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GENERAL CERTIFICATE OF SECONDARY EDUCATION
TYSTYSGRIF GYFFREDINOL ADDYSG UWCHRADD

MARKING SCHEME

MATHEMATICS - 3 TIER

SUMMER 2008

INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2008 examination in GCSE MATHEMATICS - 3 TIER. 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.

FOUNDATION TIER - PAPER 1

GCSE Mathematics June 2008 Foundation Tier Paper 1 3 tier examination	Marks	MARK SCHEME Comments FINAL VERSION
1. (a) (i) 12 24 or 24 12 (ii) 46 23 or 23 46 (iii) 9 7 or 7 9 (iv) 60 4 or 4 60 (b) 7425 (c) $\frac{8}{15}$ ISW	B1 B1 B1 B1 B1 B2 7	CAO B1 for $\frac{16}{30}$ or equivalent
2. (a) Rectangle Trapezium Pentagon (b) Radius Chord Tangent	B1 B1 B1 B1 B1 B1 6	CAO CAO CAO CAO CAO CAO CAO
3. 2 1 4 1 2 3 5 8 2 3 Labels on axes Uniform scale Bars correct	B1 B1 M1 A1 4	CAO For at least one label given M1 for uniform scale FT from 'their table' Accept vertical line diagram
4. (a) $5 \times 40 + 50$ (£)250 (b) 28 70 (c) 12 , 15 , 18 45	M1 A1 B1 B1 M1 A1 6	M1 for attempt to multiply AND add. CAO (£)450 gets M0 A0 CAO CAO M1 for any two correct when 3 numbers are given. CAO 18, 27, 36, 45 gets M1 A1
5. Correct image	B2 2	-1 for each incorrect vertex.
6. (a) $\frac{2}{8}$ $\frac{7}{28}$ (b) (£)40 – (£)26 (£)14 (c) Rent (£)100 , saving (£)125 (£)100 AND (£)125 seen OR $\frac{1}{5} = 20\%$ OR $\frac{1}{5} = \frac{20}{100}$, $25\% = \frac{25}{100}$ Correct conclusion drawn (d) 50(%) 25(%) $\frac{1}{4}$ (0).5 60(%) or equivalent (e) Oranges cost (£)2.88 or 288(p) Change (£)7.12 or 712(p)	B2 M1 A1 M1 A1 M1 A1 B1 B1 B1 B1 B1 11	B1 for 1 correct or (1 or 2 correct and 1 incorrect) CAO M1 for 100 or 125 AND an attempt at finding the second value A1 OR M1 for change to %age or fractions which can be compared A1 Allow $25\% = \frac{1}{4}$ and $\frac{1}{4} > \frac{1}{5}$ for M1 A1 CAO CAO FT for 'their' percentages FT
7. (a) (i) 12p (ii) $8a - 2b$ ISW (b) (i) 12 or 45 seen 57 (ii) $12 - 4 - 2$ 6 (b) Attempt to obtain $(33 + 3)/4$ 9	B1 B1 B1 B1 B1 B1 M1 A1 8	CAO CAO CAO CAO B1 for 12 or -2 Accept sight of 8 ($12 - 4$) CAO CAO

GCSE Mathematics June 2008 Foundation Tier Paper 1 3 tier examination	Marks	MARK SCHEME Comments FINAL VERSION
8. Estimate for height of car Height of house 10cm (9.6cm) height of car 2cm (1.9cm) OR 5 (equal) intervals marked on the diagram Height of house = $5 \times$ 'their height of the car' Height of house	B1 B1 M1 A1 4	1.2m to 2m 4ft to 6ft 6inches $\pm 2\text{mm}$ Accept 4 (or 5) \times 'their height' + <u>a part of 'their' height</u> FT for 'their height' Answer only which is greater than $4 \times$ 'their' height BUT less than or equal to $6 \times$ 'their' height gets B1 M1 A1
9. 45 45 46 47 47 48 49 50 51 (a) Median 47 (b) Range 6	M1 A1 B1 3	Attempt at ordering the numbers CAO CAO
10. (a) Area = 4×3 = 12 m^2 (b) Cost of carpet = $15 \times$ 'their area' (£)180 Total cost = (£) 180 + 35 = (£) 215	M1 A1 M1 A1 m1 A1 6	CAO FT from (a) FT
11. (a) $x = (180 - 90 - 29)$ = $61(^{\circ})$ (b) Base angle = $(180 - 46)/2$ = $67(^{\circ})$ $y = 113(^{\circ})$	M1 A1 M1 A1 B1 5	Award M1 for $90 - 29$ C.A.O. C.A.O. Allow 3 marks for $y = 113$ F.T $180 -$ 'their 67'
12. (a) $(0)\cdot04(00\dots)$ (b) $479.887(00\dots)$ (c) 72 (d) $8/9 - 6/9$ = $2/9$ ISW	B1 B1 B2 M1 A1 6	B1 for 8 OR 9 seen OR 24×3 OR 4×18 OR $2 \times 2 \times 2 \times 3 \times 3$ For dealing with the process correctly C.A.O. OR equivalent fractions OR decimals, but M1, A0 for $\cdot889 - \cdot667 = \cdot222$ OR equivalent in %
13. For example 90, 250 and 50 OR 100, 200 and 50 Use of 100 for the 52 is M0, but 300 for 248 is acceptable. Estimate 300 – 500	M1 A1 2	For reasonable estimates that lead to a calculation that effectively only involves multiplication or division. by single digit numbers. Must be a correct calculation using their figures, giving an estimate in the range 300 – 500.

GCSE Mathematics June 2008 Foundation Tier Paper 1 3 tier examination	Marks	MARK SCHEME Comments FINAL VERSION	
14. (a) (i) $\cdot 15 + \cdot 09$ $\cdot 24$ or equivalent ISW (ii) $\cdot 35$ (b) $\cdot 35$ of 200 $= 70$ (c) Receipts = £160 Payouts = £140 Must use a whole number of prize winners Profit = (£)20 OR 2000 (p)	M1 A1 B1 M1 A1 M1 A1 7	For adding the 2 probs. C.A.O. C.A.O. F.T. their (a)(ii). 70 out of 200 gets M1, A1 $\frac{70}{200}$ gets M1, A0. Full method of $200 \times 80p - \text{their (b)} \times £2$ F.T. 'their 70'.	NOTES (Use throughout): There is no F.T. for the use of any probabilities outside the range 0 to 1 inclusive. Penalise -1 once only for consistent use of words such as "35 out of 100", "35 in 100" OR "35:100". When fraction and wrong notation seen, DO NOT penalise wrong notation. If incorrect reduction of fractions, then give the full marks at that point, but if they go on to use the incorrect fraction in part (c), penalise -1.
15. In the range 9.3 – 9.7 (cm) OR 93 – 97 (mm) $\times 40$ (m) $=$ 'their XY' $\times 40$ (m) <u>Note</u> $9.3 \times 40 = 372$ $9.4 \times 40 = 376$ $9.5 \times 40 = 380$ $9.6 \times 40 = 384$ $9.7 \times 40 = 388$	B1 M1 A1 3	Correct measurement of $9.5\text{cm} \pm 2\text{mm}$ For correct use of scale F.T. their measurement. Unsupported 372 – 388 gets all 3 marks. Use of a scale other than 40 should be marked then MR-1, BUT NOT FOR 10^n , where n is a positive number, due to the ambiguity with metric conversion factors.	
16. (a) $5x$ (b) $x - 3$ (c) $10(x - 3)$ (d) $10(x - 3) + 5x$ $10x - 30 + 5x$ $15x - 30$ OR $15(x - 2)$	B1 B1 B1 B1 B1 B1 6	Do not penalise extra $=x$ or $x=$ or $=n$ or $n=$ in this question. Change of letter is penalised -1 once only. C.A.O. Ignore subsequent working in parts (a), (b) and (c). C.A.O. F.T. $10 \times$ their (b) if (b) is at least of the form $ax+b$. B1 for $10 \times x - 3$ OR $x - 3 \times 10$ in this part. $10x - 3$ gets B0. F.T. their (a)+(c) if at least $ax + bx$. Clearing their brackets correctly. B0 if no brackets or incorrect. Correctly collecting terms if at least $ax+b$ and cx involved. No penalty for incorrect factorisation. If B3 awarded, then - 1 once only for any inappropriate extra algebra such as $15x = 30$ OR $x = 2$.	
17. $(-1, -1), (-3, -1), (-2, -2), (-2, -3), (-1, -3)$	B2 2	All correct. Plotting 5 correct vertices only gets the B2. OR B1 for a pentagon with at least 2 correct vertices, OR B1 for a correct reflection about $x = c$ ($c \neq 1$). OR B1 for a correct reflection in $y = 1$ Extra drawings gets B0. If B0, then B1 for sight of the line $x = 1$ with or without any number of diagrams.	

<p align="center">GCSE Mathematics June 2008 Foundation Tier Paper 1 3 tier examination</p>	<p align="center">Marks</p>	<p align="center">MARK SCHEME Comments FINAL VERSION</p>
<p>18. (a) $240/600 \times 100$ $= 40 (\%)$</p> <p>(b) $200 \times 30/12$ $110 \times 30/12$ $2 \times 30/12$ 500 (ml) (milk) 275 (g) (flour) 5 (large eggs)</p>	<p>M1 A1 M1 A1 A1 5</p>	<p>C.A.O. <u>40/100 gets SC1</u></p> <p>Sight of any ingredient $\times 30/12$ OR $2\frac{1}{2}$ OR equivalent.</p> <p><u>C.A.O. on the ingredient used for the M1.</u> For the remaining 2 quantities Unsupported correct answers get the appropriate marks. For example, 5 eggs gets M1, A1, then 500 and 275 would be needed for the 3rd mark.</p>
<p>19. Another correct angle of 116 OR 64 Any other correct angle of 57 OR an angle of 123</p> <p>$180 - \hat{ADE} - \hat{AED}$ $= 59$</p>	<p>B1 B1 M1 A1 4</p>	<p>CHECK FOR ANY WORKING ON THE DIAGRAM</p> <p>OR any other correct method, e.g. one that uses triangle AFG OR uses the exterior angle property. F.T. their angles if using at least one parallel line property. Using triangle ADE or AFG as isosceles is M0.</p>
<p>20. (a) $4x$ 24 $x = 24/4$ I.S.W. (= 6)</p>	<p>B1 B1 B1 3</p>	<p>Collecting terms correctly <u>F.T. until second error.</u> F.T. must be of equiv. difficulty (division by a number $\neq 1$) C.A.O. Accept an embedded answer.</p>

