  (b) Correct translation	B2  B1 3	B1 for a reflection in any line indicated, or B1 for drawing $y = -1$
7.	(a) 50 $50/200 (\times 100)$ 25%  (b) (i) 100/5 Nigel (£)80 and Paul (£)20 (ii) No 1/5, 4/5 <b>OR</b> 9, 36 matches <b>OR</b> Nigel 4, Paul 1, then repeat etc. <b>OR</b> NNNNPNNNNP... <b>OR</b> ..	M1 M1 A1  M1 A1 B1 E1  7	<i>SC1 for 125%..Penalise -1 for further working after 25%.</i>  CAO Maybe implied in explanation FT their (b)(i) logic. "Nigel should go more" is insufficient.

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8.	(a) 2, 11	B2	B1 for each
	(b) Plots correct, allowing one error All points correct & joined with a curve	B1	FT from (a)
		B1	FT from (a)
		4	
9.	(a) Method that produces at least 2 correct prime factors Sight of correct factors (2, 2, 2, 3, 3, 5) $2^3 \times 3^2 \times 5$ or $2^3 \cdot 3^2 \cdot 5$	M1	Ignore 1s seen
		A1	
		B1	
(c) E.g. Odd power, index 5 is not even, ...	E1	FT their factors (with at least one index >1 used). Do not ignore 1s.	
		4	
10.	(a) Bisector of angle CAB Arc radius 6cm centre B Correct region shaded	B1	$\pm 2^\circ$ $\pm 1$ mm FT for intention of bisector & arc
		B1	
		B1	
(b) Enlargement 1/2 Correct position	B1		
		B1	
		5	
11.	Correct frequency polygon	B2	IGNORE bars if polygon drawn. B1 for 4 correct plots, or correct vertical plots, or correct horizontal plots. SC1 for correct frequency diagram or SC1 for translated polygon.
		2	
12.	$0.12 + 0.34$ $= 0.46$	M1 A1 2	
13.	(a) 8	B1	Needs to show recurring, do not accept 0.2 or 0.22 etc
	(b) 0.22... or 0.2	B1	
	(c) (i) $\frac{1}{4}$ or 0.25 (ii) 1	B1	
		B1	
		4	
14.	$m = 2$ $c = 4$ $y = 2x + 4$	B1 B1 B1 3	Gradient Intersection with y – axis CAO
15.	(a) Group A with valid reason	B2	Valid reason includes finished first, or median lower. B1 for Group A with incorrect or no reason.
	(b) (About) 8 (minutes)	B1	
		3	
16.	(a) $\frac{6}{4} \times 3.2$ $= 4.8$ (cm)	M1	Or equivalent  Or equivalent If no marks in (a) or (b) then award SC1 for sight of $\frac{6}{4}$ or 1.5 or $\frac{4}{6}$ or $\frac{2}{3}$ or 0.33..
		A1	
	(b) $4.5 / \frac{6}{4}$ $= 3$ (cm)	M1 A1 4	