FOUNDATION TIER - PAPER 2

2008 Summer Paper 2 (Calculator allowed) Foundation 3 - Tier	Marks	MARK SCHEME FINAL VERSION Comments				
1. (a) 182.12 22.96 26.52 246.3(0) (b) $10 \times$ 'their total'/100 or equiv. (£) 24.63	B1 B1 B1 B1 M1 A1 6	CAO CAO CAO FT for 1 error FT from (a)	18.21 2.296 2.652 1.47 24.63	18.21 2.29 2.65 1.47 24.62	18.21 2.30 2.65 1.47 24.63	Accept any of the above giving for part (b) All four must be attempted for M1 Unsupported (£)24.62 gets M1 A1
2. (a) 105 106 107 108 109 110 111 112 113 (b) 32	M1 A1 B1 3	M1 for attempting to count squares. Accept fractional answers in the given range. CAO				
3. (a) (i) EB or BE (ii) Line through F parallel to AC (iii) 8.7 (b) Draw a circle of radius 6cm (± 2 mm)	B1 B1 B1 B1 4	Accept 87mm ± 2 mm				
4. 16 10 13 15	B1 B1 B1 B1 4	CAO CAO CAO CAO				
5. (a) (i) 4 5 6 7 (ii) 7 6 4 5 (b) Shade any 2 sections (c) 1 2 11 22 (d) (i) 7460 (ii) 7000	B1 B1 B1 B2 B1 B1 7	CAO CAO B1 for 2 or 3 factors. CAO CAO	<u>B0 if any incorrect factors are given.</u>			
6. (a) (i) 68 (ii) Pointer at 56 (b) (i) 570 (ii) 920	B1 B1 B1 B1 4	CAO > 54 but < 58 CAO CAO				
7. (a) A and D G and B (b) P and V	B1 B1 B2 4	B1 for 1 correct or (1 or 2 correct and 1 incorrect)				
8. Attempt to add the numbers (531) 'their sum'/9 59	M1 m1 A1 3	CAO				
9. (-5, -2) (1,4)	B1 B1 2	CAO CAO				
10. (a) 98° 26° (b) A line of length 13cm or 9cm or 12cm A second line having a correct length Completed correct triangle	B1 B1 M1 M1 A1 5	$\pm 2^\circ$ $\pm 2^\circ$ Allow ± 2 mm for each length CAO	If B2 is given then -1 for <u>incomplete triangle</u>			
11. (a) 75 (b) 2 correct lines	B1 B2 3	CAO B1 for 1 correct line or 2 correct lines and 1 or 2 diagonals				

2008 Summer Paper 2 (Calculator allowed) Foundation 3 - Tier	Marks	MARK SCHEME FINAL VERSION Comments
12. (a) $20/0.87$ $2000/87$ 22 $86(p)$ or $(£)(0).86$ (b) (i) 28.09 (ii) 6.9 (c) (i) 5 -5 (ii) -6 (iii) -7	M1 A1 A1 B1 B1 B1 B1 B1 8	Accept 20/87 for M1 CAO CAO CAO CAO CAO CAO CAO
13. (a) $4.5 \text{ kg of potatoes cost} = 4.5 \times (£)1.08$ $= (£)4.86$ $2.8 \text{ kg of turnips cost} = £8.64 - 4.5 \times (£)1.08$ $= (£)3.78$ $1 \text{ kg of turnips costs } 3.78/2.8$ $= (£)1.35 \text{ OR } 135(p)$ (b) $\frac{62}{100} \times 12.5$ $= 7.75$	M1 A1 M1 A1 M1 A1 6	For the complete method that leads to the total cost of the turnips. C.A.O. F.T. their “£3.78”, but £8.64/2.8 gets M0. If F.T. leads to fractional pence, allow A1 for any correct answer, rounded or not rounded. Reversal of potatoes and turnips is MR–1. <u>OR Partition methods, but they must lead to 62%</u> <u>e.g 50% = 6.25, 10% = 1.25, 2% = .25, 6.25+1.25+.25</u> C.A.O. Ignore incorrect units, even %.
14. Accept the names of the shapes R Triangular prism P Cube Q Tetrahedron S Octagon	B3 3	All correct B2 for any 2 correct B1 for any 1 correct. <u>If 2 letters are put in the same cell, they are both incorrect.</u>
15. (a) (i) $12/4$ ISW (3) (ii) 8 (b) $7x - 21$ I.S.W. (c) 18 (d) 4, 7, 12	B1 B1 B1 B2 B2 7	Do not penalise extra =x or x= or =n or n= in this question. Change of letter is penalised –1 once only. Allow $7 \times x - 7 \times 3$ B1 for the 30 OR –12 $30x - 12y$ gets B0. B1 for 4 given first OR 7 given second OR 12 given third. OR B1 for $1^2 + 3$ AND $2^2 + 3$ AND $3^2 + 3$, ignore any incorrect evaluations of these expressions. OR B1 for 3, 4, 7.
16. 3 or 4 angles correct and correctly labelled. 3 or 4 angles correct, labels not fully correct. 2 angles correct and correctly labelled. 2 angles correct, labels not fully correct. 1 angle correct and correctly labelled. OR <u>If 0 OR 1 for their diagram or no diagram.</u> 360/120 Angles are 132, 105, 84 and 39	B4 B3 B3 B2 B1 M1 A1 4	Use the overlay and allow $\pm 2^\circ$. Correct labels (Words NOT the frequency OR angle). 3 correct labels is enough. 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. 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) 3° gets the M1. OR SC1 for all correct percentages: 36.7, 29.2, 23.3, 10.8

2008 Summer Paper 2 (Calculator allowed) Foundation 3 - Tier	Marks	MARK SCHEME FINAL VERSION Comments
17. (a) 36.49 (b) $\frac{84}{350} \times 100 = \underline{24\%}$ (c) $86 + 86 \times .17(5)$ $= (\pounds)101.05$ Angus cheaper by $(\pounds) 2.51$ $98.54 \times \frac{100}{117.5} = (\pounds)83.86(3)$	B2 M1 A1 M1 A1 B1 7	B1 for 36.488(135) OR 36.5 36.48 only gets B1. Partition methods should be worked out properly, e.g. 10%=35, 1%=3.5, 20%=70, 4%=14 <u>SC1 for .24 OR 24/100</u> <u>For a correct method of finding the VAT inclusive price using 17½% OR 17% OR 7½%.</u> C.A.O. F.T. the difference between ‘their Camel price’ and 98.54 AND the name of the site that is the cheaper. <u>Candidates who find the Angus pre-VAT price by a correct method can earn M1, A1, but it will be B0.</u>
18. (a) Volume = $21 \times 15 \times 1.6 = 504 \text{ (m}^3\text{)}$ (b) Height = $377 / (21 \times 15) = 1.2 \text{ (m)} \quad 1.19(6\dots)\text{(m)}$	M1 A1 M1 A1 4	C.A.O. <u>M1, A0 for the 504×10^n ($n \neq 0$)</u> <u>But any further arithmetic performed on the 504, e.g. $\div 2$ is M0,A0</u> C.A.O. SC1 for 0.4(m) from the top.
19. (a) 40 (miles) (b) 45 (mins) (c) Line starting at (3:30, 100) to at least the point (4:00, 70). (d) Reading where the lines cross. <u>This is 4:03 – 4:06 for the correct line</u>	B1 B1 B2 B1 5	C.A.O. C.A.O. B1 for a line starting at (3:30, 100) going to the right with negative slope Should be read accurately if on a 2mm line. Allow interpolation or either side if inside a 2mm square. <u>F.T. for a line starting at (2:00, 100) OR</u> <u>F.T. for a line starting at (3:30, 0)</u>
20. (a) $255 - 259$ (°) (b) Their 214° bearing from B Their 168° bearing from A Point C.	B1 M1 M1 A1 4	Allowing $257 \pm 2^\circ$. Only the 3 figure bearing gets the B1. Allow $\pm 2^\circ$ using overlay. Watch for only a dot. Allow $\pm 2^\circ$ using overlay. Watch for only a dot. F.T. if at least M1 and 2 intersecting lines.
21. (a) Vague, what do you mean by often? Use definite figures and/or a time period, such as 0–2, 3–4, 5+ times per annum No box for ‘never’ (b) (i) Overlapping ages (ii) What about the under 30s?	B1 B1 B1 B1 4	Along these lines
22. (a) –1 (b) Plots Curve	B1 P1 C1 3	C.A.O. – 1 on 2nd error Must be a curve.

INTERMEDIATE - PAPER 1

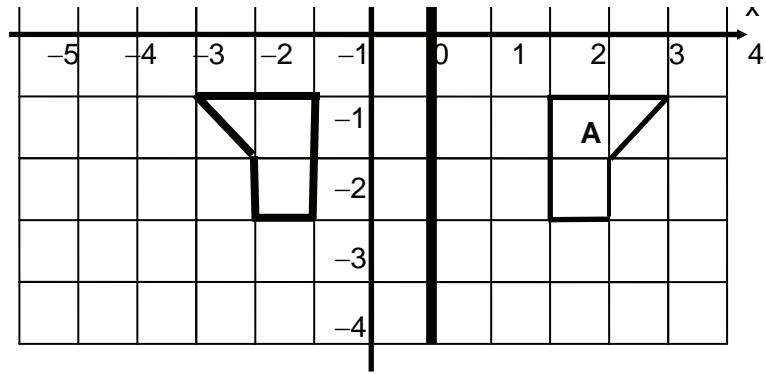
2008 Summer Paper 1 (Non calculator) Intermediate Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (22/05/2008) (Page 1)	
1. (a) $x = (180 - 90 - 29)$ $= 61(^{\circ})$ (b) Base angle $= (180 - 46)/2$ $= 67 (^{\circ})$ $y = 113 (^{\circ})$	M1 A1 M1 A1 B1 5	Award M1 for $90 - 29$ C.A.O. C.A.O. F.T $180 - 'their 67'$ Allow 3 marks for $y = 113$	
2. (a) $(0)\cdot038$ (b) 480 (c) 72 (d) $8/9 - 6/9$ $= 2/9$ <u>(I.S.W.)</u>	B1 B1 B2 M1 A1 6	C.A.O. Accept $3\cdot8 \times 10^{-2}$. Do not accept $(0)\cdot0380$ etc. Allow the 'leading' zero. C.A.O. Accept $4\cdot80 \times 10^2$. Do not accept $480\cdot0$ etc. B1 for 8 OR for 9. For dealing with the process correctly C.A.O. OR exact equivalent fractions OR decimals, but M1, A0 for $\cdot889 - \cdot667 = \cdot222$ OR equivalent in %	
3. For example, $42\% = \cdot42$ $\cdot46 = 46\%$ $9/20 = \cdot45$ OR 45% Smallest = 42% , largest = $\cdot46$	B1 B1 B1 3	MARKERS MUST MARK ALL THE WORKING SHOWN For correctly getting $\cdot46$ and 42% into a form suitable for comparing. $46/100$ is accepted as 46% for the purpose of comparing. For a correct equivalent to $9/20$, e.g. $\cdot45$ OR 45% suitable for comparing with the other quantities. Correct answers OR follow through of correct conclusion from their working.	
4. For example 90, 250 and 50 OR 100, 200 and 50 <u>Use of 100 for the 50 is M0,</u> <u>but 300 for 248 is acceptable.</u> Estimate 300 – 500	M1 A1 2	For reasonable estimates that lead to a calculation that effectively only involves multiplication or division. by single digit numbers. Must be a correct calculation using their figures, giving an estimate in the range 300 – 500.	
5. (a) (i) $\cdot15 + \cdot09$ $\cdot24$ <u>OR equivalent (I.S.W.)</u> (ii) $\cdot35$ <u>OR equivalent</u> (b) $\cdot35$ of 200 $= 70$ (c) Receipts = £160 Payouts = £140 <u>Must use a whole number for prize winners</u> Profit = (£)20 OR 2000 (p)	M1 A1 B1 M1 A1 M1 A1 7	For adding the 2 probs. C.A.O. C.A.O. F.T. their (a)(ii). 70 out of 200 gets M1, A1 $\frac{70}{200}$ gets M1, A0.	NOTES (Use throughout): There is no F.T. for the use of any probabilities outside the range 0 to 1 inclusive. Penalise –1 once only for consistent use of words such as “35 out of 100”, “35 in 100” OR “35:100”. When fraction and wrong notation seen, DO NOT penalise wrong notation. If incorrect reduction of fractions, then give the full marks at that point, but if they go on to use the incorrect fraction in part (c), penalise –1.
6. In the range $9\cdot4 - 9\cdot8$ <u>(cm) OR 94 – 98 (mm)</u> $\times 40$ (m) $= 'their XY' \times 40$ (m) <u>Note</u> $9\cdot6 \times 40 = 384$ <u>$9\cdot5 \times 40 = 380$</u>	B1 M1 A1 3	Correct measurement of $9\cdot6\text{cm} \pm 2\text{mm}$ For correct use of scale F.T. their measurement. <u>Unsupported 376 – 392 gets all 3 marks.</u> Use of a scale other than 40 should be marked then MR–1, BUT NOT FOR 10^n , where n is a positive number, due to the ambiguity with metric conversion factors.	

2008 Summer Paper 1 (Non calculator) Intermediate Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (22/05/2008) (Page 2)
7. (a) $5x$ (b) $x - 3$ (c) $10(x - 3)$ (d) $10(x - 3) + 5x$ $10x - 30 + 5x$ $15x - 30$ ISW OR $15(x - 2)$	B1 B1 B1 B1 B1 B1 6	Do not penalise extra $=x$ or $x=$ or $=n$ or $n=$ in this question. Change of letter is penalised -1 once only. C.A.O. Ignore subsequent working in parts (a), (b) and (c). C.A.O. F.T. $10 \times$ their (b) if (b) is at least of the form $ax+b$. B1 for $10 \times x - 3$ OR $x - 3 \times 10$ in this part. $10x - 3$ gets B0. F.T. their (a)+(c) if at least $ax + bx$. Clearing their brackets correctly. B0 if no brackets or incorrect. B1 Correctly collecting terms if at least $ax+b$ and cx involved. No penalty for incorrect factorisation. If B3 awarded, then -1 once only for any inappropriate extra algebra such as $15x = 30$ OR $x = 2$.
8. $(-1, -1), (-3, -1), (-2, -2), (-2, -3), (-1, -3)$ <u>Use diagram on page 5</u>	B2 2	All correct. Plotting 5 correct vertices only gets the B2. OR B1 for a pentagon with at least 3 correct vertices, OR B1 for a correct reflection about $x = c$ ($c \neq 1$). OR B1 for a correct reflection in $y = 1$ Extra drawings gets B0. If B0, then B1 for sight of the line $x = 1$ with or without any number of diagrams.
9. (a) $240/600 \times 100$ $= 40$ (%) (b) $200 \times 30/12$ $110 \times 30/12$ $2 \times 30/12$ 500 (ml) (milk) 275 (g) (flour) 5 (large eggs)	M1 A1 M1 A1 A1 5	C.A.O. 40/100 gets SC1 Sight of any ingredient $\times 30/12$ OR $2\frac{1}{2}$ OR equivalent. C.A.O. on the ingredient used for the M1. For the remaining 2 quantities Unsupported correct answers get the appropriate marks. For example, 5 eggs gets M1, A1, then 500 and 275 would be needed for the 3 rd mark.
10. Another correct angle of 116 OR 64 Any other correct angle of 57 OR an angle of 123 $180 - \hat{ADE} - \hat{AED}$ $= 59$	B1 B1 M1 A1 4	CHECK FOR ANY WORKING ON THE DIAGRAM OR any other correct method, e.g. one that uses triangle AFG OR uses the exterior angle property. F.T. their angles if using at least one parallel line property. Using triangle ADE or AFG as isosceles is M0.
11. (a) $4x = 24$ $x = 24/4$ I.S.W. ($= 6$) (b) y^{10} (c) $15x + 20 - 4x - 14$ $= 11x + 6$ (Watch out for compensating errors)	B2 B1 B1 B1 B1 6	Collecting terms correctly in an equation. F.T. until second error B1 for $\pm 4x$ OR ± 24 anywhere F.T. must be of equiv. difficulty (division by a number $\neq 1$) Allow sight of embedded use of 6 for x. C.A.O. Clearing brackets correctly. F.T. collecting terms until second error. If they introduce an $=$ sign after scoring B2 then penalise -1 . If they introduce an $=$ sign whilst doing the work, transpose all their terms to one side of the equation, mark this as normal, then if B1 scored leave it, but if B2 scored then penalise -1 for use of an equation.

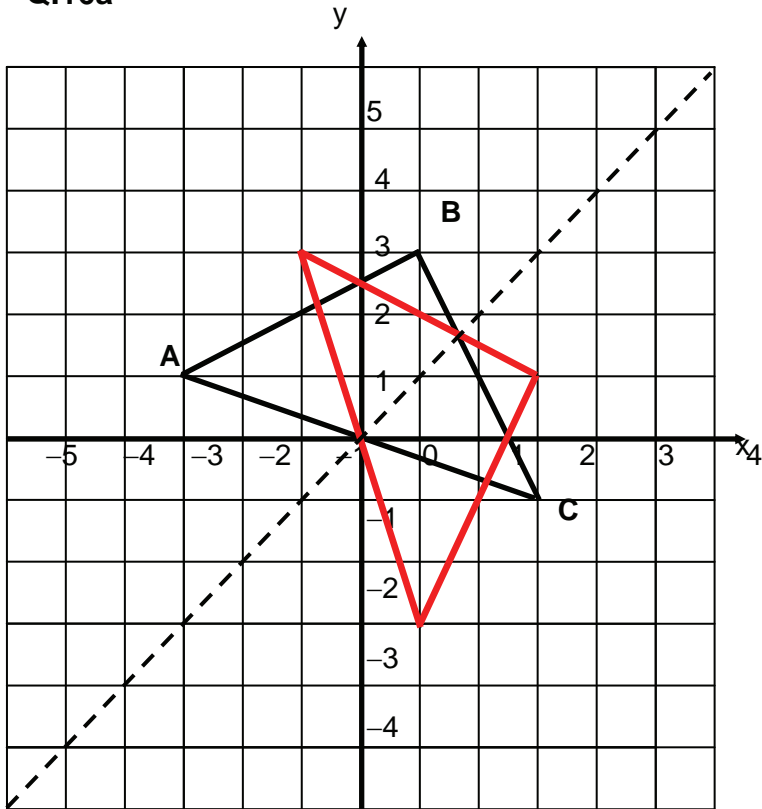
2008 Summer Paper 1 (Non calculator) Intermediate Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (22/05/2008) (Page 3)
12. (a) $4n - 1$ (b) $n(n + 2)$ OR $n^2 + 2n$	B2 B2 4	Do not penalise extra $=x$ or $x=$ or $=n$ or $n=$ in this question. Change of letter is penalised -1 once only. Or equivalent such as $3 + 4(n-1)$. Allow $n^4 - 1$, $n \times 4 - 1$. B1 for the $4n$. Allow $n \times n+2$ without brackets. B1 for $n \times$ expr. in n OR expr. in $n \times n+2$ When brackets are not used, the absence of a multiplication sign gets penalised -1 once only. For example, $n^2 + 2$ gets B2 $-1 =$ B1
13. (a) $(3x - 72) + (2x + 16) + (120 - x) = 360$ (b) $4x = 296$ $x = 74$	B2 B1 B1 4	B1 for adding the 3 terms, <u>B1 for exp. in $x = 360$. $4x + 64$ gets B1, but $4x$ and 64 separately does not</u> F.T. until 2 nd error F.T. provided at least TWO of the 'ax+b' terms are added. F.T. if 180 used instead of 360. Collecting terms. Unsupported answer of 74 OR by 'trailing' gets this B2 only.
14. Suitable axes, with uniform scales (not necessarily labelled) Polygon with at least 3 vertices plotted at their correct positions (vert. & horiz.). For example, (5, 13), (10, 23), (15, 34), ... All 5 vertices at correct positions (vert. & horiz.).	B1 M1 A1 3	Must be numbers only. Use of $3 \leq w \leq 7$ etc gets 0. 'Reverses' axes should be marked without penalty. Accept 'straight' lines drawn without a ruler. <u>No polygon is M0, A0.</u> Ignore bars if polygon drawn. If Mark scale not correct, assume mid-points are at the mid-point of the '2 cm grid lines'. SC1 for a polygon using all 5 vertices correct if translated horizontally. Usually this means the polygon has been plotted at the ends of the intervals rather than at the mid-points.
15. (a) $2, 2, 5, 5, 5$ $2^2 \times 5^3$ <u>(Use of + here is B0)</u> (b) 7	M1 A1 B1 B1 4	For a method that produces 2 prime factors from the set $\{2, 2, 5, 5, 5\}$ before their second error. If their 2 nd prime and 2 nd error occurs at the same 'level' then allow M1. C.A.O. for the five correct factors. (Ignore 1s). F.T. their answer if at least one index form used with at least a square. <u>Ignore prime number requirement for this B mark.</u> <u>Use of brackets $(2^2)(5^3)$ OR dot $2^2 \cdot 5^3$ gets the B1.</u> The inclusion of any 1s in their index form gets B0. C.A.O. <u>Accept $3^2 \times 7^4$</u>
16. (a) Correct image $(1, -3)$ $(3, 1)$ $(-1, 3)$ (b) Correct image <u>$(-2, 0)$ $(-2, -3)$ $(-4, -2)$</u> <u>See diagrams on page 5</u>	B2 B2 4	B1 for any 2 correct vertices. <u>B1 for correct reflection in $y = -x$</u> $(-1, 3)$ $(-3, -1)$ $(1, -3)$ <u>B1 for anticlockwise rotation of 90° about $(-1, 2)$.</u> <u>$(0, 4)$ $(0, 7)$ $(2, 6)$</u> <u>B1 for clockwise rotation of 90° about $(2, -1)$.</u> <u>$(4, 0)$ $(4, -3)$ $(2, -2)$</u>
17. (a) At least a 2cm arc of a circle centre A, radius AB (3cm) (b) Straight line joining the 2 centres. (c) Straight line segments Both lines and correct intersection.	B1 B1 B1 B1 4	IN THIS QUESTION: Allow dots as long as intention is clear. B0 if any extra arcs or lines. <u>In parts (b) & (c) if pupils draw the correct locus do not penalise the 'tangential' line on the top of the circles or repeated circles to depict 'movement'.</u> Need not go entirely from left circle to right circle. Long enough to ensure that it is on the correct locus For either the sloping line or the horizontal line. Two straight lines intersecting at a point (ignore extensions). There should be no arcs at the point of intersection.