GCSE Pilot 2006 Mathematics Higher Tier Paper 1	Mark	Mark Scheme Comments	
17. $x^2 + 6x - 16$	B2 2	B1 for $x^2 - 16$ or for $6x$ . Only award B2 for the trinomial	
18. Correctly setting up 2 eqns for eliminating 1 variable First variable's value Correctly substituting their first variable Second variable's value	M1 A1 M1 A1  4	Or alternate substitution method Either $x = 5$ or $y = -3$ FT their first variable FT their first variable	
19. (a) $5x+5y = 8y+5$ $5x = 3y + 5$ $x = (3y+5) / 5$  (b) $10k - 5m = ck + 5$ $10k - ck = 5m + 5$ $k(10 - c) = 5m + 5$ $k = (5m+9)/(10-c)$	B1 B1 B1  B1 B1 B1 B1  7	Expand Collect Divide  Expand Collect Factorise Divide	<i>FT each stage for equivalent level of difficulty</i>  <i>Penalise -1 in (a) &amp; -1 (b) for further incorrect work</i>
20. $(3x - 1)(2x - 3)$ or $(3x - 3)(2x - 1)$ $(3x + 1)(2x + 3)$ $x = -1/3$ and $x = -3/2$	M1 A1 B1 3	FT their pair of brackets. Ignore incorrect simplification <i>Use of quadratic formula no marks</i>	
21. (a) $g \propto h^2$ or $g = kh^2$ $1 = k \cdot 3^2$ $g = 1/9 h^2$  (b) $4/9$	M1 M1 A1  B1 4	FT $g \propto 1/h^2$ only, for all parts Maybe implied by use in (b)  FT their $g=kh^2$ or $g=k/h^2$ only	
22. $x=0.3444\dots$ and $10x=3.444\dots$ and attempt to subtract $31/90$	M1 A1 2	Or equivalent, e.g. Subtracting $10x$ & $100x$ N.B. $3.1/9$ gets M1, A0	
23. (a) $5/11 \times 4/10$ $= 2/11$  (b) Complete method, e.g. P(B'B') ( $=7/11 \times 6/10$ ) $= 21/55$	M1 A1  M1 A1  4	Or equivalent (e.g. $20/110$ )  Or correct full listing with colours Or equivalent (e.g. $42/110$ )	
24. (a) (i) Correct sketch (ii) Correct sketch  (b) Shift down Correct shift down with $y=-3$ indicated	B1 B1  M1 A1  4	May still be above the x-axis	
25. $6(x+5) + 3(4x-3)$ as a numerator $(4x - 3)(x + 5)$ as a denominator $6x + 30 + 12x - 9$ $18x + 21$ $\frac{18x + 21}{(4x - 3)(x + 5)}$	B1 B1 M1 A1 4	Brackets maybe implied by later working  Or $\frac{3(6x + 7)}{(4x - 3)(x + 5)}$ Ignore incorrect expansion of $(4x-3)(x+5)$ <i>Penalise further foolishness -1</i>	
26. $30 + 6\sqrt{2} + 5\sqrt{2} + 2$ $= 32 + 11\sqrt{2}$ and irrational	M1 A1 2	$\sqrt{2}\sqrt{2}$ must be evaluated	

GCSE Pilot 2006 Mathematics Higher Tier Paper 2		Mark	Mark Scheme Comments
1.	A stage of working, e.g. 1 ½(jars) to 2(slices), 3:4, ¾ 15 (jars)	M1 A1 2	
2.	(a) 15 and 27 entered in the table  (b) -1, x3 or x3, -3	B1  B2  3	B1 for either -1, -3 or x3 in either box Accept equivalent in words
3.	(a) (i) 150 × 4 + 120 (x1) or (ii) 150 × 3 + 120 × 2 720(p) or (£)7.20 690(p) or (£)6.90  (b) 72(p) or 69(p) or 3(p) 720 + 72 or 690 + 69 or 30 + 3 33(p) and Bonus (deal)	M1 A1 A1  M1 M1 A1  6	Seen or implied in either part <i>Do not penalise decimal money notation</i> <i>SC1 for (£)14 &amp; (£)11</i>  For finding a correct 10%. FT from (a) Method of finding 110%. FT from (a) Correct for FT for Mega & Bonus logic <b>Penalise place value of money overall -1 (e.g. all values which are pence with £ sign)</b>
4.	(a) 8x + 4x = 7 - 4 12x = 3 x = 3/12 (= ¼ = 0.25)  (b) 10x - 15 = 50 or 2x - 3 = 50/5 10x = 65 or 2x = 13 x = 65/10 or x = 13/2 (= 6.5)  (c) (i) 2x(x - 3) (ii) 3(a - 4)  (d) -2, 1, 6	B1 B1 B1  B1 B1 B1  B2 B1  B2 11	<i>FT until 2<sup>nd</sup> error in (a) &amp; (b)</i>    B1 for partially factorised 2(x <sup>2</sup> - 3x) or x(2x - 6) or 2x(x ... ) or 2x( ... -3)  B1 for any 2 terms correct OR SC1 for -3,-2,-1
5.	Attempt substitution of one value of x between 0 & 4 Two correct points on the line given (or plotted) Correct straight line drawn	M1 A1 A1  3	CAO. SC1 for y=2x + 3 or a straight line with correct gradient of 3
6.	20 (km / h)	B2  2	B1 for sight of 30 and 1½ (or 1 hr 30 mins or 90 min) (NOT 1.30hr). SC1 for 12 (from 30/2.5)
7.	(a) 4.8  (b) ¾ or 0.75  (c) 6.14  (d) 945 and 955	B2  B1  B2  B2 7	B1 for 4.809...or SC1 for -1.8 or their answer to 1dp.   B1 for 6.1(3652....)  B1 each. Accept 954.9999... etc, not 954.9.