2008 Summer Paper 1 (Non calculator) Intermediate Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (22/05/2008) (Page 4)	
18. Correctly setting up two equations for eliminating one variable, i.e. coeffs. of one variable have the same absolute value. First variable's value. Correctly substituting their first variable Second variable's value	M1 A1 M1 A1 4	Allow <u>one error</u> in calculating the 4 coefficients, which do not involve the variable being eliminated. C.A.O. Either $x = 7$ OR $y = -2$ F.T. F.T. If ONLY both answers of $x = 7$ AND $y = -2$ THEN B4	<u>Substitution method</u> M1 for correctly substituting for one variable into the other equation, then A1 for the correct answer.
19. (a) $12p^4r^8$ (b) $3a(2ab + 3)$	B2 B2 4	Ignore any extra \times signs. B1 for $12p^4r^m$ OR $12p^n r^8$ OR kp^4r^8 B1 for $a(6ab + 9)$ OR $3(2a^2b + 3a)$ OR $3a(2ab + \dots)$ OR $3a(\dots + 3)$ Ignore = 0, but if B2, -1 for extra inappropriate algebra.	
20. (a) Least = 11.5 Greatest = 12.5 (b) (i) 1150 1250 (ii) $1150 + 4 \times 11.5 = 1196 < 1200$ $1150 + 5 \times 11.5 = 1207.5 > 1200$ 105 bags are needed	B1 B1 B1 B1 M1 A1 A1 7	C.A.O. C.A.O. Accept 12.49 (recurring) F.T. provided $11 \leq$ their least in (a) < 12 F.T. provided $12 <$ their greatest in (a) ≤ 13 . Allow B1 for sight of 11.5×100 and 12.5×100 with both evaluated incorrectly The above conditions on 'least' and 'greatest' do NOT apply in (b)(ii). F.T. provided they use their 'least' value from (a) $\neq 12$. Any use of 12 means 0 marks for (b)(ii). For the accuracy of their calculations. If 'their least' is a factor of 1200, penalise -1, once only. Correct conclusion on their calculations. Allow M1 for 1200/11.5, then A1 for correct evaluation, then A1 for correct interpretation.	
21. (a) $4x \geq 9$ $x \geq 9/4$ I.S.W. $2\frac{1}{4}$ (NOT $9 \div 4$) (b) Smallest = 3	B1 B1 B1 3	C.A.O OR 2.25 OR 2.2 OR 2.3 F.T. until 2 nd error Use of $>$ is MR-1. IF ONLY = USED IN PART (a) THEN 0 marks. F.T. if 'their 2.25' is NOT a whole number AND a B1 has been awarded.	
22. volume length none of these area	B2 2	For all 4 correct. B1 for any 3 correct. Allow use of first letter, such as, v, l, none, a	
23. (a) Any 2 of: angle A = angle E angle ACB = angle DCE angle B = angle D (b) $\frac{DE}{8} = \frac{15}{10}$ DE = 12 (cm)	M1 A1 M1 A1 4	For any 1 of these and an attempt at showing that the 2 triangles have corresponding angles Complete explanation. (Need only involve 2 pairs of angles). Correct substituted ratio with DE as the only unknown. Giving the scale factor as 1.5 is not enough for M1.	
24. (a) Interquartile range = <u>31.5 - (24 to 24.5)</u> = 7.5 (b) $39 - 9$ = 30	M1 A1 M1 A1 4	Award M1, for their graph showing that they are using '45 and 15' AND (have read at least one value correctly or both values with a consistent misread of the scale) AND subtracted their 2 values. Misreads of the scale can be from the 20 or from the 25 etc Allow 7 - 7.5 Unsupported answers in the range 7 - 7.5 get M1, A1. C.A.O.	

Q.8



Q.16a



INTERMEDIATE - PAPER 2

2008 Summer Paper 2 (Calculator allowed) Intermediate Tier	Marks	POST CONFERENCE FINAL MARK SCHEME 07/06/2008 Comments (Page 1)
<p>1. (a) 4.5 kg of potatoes cost = $4.5 \times (\pounds)1.08$ = $(\pounds)4.86$ 2.8 kg of turnips cost = $\pounds 8.64 - 4.5 \times (\pounds)1.08$ = $(\pounds)3.78$</p> <p>1kg of turnips costs $3.78/2.8$ = $(\pounds)1.35$ OR 135(p)</p> <p>(b) $\frac{62}{100} \times 12.5$ = 7.75</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>6</p>	<p>For the complete method that leads to the total cost of the turnips.</p> <p>C.A.O.</p> <p>F.T. their “£3.78”, but £8.64/2.8 gets M0.</p> <p>If F.T. leads to fractional pence, allow A1 for any correct answer, rounded or not rounded.</p> <p>Reversal of potatoes and turnips is MR-1.</p> <p>OR Partition methods, but they must lead to 62% e.g 50% = 6.25, 10% = 1.25, 2% = .25, 6.25+1.25+.25</p> <p>C.A.O. Ignore incorrect units, even %.</p>
<p>2. Accept the names of the shapes</p> <p>R Triangular prism P Cuboid Q Tetrahedron S Octagon</p>	<p>B3</p> <p>3</p>	<p>All correct</p> <p>B2 for any 2 OR 3 correct B1 for any 1 correct. If 2 letters are put in the same cell, that row is incorrect.</p>
<p>3.</p> <p>(a) $7x - 21$ I.S.W.</p> <p>(b) $7a - 7b$ I.S.W.</p> <p>(c) 18</p> <p>(d) 4, 7, 12</p>	<p>B1</p> <p>B1, B1</p> <p>B2</p> <p>B2</p> <p>7</p>	<p>Do not penalise extra =x or x= or =n or n= in this question. Change of letter is penalised -1 once only.</p> <p>C.A.O.</p> <p>B1 for either term OR $7a + (-7b)$. B2 requires $7a - 7b$. If they introduce an = sign after scoring B2 then penalise -1.</p> <p>B1 for the 30 OR -12 $30x - 12y$ gets B0.</p> <p>B1 for 4 given first OR 7 given second OR 12 given third. OR B1 for $1^2 + 3$ AND $2^2 + 3$ AND $3^2 + 3$, ignore any incorrect evaluations of these expressions. OR B1 for 3, 4, 7.</p>
<p>4. 3 or 4 angles correct and correctly labelled.</p> <p>3 or 4 angles correct, labels not fully correct. 2 angles correct and correctly labelled. 2 angles correct, labels not fully correct. 1 angle correct and correctly labelled.</p> <p>OR</p> <p><u>If 0 OR 1 for their diagram or no diagram,</u> 360/120</p> <p>Angles are 132, 105, 84 and 39</p>	<p>B4</p> <p>B3</p> <p>B3</p> <p>B2</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>4</p>	<p>Use the overlay and allow $\pm 2^\circ$. Correct labels (Words NOT the frequency OR angle). 3 correct labels is 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> <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) 3° gets the M1. OR SC1 for all correct percentages: 36.7, 29.2, 23.3, 10.8 Allow rounding, e.g. 37, 29, 23 and 11</p>
<p>5. (a) 36.49</p> <p>(b) $\frac{84}{350} \times 100$ = 24 (%)</p> <p>(c) $86 + 86 \times .17(5)$ = $(\pounds)101.05$ Angus cheaper by $(\pounds) 2.51$</p> <p>$98.54 \times \frac{100}{117.5} = (\pounds)83.86(3)$</p>	<p>B2</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>7</p>	<p>B1 for 36.488(135) 36.48 only gets B1.</p> <p>Partition methods should be worked out properly, e.g. $10\%=35, 1\%=3.5, 20\%=70, 4\%=14$ SC1 for .24 OR 24/100</p> <p>For a correct method of finding the VAT inclusive price using 17½% OR 17% OR 7½%.</p> <p>C.A.O.</p> <p>F.T. the difference between ‘their Camel price’ and 98.54 AND the name of the site that is the cheaper.</p> <p>Candidates who find the Angus pre-VAT price by a correct method can earn M1, A1, but it will be B0.</p>

2008 Summer Paper 2 (Calculator allowed) Intermediate Tier	Marks	POST CONFERENCE FINAL MARK SCHEME 07/06/2008 Comments (Page 2)
6. (a) Volume = $21 \times 15 \times 1.6$ = 504 (m ³) (b) Height = $378 / (21 \times 15)$ = 1.2 (m)	M1 A1 M1 A1 4	C.A.O. If there is further work which changes the value of 504, then the A1 becomes A0. <u>M1, A0 for the 504×10^n ($n \neq 0$)</u> <u>But any further arithmetic performed on the 504, e.g. $\div 2$ is M0, A0</u> C.A.O. <u>$\frac{3}{4}$ full gets 0, but $\frac{3}{4} \times 1.6$ gets M1 and 1.2 gets the A1</u> <u>SC1 for 0.4 (m)</u>
7. (a) 98 (cm) (b) Area = e.g. $24 \times 10 + 15 \times 12 + 3 \times 8$ OR $9 \times 10 + 18 \times 15 + 12 \times 7$ = 444 (cm ²)	B1 M1 A1 U1 4	C.A.O. <u>For any correct set of arithmetical operations that would give 444 if correctly evaluated. BUT do not penalise an incorrect AH that is seen in both parts AND B0 has been given for (a).</u> For the cm in (a) AND the cm ² in (b).
8. (a) 40 (miles) (c) 45 (mins) (c) Line starting at (3:30, 100) to at least the point (4:00, 70). (d) Reading where the lines cross. <u>This is 4:03 – 4:06 for the correct line</u>	B1 B1 B2 B1 5	C.A.O. C.A.O. B1 for a line starting at (3:30, 100) going to the right with negative slope Should be read accurately if on a 2mm line. Allow interpolation or either side if inside a 2mm square. <u>F.T. for a line starting at (2:00, 100) OR</u> <u>F.T. for a line starting at (3:30, 0)</u>
9. (a) 255 – 259 (°) (b) Their 214° bearing <u>from B</u> Their 168° bearing <u>from A</u> Point C.	B1 M1 M1 A1 4	Allowing $257 \pm 2^\circ$. Only the 3 figure bearing gets the B1. <u>Ignore sight of S77°W $\pm 2^\circ$, but B0 if any incorrect bearing is given.</u> Allow $\pm 2^\circ$ using overlay. Watch for only a dot. Allow $\pm 2^\circ$ using overlay. Watch for only a dot. F.T. if at least M1 and 2 intersecting lines.
10. (a) Vague, what do you mean by often? Use definite figures and/or a time period, such as 0–2, 3–4, 5+ times per annum <u>No box for ‘never’</u> (b) (i) Overlapping ages (ii) What about the under 30s?	B1 B1 B1 B1 4	Along these lines
11. (a) –1 (b) Plots Curve	B1 P1 C1 3	C.A.O. – 1 on 2nd error Must be a curve.
12. <u>(Dic gets)</u> $7/20 \times 600$ = (£) 210 <u>(John gets)</u> (£) 120 <u>(Hywel gets)</u> (£) 270	M1 A1 A1 3	For the correct method for finding any share For the share associated with the M1 For the other 2 shares <u>Names not needed</u>

2008 Summer Paper 2 (Calculator allowed) Intermediate Tier		Marks	POST CONFERENCE FINAL MARK SCHEME 07/06/2008																																																																									
			Comments	(Page 3)																																																																								
13.	$\begin{array}{r} 800.00 \\ + 40.00 \\ \hline 840.00 \\ + 42.00 \\ \hline 882.00 \\ + 44.10 \\ \hline 926.10 \end{array}$ <p style="text-align: right;"><u>926.1(0)</u></p>	B1 M1 A1 3	<p>For a correct 5%.</p> <p>Alternatively they may get the B1 for (£)120 OR (£)920 if seen.</p> <p>For the overall method (3 stages of adding different 5%).</p> <p>The method for finding their three 5% must be a correct one otherwise it is M0. Arithmetical errors are allowed for the M1</p> <p>Candidates using depreciation: Allow SC1 for seeing an amount of (£)685.9(0) and award the B1.</p> <p>Accept (£)926</p> <p><u>If candidates go on to give the compound interest, then I.S.W.</u></p> <p>If 2 years used, only the B1 mark can be gained.</p> <p>If 4 years used, mark up to 3 years, then MR-1 provided the B or A mark has been awarded.</p>																																																																									
14.	$\begin{array}{l} 8x + 20 = 3x - 15 \\ 5x = -35 \\ x = -35/5 \text{ I.S.W. } (= -7) \end{array}$	B1 B1 B1 3	<p>Clearing bracket <u>correctly</u></p> <p>Collecting terms <u>in an equation</u></p> <p>F.T. equivalent difficulty, $x = b/a$ ($a \neq 0$)</p> <p>B0 for $-35 \div 5$</p> <p>Answer only gets full marks.</p>		F.T. until 2 nd error																																																																							
15.	$\frac{1}{6} \times \frac{1}{6} = \frac{1}{36} \quad (.02\dot{7})$	M1 A1 2	<p>C.A.O. <u>Allow corrected values, such as .028, .0278 etc, but .027 OR .0277 etc is M1, A0. (Must be at least 2 sig. figs)</u></p>																																																																									
16.	<p>One correct (see note on the right for defⁿ.) evaluation of $x^3 - 5x - 1$ for an x satisfying: $2 \leq x \leq 3$</p> <p><u>Watch for pupils who are trying to make $x^3 - 5x$ equal to 1 rather than $x^3 - 5x - 1$ equal to 0.</u></p>	B1	<p>Calculations should be accurate to 1 figure (including 0) rounded or truncated. Values like -0.0007 can be represented as -0 in this question. By convention, 0 is taken as $+0$, that is, a small +ve number.</p> <p>If no calculations are given, accept use of "too low" or "too high" OR >0 and <0.</p>																																																																									
Useful Data																																																																												
Two correct (see note on the right for def ⁿ .) evaluations of $x^3 - 5x - 1$ for an x satisfying: $2.25 \leq x < 2.45$ which give opposite signs for f(x).	B1	<table border="1"> <thead> <tr> <th>x</th> <th>$x^3 - 5x - 1$</th> <th>x</th> <th>$x^3 - 5x - 1$</th> <th>x</th> <th>$x^3 - 5x - 1$</th> </tr> </thead> <tbody> <tr><td>2</td><td>-3</td><td>2.3</td><td>-0.3330</td><td>2.25</td><td>-0.8594</td></tr> <tr><td>2.1</td><td>-2.239</td><td>2.31</td><td>-0.2236</td><td>2.26</td><td>-0.7568</td></tr> <tr><td>2.2</td><td>-1.352</td><td>2.32</td><td>-0.1128</td><td>2.27</td><td>-0.6529</td></tr> <tr><td>2.3</td><td>-0.333</td><td>2.33</td><td>-0.0007</td><td>2.28</td><td>-0.5476</td></tr> <tr><td>2.4</td><td>0.824</td><td>2.34</td><td>0.1129</td><td>2.29</td><td>-0.4410</td></tr> <tr><td>2.5</td><td>2.125</td><td>2.35</td><td>0.2279</td><td></td><td></td></tr> <tr><td>2.6</td><td>3.576</td><td>2.36</td><td>0.3443</td><td>2.42</td><td>1.0725</td></tr> <tr><td>2.7</td><td>5.183</td><td>2.37</td><td>0.4621</td><td>2.43</td><td>1.1989</td></tr> <tr><td>2.8</td><td>6.952</td><td>2.38</td><td>0.5813</td><td>2.44</td><td>1.3268</td></tr> <tr><td>2.9</td><td>8.889</td><td>2.39</td><td>0.7019</td><td>2.45</td><td>1.4561</td></tr> <tr><td>3</td><td>11</td><td>2.4</td><td>0.8240</td><td></td><td></td></tr> </tbody> </table>	x	$x^3 - 5x - 1$	x	$x^3 - 5x - 1$	x	$x^3 - 5x - 1$	2	-3	2.3	-0.3330	2.25	-0.8594	2.1	-2.239	2.31	-0.2236	2.26	-0.7568	2.2	-1.352	2.32	-0.1128	2.27	-0.6529	2.3	-0.333	2.33	-0.0007	2.28	-0.5476	2.4	0.824	2.34	0.1129	2.29	-0.4410	2.5	2.125	2.35	0.2279			2.6	3.576	2.36	0.3443	2.42	1.0725	2.7	5.183	2.37	0.4621	2.43	1.1989	2.8	6.952	2.38	0.5813	2.44	1.3268	2.9	8.889	2.39	0.7019	2.45	1.4561	3	11	2.4	0.8240				
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Thus solution is 2.3 correct to 1 decimal place. Candidates must give a method that proves that the solution is 2.3 correct to 1 decimal places.	A1 4																																																																											
17. (a) Volume = $\pi \times 4.7^2 \times 23.5$ = <u>1630(847872)</u> OR 1631	M1 A1	Accept 1630 – 1632																																																																										
(b) Density = $\frac{9.9 (\times 1000)}{45.8 \times 24.9}$ = 8.68(1012) OR 8.7	M1 A2 5	Ignore the 1000 for this M mark. A1 for .0086(8101)																																																																										