GCSE Pilot 2006 Mathematics Higher Tier Paper 2		Mark	Mark Scheme Comments
8.	$\begin{array}{r} 5500.00 \\ \underline{330.00} \\ 5830.00 \\ \underline{349.8(0)} \\ 6179.8(0) \end{array}$ <p style="margin-left: 100px;"><u>OR</u></p> $\begin{array}{r} 5500(1.06)^2 \\ 6179.8(0) \end{array}$	B1 M1 A1    M1 A2    3	For a correct 6%. For the overall method (2 stages of adding <u>different</u> 6%).  C.A.O. Ignore subsequent working. SC1 for (£)6160 (simple interest), alternatively they may get the B1 for (£)660 if seen.
9.	Mid points 154, 161, 168 $154 \times 18 + 161 \times 37 + 168 \times 25$ $(\sum fx =) 12929$ $161.6(125)$	B1 M1 A1 A1    4	FT for their mid points from within group (not bounds) FT for correct sum of their $fx$ terms FT their $\sum fx / 80$ correct evaluated. Do not allow 161. <i>Unsupported 161.6125 awarded all 4 marks.</i> <i>SC1 for bounds with correct FT answer</i> <i>(lower 158.6125, upper 164.6125)</i>
10.	(a) $\frac{1}{2} \times \Pi \times 6.4^2$ $= 64. (33... \text{ cm}^2)$  (b) Area $\times$ length = $2.5 \times 1.6 \times (100)$ Change of units, e.g. 160 or $\times 100$ shown $= 400 (\text{cm}^3)$	M1 A1  M1 M1 A1 5	SC1 for 128. (...), 257. (...)  Change of units not necessarily shown.  CAO
11.	One correct evaluation $1 \leq x \leq 2$  2 correct evaluations, $1.3 \leq x \leq 1.6$ , one either side of 0  2 correct evaluations, $1.45 \leq x \leq 1.5$ , one either side of 0 OR correct evaluation of 1.45 if previous B1 awarded  1.5 <i>No calculations shown: accept "too</i>  <i>high", "&gt;", etc.</i>	B1   B1  M1   A1 4	X $2x^3 + x - 8$  1    -5 2    10  1.3   -2.306 1.4   -1.112 1.5   0.25 1.6   1.792  1.45   -0.45275 1.46   -0.315728 1.47   -0.176954 1.48   -0.036416 1.49   0.105898
12.	(a) $(x - 10)(x + 1)$ $x = 10$ and $x = -1$  (b) $24 - 2x = 30 - 5x$ $3x = 6$ $x = 6/3 (= 2)$  (c) $12x^8y^7$  (d) $(x + 3)(x - 3)$	B2 B1 B1 B1 B1  B2  B1 9	B1 for $(x - 10)(x + 1)$ with no or incorrect signs B1 their pair of brackets  FT (including $24 - 2x = 30 - x$ to $-x = 6$ here) FT (from above to $x = -6$ )  B1 for any two factors number, $x$ & $y$ correct, or correct but with "times" left in expression  <i>FT until 2<sup>nd</sup> error</i>