2008 Summer Paper 2 (Calculator allowed) Intermediate Tier	Marks	POST CONFERENCE FINAL MARK SCHEME 07/06/2008 Comments (Page 4)	
18. $PR^2 = 13 \cdot 6^2 + 8 \cdot 3^2$ $PR^2 = (184 \cdot 96 + 68 \cdot 89) = 253 \cdot 85$ $PR = 15 \cdot 9(3267)$ $= 15 \cdot 9$ OR $16(\cdot 0)$ OR $15 \cdot 93$	M1 A1 A1 A1 4	Correct substituted Pythagoras C.A.O. Allow $PR = 253 \cdot 85$ F.T. their PR^2 if M awarded Appropriate accuracy.	Ignore incorrect writing of their process if their answers are correct.
19. (a) (i) $5 \cdot 3 \times 10^{10}$ (ii) 2×10^{-8} (b) $4 \cdot 9(64) \times 10^{-8}$ OR 5×10^{-8}	B1 B1 B2 4	C.A.O. C.A.O. B1 for $49 \cdot 64 \times 10^{-9}$ OR B1 for .000000049(6)	Penalise -1, once only for consistent use of incorrect notation, e.g. $5 \cdot 3^{10}$ OR $2^{10^{-8}}$
20. (a) $x^2 - 12$ $- 4x$ (b) OR $6m - 3t = 2t + 7$ $2m - t = \frac{2t+7}{3}$ $6m = 3t + 2t + 7$ OR $5t + 7$ $2m = t + \frac{2t+7}{3}$ $m = \frac{3t+2t+7}{6}$ OR $\frac{5t+7}{6}$ $m = \frac{t}{2} + \frac{2t+7}{6}$ (c) $4(x-1)(x+1)$	B1 B1 B1 B1 B1 B2 7	If B2 OR B3 then penalise -1, once only, if any subsequent incorrect or inappropriate algebra such as using equations B2 only if written as a trinomial, e.g. $x^2 - 4x - 12$ (any order) Clearing bracket correctly F.T. until second error For isolating the term in m. F.T. equivalent difficulty, i.e. $m = f(t)/a$ with $a \neq 1$	B1 for $4(x^2 - 1)$ OR $(2x - 2)(2x + 2)$
21. $3x - 7 - 2(4x + 5)$ $= 3$ $-5x = 20$ $x = -20/5$ (L.S.W.) ($= -4$)	M1 M1 A1 A1 4	For correctly clear fractions by a valid method for any 2 terms. For correctly clear fractions by a valid method for all 3 terms. NOTE: $3x - 7 - 8x + 10 = 3$ would get M1, M1, A0 and the final A1 can be gained for correct follow through (0) The two A1s are dependent on only one M1 being awarded Collecting terms Candidates who do not deal with the $-2 \times +5$ correctly do not lose the M1, but do lose the first of the A1s F.T. until 2 nd error starting after the M marks. If 0 marks awarded, SC1 for $\frac{-5x+3}{4} = \frac{3}{4}$ OR $\frac{-5x-17}{4} = \frac{3}{4}$	Unsupported answer of $x = -4$ gets all 4 marks.
22. (a) $H = 15 \times \tan 67^\circ$ Height = $35 \cdot 3(3778)$ (m) (b) $\cos(\text{angle}) = 13/21$ $= 0 \cdot 619(047)$ $\angle EBC = 51 \cdot 7(533)$ OR 52	M2 A1 M1 A1 A1 6	Correct substituted tan ratio. Allow M1 for $\tan 67^\circ = \text{Height}/15$ C.A.O. Correct substituted cos ratio $\cos^{-1}(13/21)$ gets M1 Unsupported $51 \cdot 7$ OR $51 \cdot 8$ OR 52 gets 3 marks.	
23. (a) 0.3 and 0.7 in correct places on the first branch 0.3 and 0.7 in correct places on the second branch(es) (b) $0 \cdot 7 \times 0 \cdot 7$ $= 0 \cdot 49$	B1 B1 M1 A1 4	C.A.O. Accept equivalents such as $3/10$ and $7/10$ or 30% and 70% . C.A.O. Accept equivalents as above. Accept 0.3 and 0.7 on only one branch if the other branch is empty. F.T. their tree if probabilities are between 0 and 1 exclusive and NOT all $1/2$. Or equivalent	

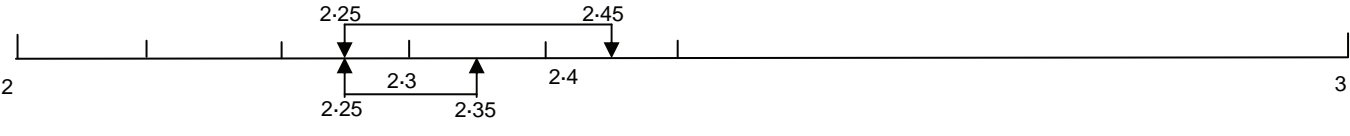
HIGHER TIER - PAPER 1

2008 Summer 3 Tier Paper 1 Higher Tier	Marks	Comments
1. (a) y^{10} (b) $15x + 20 - 4x - 14$ $= 11x + 6$ (Watch out for compensating errors)	B1 B1 B1 3	C.A.O. Clearing brackets correctly. F.T. collecting terms until second error. If they introduce an = sign after scoring B2 then penalise -1. If they introduce an = sign whilst doing the work, transpose all their terms to one side of the equation, mark this as normal, then if B1 scored leave it, but if B2 scored then penalise -1 for use of an equation.
2. (a) $4n - 1$ (b) $n(n + 2)$	B2 B2 4	Do not penalise extra =x or x= or =n or n= in this question. Change of letter is penalised -1 once only. Or equivalent such as $3 + 4(n-1)$. Allow $n4 - 1$, $n \times 4 - 1$. B1 for the $4n$. Allow $n \times n+2$ without brackets. B1 for ight of $1n^2$ from 2^{nd} difference method. B1 for $n \times$ expr. in n OR expr. in $n \times n+2$ When brackets are not used the absence of a multiplication sign gets penalised -1 once only. For example $n n+2$ gets B2 -1
3. Suitable axes, with uniform scales (not necessarily labelled) Polygon with at least 3 vertices plotted at their correct positions (vert. & horiz.). For example, (5, 13), (10, 23), (15, 34), ... All 5 vertices at correct positions (vert. & horiz.).	B1 M1 A1 3	Must be numbers only. Use of $3 \leq x \leq 7$ etc gets 0. 'Reverses' axes should be marked without penalty. Accept 'straight' lines drawn without a ruler. <u>No polygon is M0, A0.</u> Ignore bars if polygon drawn. If Mark scale not correct, assume mid-points are at the mid-point of the '2 cm grid lines'. SC1 for a polygon using all 5 vertices correct if translated horizontally. Usually this means the polygon has been plotted at the ends of the intervals rather than at the mid-points.
4. (a) $2, 2, 5, 5, 5$ $2^2 \times 5^3$ (b) 7	M1 A1 B1 B1 4	For a method that produces 2 prime factors. C.A.O. for the five correct factors. (Ignore 1s). F.T. their answer if at least one index form used with at least a square. <u>Ignore prime number requirement B mark.</u> <u>Use of brackets $(2^2)(5^3)$ OR dot $2^2.5^3$ is B1.</u> "+"s is B0 The inclusion of any 1s in their index form gets B0. Accept embedded 7, $3^2 \times 7^4$
5. (a) Correct image $(1, -3) (3, 1) (-1, 3)$ (b) Correct image $(-2, 0) (-2, -3) (-4, -2)$	B2 B2 4	B1 for any 2 correct vertices. MR-1 if in $y=-x$ Watch for reflection in x-axis, B0 B1 for anticlockwise rotation of 90° about $(-1,2)$. $(0, 4) (0, 7) (2, 6)$: 2^{nd} point will require extra grid lines. B1 for clockwise rotation of 90° about $(2,-1)$. $(4, 0) (4, -3) (2, -2)$
6. (a) At least a 2cm arc of a circle centre A, radius AB (3cm) (b) Straight line joining the 2 centres. (c) Straight line segments Both lines and correct intersection.	B1 B1 B1 B1 4	IN THIS QUESTION: Allow dots as long as intention is clear. B0 if any extra arcs or lines. In parts (b) & (c) if pupils draw the correct locus do not penalise 'tangential' line on the top of the circles or repeated circles to depict movement Need not go from left circle to right circle. For either the sloping line or the horizontal line. Two straight lines intersecting at a point (ignore extensions). There should be no arcs at the point of intersection.
7. Correctly setting up two equations for eliminating one variable, i.e. coeffs. of one variable have the same absolute value. First variable's value. Correctly substituting their first variable Second variable's value	M1 A1 M1 A1 4	Allow <u>one error</u> in calculating the 4 coefficients, which do not involve the variable being eliminated. C.A.O. Either $x = 7$ OR $y = -2$ F.T. F.T. If ONLY both answers of $x = 7$ AND $y = -2$ THEN B4 <u>Substitution method</u> M1 for correctly substituting for one variable into the other equation, then A1 for the correct answer.

<p>8. (a) $12p^4r^8$</p> <p>(b) $3a(2ab + 3)$</p>	<p>B2</p> <p>B2</p> <p>4</p>	<p>Ignore any extra \times signs. B1 for $12p^4r^m$ OR $12p^n r^8$ OR kp^4r^8</p> <p>B1 for $a(6ab + 9)$ OR $3(2a^2b + 3a)$ OR $3a(2ab+\dots)$ OR $3a(\dots+3)$ SC1 for $a(ab+1.5)$</p> <p>Ignore $=0$, but B2,-1 for extra inappropriate algebra</p>
<p>9. (a) Least = 11.5 Greatest = 12.5</p> <p>(b)(i) 1150 OR sight of 11.5×100 incorrectly evaluated 1250 OR sight of 12.5×100 incorrectly evaluated</p> <p>(ii) $1150 + 4 \times 11.5 = 1196 < 1200$ $1150 + 5 \times 11.5 = 1207.5 > 1200$</p> <p>105 blocks are needed</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>7</p>	<p>C.A.O.</p> <p>C.A.O. Accept 12.49 (recurring)</p> <p>F.T. provided $11 \leq$ their least in (a) < 12 F.T. provided $12 <$ their greatest in (a) ≤ 13. FT from 1st(b)(i), i.e. “12.5 x value” which has been used for “11.5x....”</p> <p>The above conditions on ‘least’ and ‘greatest’ do NOT apply in (b)(ii). F.T. provided they use their ‘least’ value from (a) $\neq 12$. Any use of 12 means 0 marks for (b)(ii). M1 for intention to divide 1200 by 11.5</p> <p>For the accuracy of their calculation(s), including division If ‘their least’ is a factor of 1200, penalise –1, once only. Correct conclusion on their calculations.</p>
<p>10. (a) $4x \geq 9$ OR $-9 \geq -4x$ $x \geq 9/4$ I.S.W. $2\frac{1}{4}$ (NOT $9 \div 4$)</p> <p>(b) Smallest = 3</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>3</p>	<p>C.A.O</p> <p>OR 2.25 OR 2.2. F.T. until 2nd error Use of $>$ is MR–1.</p> <p>IF ONLY = USED IN PART (a) THEN 0 marks.</p> <p>F.T. if ‘their 2.25’ is NOT a whole number AND a B1 has been awarded.</p>
<p>11. volume length none of these area</p>	<p>B2</p> <p>2</p>	<p>For all 4 correct. B1 for any 3 correct.</p>
<p>12. (a) Equal angles are: angle A = angle E angle ACB = angle DCE angle B = angle D</p> <p>(b) $\frac{DE}{8} = \frac{15}{10}$ PQ = 12 (cm)</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>4</p>	<p>For any 1 of these AND an attempt at showing that the 2 triangles are equiangular Complete explanation. (May only involve 2 pairs of angles).</p> <p>Statement of scale factor is insufficient for M1. Calculation to be carried out needed for M1</p>
<p>13. (a) Interquartile range = $31.5 - (24 \text{ to } 24.5)$</p> <p>= 7.5</p> <p>(b) $39 - 9$</p> <p>= 30</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>4</p>	<p>Award M1, for their graph showing that they are using ‘45 and 15’ AND (have read at least one value correctly or both values with a consistent misread of the scale) AND subtracted their 2 values. Misreads of the scale can be from the 20 or from the 25 etc Allow 7 – 7.5 Unsupported answers in the range 7 – 7.5 get M1, A1.</p> <p>C.A.O.</p>
<p>14. Area scale factor 4 or equivalent 20.8 (cm²)</p>	<p>M1</p> <p>A1</p> <p>2</p>	<p>Accept scale factor $\frac{1}{4}$, 2^2</p>

15.(a) $(4q + 5)(4q - 5)$ (b) $(4q - 5)(q + 2)$ (c) $(4q + 5) / (q + 2)$	B2 B2 B1 5	B1 for $(4q \dots 5)(4q \dots 5)$ B1 for $(4q \dots 5)(q \dots 2)$ FT from (a) only if this involves further simplification. Do not ignore further working
16. (a) $10h - 20e = 7h - 7k$ $10h - 7h = 20e - 7k$ $h = (20e - 7k) / 3$	B1 B1 B1 3	FT until 2 nd error Accept 10-7 as 3. Penalise further incorrect working -1
17. Strategy, repeated use of Pythag. Thm. Any two correct Hypotenuses Perimeter Pattern $6 = 7 + \sqrt{7}$	M1 B2 A1 4	Idea B1 for any correct Hypotenuse ($\sqrt{2}$ or $\sqrt{3}$ or $\sqrt{4}$ or $\sqrt{5}$ etc) <i>B marks are implied if A1 awarded, i.e. B4 for correct answer</i> CAO
18. (a) $(30+40+50+40+40=)$ 200 (b) (i) Correct histogram (ii) 40 (seconds) (c) 14 year olds, with comparison of median, mean or mode	B3 B2 B1 B1 7	Allow B1 for one correct area, or B2 for any three correct areas Frequency densities 1, 2, 3,4, 5. Allow B1 for one error (in f.d. or bars) B0 for $200/5=40$
19. Volume $x^2(x+2)$ OR $\Pi x^2 h$ Attempt to equate their volumes $\Pi x^2 h = x^2(x+2)$ $h = x^2(x+2) / \Pi x^2$ $h = (x + 2) / \Pi$	B1 M1 A1 A1 A1 5	FT for their $x^2(x+2)$ and $\Pi x^2 h$ CAO FT from their equate isolating h, equivalent difficulty CAO
20. (a) E.g 4, 9, 16, ... or 9/4, .. (b) $\sqrt{200} = 10\sqrt{2}$ OR $200 - 2\sqrt{2}\sqrt{200} + 2$ $\{ (\sqrt{200} - \sqrt{2})^2 = (10\sqrt{2} - \sqrt{2})^2 = (9\sqrt{2})^2 \}$ $= 162$ (c) $x=0.54141\dots$ and $100x=54.1414\dots$ OR $5/10 + 41/990$ $536/990$	B1 M1 A1 M1 A1 6	Not 1 or 1/4, .. Allow 1 slip CAO Or alternative $10x$ with $1000x$. (M1 for 53.6/99) Ignore incorrect cancel Read as 0.541541... M0 A0
21. Use of $x=0, y=10$, to give $10 = b c^0$ $b = 10$ Use of another pair of values with value for b, e.g. $x=1, y=20, 20 = 10c^1$ $c = 2$	M1 A1 M1 A1 4	Not from incorrect working with gradient FT their b. Or alternative method which could lead to a correct answer
22.(a) $4/12 \times 3/11 \times 2/10$ $= 24/1320 (= 1/55)$ (b) $1 - P(\text{no cherry})$ $P(\text{no cherry}) = 6/12 \times 5/11 \times 4/10 (= 120/1320 = 1/11)$ $1200/1320 (= 120/132 = 10/11)$	M1 A1 B1 M1 A1 5	Or equivalent. Ignore incorrect cancelling Or equivalent complete strategy Seen alone not part of further probabilities. OR full alternative with correct values. CAO. Ignore incorrect cancelling in final answer
23.(a) Correct sketch (b) Correct sketch with $(-6,0)$ indicated (b) (i) Correct sketch (reflection in x-axis) (ii) Correct sketch (reflection in x-axis and shift down) with $(0,-1)$ indicated	B1 B2 B1 B2 6	B1 for any horizontal shift of given curve to the left FT their $y=-h(x)$ B1 if $(0,-1)$ not indicated SC1 for $h(x) - 1$ with $(0,-1)$ indicated
24. (a) $3x - 7y$ (b) $5x + 2y$ $-2x - 2y$ (c) NO, CA \neq multiple of MA, or equivalent	B1 B1 B1 B1 4	<i>Penalise not simplifying only once.</i> FT -OM + 3x Allow clear FT with reasoning

HIGHER TIER - PAPER 2

2008 Summer Paper 2 Higher Tier	Comments																																																																																												
<p>1. Dic gets $7/20 \times 600$ $= (£) 210$</p> <p>John gets (£) 120 Hywel gets (£) 270</p>	<p>M1 A1 A1 3</p>	<p>For the correct method for finding any share For the share associated with the M1 For the other 2 shares</p>																																																																																											
<p>2. 800.00 $\underline{40.00}$ 840.00 $\underline{42.00}$ 882.00 $\underline{44.10}$ $926.1(0)$ ISW compound given</p> <p style="text-align: right;">OR $800(1.05)^3$ M1 $926.1(0)$ A2</p>	<p>B1 M1 A1 3</p>	<p>For a correct 5%. Alternatively they may get the B1 for (£)120 OR (£)920 if seen. For the overall method (3 stages of adding <u>different</u> 5%). The method for finding their three 5% must be a correct one otherwise it is M0. <u>Arithmetical errors are allowed for the M1</u> Candidates using depreciation: Allow SC1 for seeing an amount of (£)685.90 Accept (£)926 If 2 years used it is A0 and MR-1 provided the B mark has been awarded. If 4 years used, mark up to 3 years, then MR-1 provided the B or A mark has been awarded.</p>																																																																																											
<p>3. $8x + 20 = 3x - 15$ $5x = -35$ $x = -35/5$ <u>I.S.W.</u> (= -7)</p>	<p>B1 B1 B1 3</p>	<p>Clearing bracket correctly F.T. until 2nd error Collecting terms in an equation F.T. equivalent difficulty, $x = b/a$ ($a \neq 1$) B0 for $-35 \div 5$ Answer only gets full marks.</p>																																																																																											
<p>4. $1/6 \times 1/6$ $= 1/36$</p>	<p>M1 A1 2</p>	<p>C.A.O. Accept decimals rounded or truncated to at least 2 sf $0.02777777\dots$</p>																																																																																											
<p>5. <u>One correct (see note on the right for defⁿ.) evaluation of $x^3 - 5x - 1$ for an x satisfying:</u> $2 \leq x \leq 3$ Watch for pupils who are trying to make $x^3 - 5x$ equal to 1 rather than $x^3 - 5x - 1$ equal to 0.</p>	<p>B1</p>	<p><u>Calculations should be accurate to 1 figure (including 0) rounded or truncated. Values like -0.0154 can be represented as -0 in this question. By convention, 0 is taken as +0, that is, a small +ve number.</u> If no calculations are given, accept use of "too low" or "too high" OR >0 and <0.</p>																																																																																											
<p>Two correct (see note on the right for defⁿ.) evaluations of <u>$x^3 - 5x - 1$</u> for an x satisfying: $2.25 \leq x < 2.45$ which give opposite signs for f(x).</p> <p>Two correct (OR F.T.) evaluations (1 sig. fig.) $2.25 \leq x \leq 2.35$ which give opposite signs for f(x).</p> <p>Thus solution is 2.3 correct to 1 decimal place. Candidates must give a method that proves that the solution is 2.3 correct to 1 decimal places.</p>	<p>B1 M1 A1 4</p>	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="7">Useful Data</th> </tr> <tr> <th>x</th> <th>$x^3 - 5x - 1$</th> <th>x</th> <th>$x^3 - 5x - 1$</th> <th>x</th> <th>$x^3 - 5x - 1$</th> <th></th> </tr> </thead> <tbody> <tr> <td>2</td> <td>-3</td> <td>2.3</td> <td>-0.3330</td> <td>2.25</td> <td>-0.8594</td> <td></td> </tr> <tr> <td>2.1</td> <td>-2.239</td> <td>2.31</td> <td>-0.2236</td> <td>2.26</td> <td>-0.7568</td> <td></td> </tr> <tr> <td>2.2</td> <td>-1.352</td> <td>2.32</td> <td>-0.1128</td> <td>2.27</td> <td>-0.6529</td> <td></td> </tr> <tr> <td>2.3</td> <td>-0.333</td> <td>2.33</td> <td>-0.0007</td> <td>2.28</td> <td>-0.5476</td> <td></td> </tr> <tr> <td>2.4</td> <td>0.824</td> <td>2.34</td> <td>0.1129</td> <td>2.29</td> <td>-0.4410</td> <td></td> </tr> <tr> <td>2.5</td> <td>2.125</td> <td>2.35</td> <td>0.2279</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.6</td> <td>3.576</td> <td>2.36</td> <td>0.3443</td> <td>2.42</td> <td>1.0725</td> <td></td> </tr> <tr> <td>2.7</td> <td>5.183</td> <td>2.37</td> <td>0.4621</td> <td>2.43</td> <td>1.1989</td> <td></td> </tr> <tr> <td>2.8</td> <td>6.952</td> <td>2.38</td> <td>0.5813</td> <td>2.44</td> <td>1.3268</td> <td></td> </tr> <tr> <td>2.9</td> <td>8.889</td> <td>2.39</td> <td>0.7019</td> <td>2.45</td> <td>1.4561</td> <td></td> </tr> <tr> <td>3</td> <td>11</td> <td>2.4</td> <td>0.8240</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> 	Useful Data							x	$x^3 - 5x - 1$	x	$x^3 - 5x - 1$	x	$x^3 - 5x - 1$		2	-3	2.3	-0.3330	2.25	-0.8594		2.1	-2.239	2.31	-0.2236	2.26	-0.7568		2.2	-1.352	2.32	-0.1128	2.27	-0.6529		2.3	-0.333	2.33	-0.0007	2.28	-0.5476		2.4	0.824	2.34	0.1129	2.29	-0.4410		2.5	2.125	2.35	0.2279				2.6	3.576	2.36	0.3443	2.42	1.0725		2.7	5.183	2.37	0.4621	2.43	1.1989		2.8	6.952	2.38	0.5813	2.44	1.3268		2.9	8.889	2.39	0.7019	2.45	1.4561		3	11	2.4	0.8240			
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<p>6. (a) Volume = $\pi \times 4.7^2 \times 23.5$ $= 1630.(87872)$ OR 1631</p> <p>(b) Density = $\frac{9.9 (\times 1000)}{45.8 \times 24.9}$ $= 8.68(1012)$ OR 8.7</p>	<p>M1 A1 M1 A2 5</p>	<p>Accept rounds to 1630 to 1632 Ignore the 1000 for this M mark. A1 for .0086(8101)</p>																																																																																											