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<b>13.</b> (a) 0.3, 0.8, 0.2, 0.8 on correct branches  (b) $0.7 \times 0.8$ $= 0.56$	B2  M1 A1 4	B1 for one correct entry  FT their 0.8 entry
<b>14.</b> (a) (i) $6 \times 10^6$ (ii) $4.3 \times 10^{-3}$  (b) $1.68 \times 10^9$	B1 B1  B2  4	Penalise -1 once only for incorrect notation  Allow $1.7 \times 10^9$ for B2 B1 for $16.8 \times 10^8$ OR $n \times 10^9$ where $n = 8.4 \times 2/10$ incorrectly evaluated OR 1680 000 000 OR $1.6 \times 10^9$
<b>15.</b> (a) $\cos 39^\circ = EF / 14.8$ $EF = 11.5(0\dots)$  (b) $\tan S = 12.8 / 18.5$ $S = 34.679$ rounded or truncated to at least 1 d.p. or $35^\circ$	M1 A2  M1 A2  6	A1 for $EF = 14.8 \times \cos 39^\circ$  A1 for $\tan S = 0.69(189\dots)$ .
<b>16.</b> $x = \{ -31 \pm \sqrt{(31^2 - 4 \times 3 \times 8)} \} / (2 \times 3)$ $= (-31 \pm \sqrt{865}) / 6$ $x = -0.26$ and $x = -10.07$	M1 M1 A1  3	Allow one slip in substitution  FT if M1 awarded and denominator treated as 2a for numerator
<b>17.</b> Attempt to calculate at least 1 area with at least 1 correct Calculate shown or implied for all 6 areas, with at least 4 correct 63	M1  M1  A1 3	Areas are $1.5 \times 10 + 2 \times 6 + 4 \times 2.5 + 4 \times 3 + 6 \times 1.5 + 10 \times 0.5$ $= 15 + 12 + 10 + 12 + 9 + 5$
<b>18.</b> Mean = 5.22 $\sum x^2 = 320.54$ or sight of complete correct method S.D. = 2.19(2\dots) or 2.2	B1 M1 A1  3	Or sight 4.79(....)
<b>19.</b> (a) $90^\circ$  (b) $62^\circ$  (c) angle in semi circle OR (b) alternate segment theorem	B1  B1  E1  3	OR equivalent description or calculations
<b>20.</b> $\frac{1}{2} \times \frac{4}{3} \pi r^3 = 34.2$ or equivalent $r^3 = \frac{6 \times 34.2}{4\pi}$ (= 16.329...) $r = 2.5(37\dots)$	M1 M1  A1 3	Maybe implied in stages of working  SC1 for 2.01(3\dots) from using volume of a sphere
<b>21.</b> $11.5^\circ$ $168.46^\circ$ or $168.5^\circ$	B1 B1 2	FT 180 – first value. Penalise further values – only

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<p>22. (a) <math>10x + 3y - (4x + y)</math> <math>= 6x + 2y</math></p> <p>(b) <math>AC = 9x + 3y</math> <math>OC = 13x + 4y</math></p>	<p>M1 A1</p> <p>M1 A1 4</p>	<p>Award SC1 for <math>6x + 4y</math> from <math>10x+3y-4x+y</math></p> <p>FT their <math>1.5 \times (a)</math> in the form <math>\dots x + \dots y</math>. Accept unsimplified form</p> <p>Accept unsimplified form. FT their <math>1.5(a) + 4x + y</math></p>
<p>23. <math>BD^2 = 26.2^2 + 29.3^2 - 2 \times 26.2 \times 29.3 \times \cos 30^\circ</math> <math>= 215.3(038\dots)</math> <math>BD = 14.67(\dots)</math> or <math>14.7</math></p> <p><math>\frac{14.4}{\sin 50^\circ} = \frac{BD}{\sin A}</math></p> <p><math>\sin A = BD \times \sin 50^\circ / 14.4</math> <math>51.29(79\dots)^\circ</math> or <math>51.3^\circ</math> or <math>51.4^\circ</math></p>	<p>M1 M1 A1</p> <p>M1 M1 A1 6</p>	<p>FT their BD</p>





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