<p>7. $PR^2 = 13 \cdot 6^2 + 8 \cdot 3^2$ $PR^2 = (184 \cdot 96 + 68 \cdot 89) = 253 \cdot 85$</p> <p>$PR = 15 \cdot 9(3267)$ $= 15 \cdot 9$ OR $16(\cdot 0)$ OR $15 \cdot 93$</p>	<p>M1 A1</p> <p>A1 A1 4</p>	<p>Correct substituted Pythagoras C.A.O. Allow $PR = 253 \cdot 85$</p> <p>F.T. their PR^2 if M awarded Appropriate accuracy.</p> <p>Ignore incorrect writing of their process if their answers are correct.</p>
<p>8. (a) (i) $5 \cdot 3 \times 10^{10}$ (ii) 2×10^{-8}</p> <p>(b) $4 \cdot 9(64) \times 10^{-8}$ or 5×10^{-8}</p>	<p>B1 B1</p> <p>B2 4</p>	<p>C.A.O. C.A.O.</p> <p>B1 for $49 \cdot 64 \times 10^{-9}$ or $0.000000049(6)$</p> <p>Penalise -1, once only for consistent use of incorrect notation, e.g. $5 \cdot 3^{10}$ OR $2^{10 \cdot 8}$</p>
<p>9.</p> <p>(a) $x^2 - 12$ $- 4x$</p> <p>(b) $6m - 3t = 2t + 7$ $6m = 3t + 2t + 7$ OR $5t + 7$ $m = \frac{3t + 2t + 7}{6}$ OR $\frac{5t + 7}{6}$</p> <p>(c) $4(x - 1)(x + 1)$</p>	<p>B1 B1</p> <p>B1 B1 B1</p> <p>B2 7</p>	<p>If B2 OR B3 then penalise -1, once only, if any subsequent incorrect or inappropriate algebra such as using equations B2 only if written as a trinomial, e.g. $x^2 - 4x - 12$ (any order)</p> <p>Clearing bracket correctly F.T. until second error For isolating the term in m. F.T. equivalent difficulty, i.e. $m = f(t)/a$ with $a \neq 1$ Or equivalent 3 stages: divide by 3, +t, then divide by 2</p> <p>B1 for $4(x^2 - 1)$ or $(2x + 2)(2x - 2)$</p>
<p>10. $3x - 7 - 2(4x + 5) = 3$</p> <p>$-5x = 20$</p> <p>$x = -20/5$ ISW OR -4</p>	<p>M1 M1</p> <p>A1 A1</p> <p>4</p>	<p>For correctly clear fractions by a valid method for any 2 terms.</p> <p>For correctly clear fractions by a valid method for all 3 terms. <u>NOTE: $3x - 7 - 8x + 10 = 3$ would get M1, M1, A0 and the final A1 can be gained for correct follow through (0)</u> The two A1s are dependent on only one M1 being awarded <i>Not correct dealing with $-2x + 5$ gain M marks, not first A</i> Collecting terms</p> <p>F.T. until 2nd error starting after the M marks.</p> <p>If 0 marks awarded, SC1 for $\frac{-5x + 3}{4} = \frac{3}{4}$ OR</p> <p>$(-5x - 17)/4 = \frac{3}{4}$</p> <p>Unsupported answer of $x = -4$ gets all 4 marks.</p>
<p>11. (a) $H = 15 \times \tan 67^\circ$</p> <p>Height = $35 \cdot 3(3778)$ (m)</p> <p>(b) $\cos(\text{angle}) = 13/21$</p> <p>$= 0 \cdot 619(047)$ $\angle EBC = 51 \cdot 7(533)$ OR 52 OR $51 \cdot 8$</p>	<p>M2 A1</p> <p>M1 A1 A1 6</p>	<p>Correct substituted tan ratio. Allow M1 for $\tan 67^\circ = \text{Height}/15$ C.A.O.</p> <p>Correct substituted cos ratio, $\cos^{-1}(13/21)$</p> <p>Unsupported $51 \cdot 7$ OR 52 gets 3 marks.</p>
<p>12. (a) $0 \cdot 3$ and $0 \cdot 7$ on the first branch</p> <p>$0 \cdot 3$ and $0 \cdot 7$ on the second branch</p> <p>(b) $0 \cdot 7 \times 0 \cdot 7$</p> <p>$= 0 \cdot 49$</p>	<p>B1 B1</p> <p>M1 A1 4</p>	<p>C.A.O. Accept equivalents such as $3/10$ and $7/10$ or 30% and 70%.</p> <p>C.A.O. Accept equivalents as above. Accept $0 \cdot 3$ and $0 \cdot 7$ on only one branch if the other branch is empty.</p> <p>F.T. their tree if probabilities are between 0 and 1 exclusive and NOT all $1/2$.</p> <p>Or equivalent</p>
<p>13. Total = 34700 (Number in Country / 34700) $\times 45$ 16.02..., 10.81..., 8.89..., 5.32..., 3.95... 16, 11, 9, 5, 4</p>	<p>B1 M1 M1 A1 4</p>	<p>FT their total. Or alternative method Any 3 correct</p>

14.(a) $y = k/x^2$ or $ya1/x^2$ $2 = k / 225$ $y = 450/x^2$ (b)(i) 4.5 (ii) $x^2 = 450/50$ 3 or -3	B1 M1 A1 B1 M1 A1 6	FT non linear start Maybe implied in (b) If simplified FT allow B1 only Both not required
15. $45.9 \times k = 4/3 \prod r^3$ $r^3 = \frac{3 \times 45.9}{4} \times k$ $r = \sqrt[3]{\text{above with } k=1, 100 \text{ or } 1000\dots}$ $k = 1000$ 22(.2...) cm	M1 M1 A1 B1 U1 5	k is any value Or equivalent rearranged for r^3 or FT r^n for $n>1$ FT k=1, 100, 1000 only <i>An answer of 2.2 gets M1 M1 A1 B0 U0</i> <i>(Use of $1/3 \Pi r^3$ gives 35cm)</i>
16. Lines drawn: $x + y = 8$, $y = 2x + 5$ and $x = -3$ Correct region indicated	B2 B1 3	Award B2 for any two lines drawn or indicated, or B1 for any one line drawn correctly CAO
17. (a) $4x(x+2)^3$ (b) $(4x + 1)(2x - 7)$ $x = -1/4$, $x = 7/2$ (c) $\{-6 \pm \sqrt{(-6)^2 - 4 \times 3 \times (-11)}\} / 2 \times 3$ $= \{-6 \pm \sqrt{168}\} / 6$ 1.16, -3.16	B3 B2 B1 M1 M1 A1 9	B2 for indices correct but one unsimplified, B1 for either index correct in unsimplified form. <i>Penalise -1 further working if B3</i> B1 for $(4x \dots 1)(2x \dots 7)$ OR $(4x \dots 7)(2x \dots 1)$ OR B1 for middle term splitting method FT their pair of brackets. Ignore incorrect cancelling <i>Use of formula gains no marks</i> For substitution, allow one slip CAO
18. Mean = 152.5 Use of $\frac{\sqrt{\sum f(x - \bar{x})^2}}{\sqrt{n}}$ or $\sqrt{(\sum fx^2 \div \sum f) - \left(\frac{\sum fx}{\sum f}\right)^2}$ Calculations shown using either formula SD = 40.(23...)	B1 M1 M2 A1 5	 Award M1 for calculations shown with one slip CAO ($\sum fx^2 = 497500$, $\sum fx^2 / \sum f = 24875$, $SD^2 = 1618.75$)
19. (a) Sight of $y=10x$ stated or drawn, or implied $x = -1.9..$ (b) Use of trapezium rule or summation of areas y values 10 and 12 (± 0.1) at $x = 2$ and $x=3$ Area calculations or substitution Area 22	B1 B1 M1 B1 M1 A1 6	FT $y=10x$ or $y=-10x$ only Need not be for the ordinates given. For idea, so ignore if area below x-axis included Maybe implied or embedded (included within extra area below) For CORRECT area and ordinates. Maybe for their y values. (Areas are 5, 11, 6) CAO
20.(a) $BD^2 = 8.7^2 + 12.1^2 - 2 \times 8.7 \times 12.1 \times \cos 80$ $BD^2 = 185.54\dots$ $BD = 13.62\dots(\text{cm})$ (b) Area CDB = $\frac{1}{2} 6.3 \times BD \times \sin 25$ (=18.133... cm^2) Area ADB = $\frac{1}{2} 8.7 \times 12.1 \times \sin 80$ (=51.835... cm^2) Area quad. 33.7(... cm^2)	M1 M1 A1 M1 M1 A1 6	FT their BD^2 if M1 awarded FT their BD FT if one of M marks awarded and their calculations correct
21. 207^0 333^0 with no other values	B1 B1 2	FT 540 – first answer, in the range 0 to 360
22. $n(n+4) + 7(n+3)$ as a numerator AND $(n+3)(n+4)$ as a denominator OR multiplying throughout by $(n+3)$ and $(n+4)$ $n(n+4) + 7(n+3) = (n+3)(n+4)$ $n^2 + 4n + 7n + 21 = n^2 + 3n + 4n + 12$ $n = -9/4$	B2 B1 B1 B1 5	Brackets required or implied later Award B1 for either numerator or denominator, or multiplying throughout by $(n+4)$ or $(n+3)$ with an error CAO FT for similar level of difficulty, n^2 terms on both sides



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