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GENERAL CERTIFICATE OF SECONDARY EDUCATION
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MARKING SCHEME

MATHEMATICS - 2 TIER

NOVEMBER 2008

INTRODUCTION

The marking schemes which follow were those used by WJEC for the November 2008 examination in GCSE MATHEMATICS - 2 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.

MATHEMATICS - 2 TIER
PAPER 1 - FOUNDATION WITH COURSEWORK

2008 Autumn Paper 1 (Non calculator) **2 Tier Foundation Tier**	**Marks**	**POST CONFERENCE MARK SCHEME (13/11/2008)** **Comments (Page 1)**
1. (a) (i) 32 and 58	B1	C.A.O.
(ii) 34 and 16	B1	C.A.O.
(iii) 48	B1	C.A.O.
(iv) 7	B1	C.A.O.
(b) (i) 4569	B1	C.A.O.
(ii) 9654	B1	C.A.O.
(c) (£)50 **I.S.W.**	B1	C.A.O.
	7	
2. (a) eight thousand **(and)** forty three	B1	C.A.O.
(b) (i) 15 squares shaded	B1	C.A.O. **(Any unambiguous indication, e.g. crosses)**
(ii) $\frac{12}{30}$	B1	C.A.O.
$\frac{2}{5}$	B1	F.T. their fraction if possible
(c) $\frac{2}{10}$, $\frac{5}{25}$ circled **or any unambiguous indication**	B2	2 correct and none incorrect B1 for 1 correct and up to one incorrect B1 for 2 correct and 1 incorrect
(d) (0).25	B1	C.A.O.
(0).3(0)	B1	C.A.O.
¼ , (0).28, 30% OR correct equivalent	B1	F.T. if at least B1 already awarded
	9	
3. (a) Cost = 5 × 60 + 40	M1	Correctly substituted and attempt to multiply and add
= (£)340	A1	C.A.O.
(b) days × 60 = 510 – 30	M1	For correct substitution and subtraction
Days = 8	A1	C.A.O.
	4	Allow embedded references to the correct answer.
4. (a) 9 12 11 8	B2	B1 for any three correct **(tallies and)** frequencies. Frequencies take precedence over tallies **B1 for only correct tallies given.**
(b) B(rian)	B1	F.T. their table of frequencies B0 for 12, but B(rian) and 12 is B1
(c) A, B, C, D along one axis	B1	OR indicated on the bars themselves F.T. their table of frequencies **(or tallies if no frequencies).**
Uniform scale starting at 0	B1	**If no scale then B0, but allow one square to represent a frequency of 1.**
Four bars at correct heights	B2	**B1 for any 2 or 3 correct bars on F.T.**
(d) $\frac{11}{40}$ **I.S.W.**	B2	B1 for the 11 in a fraction < 1. B1 for x/40 in a fraction < 1. **Penalise −1 for incorrect notation such as 11:40, 11 in 40 etc.**
	9	
5.		Use overlay, allow ±2mm throughout
2 rectangle 6cm by 3cm **2 rectangles 3cm by 2cm** **(All must be linked by at least 1 side)**	B3	**OR B2 for 2 or 3 correct rectangles** **OR B1 for any one correct rectangle**
For the 5 rectangles making a correct net for the box	B1	Award this mark even if rectangles not 'accurate' **If 5 rectangles (closed box) then mark the 'open box rectangles' and final B for the net is B0.**
	4	
6. (a) (i) 5	B1	C.A.O.
(ii) 32	**B2**	C.A.O. **B1 for 40 OR F.T. 'their 40' – 8** **Accept embedded answers, e.g. 32 + 8 ÷ 4 = 10**
(b) (i) (y =) 50	B1	C.A.O.
(ii) (x =) 20	B1	C.A.O.
	5	

2008 Autumn Paper 1 (Non calculator) 2 Tier Foundation Tier	Marks	POST CONFERENCE MARK SCHEME (13/11/2008) Comments (Page 2)	
7. (a) (i) m(etres) (ii) kg **OR N(ewtons)** (iii) l(itres) (iv) m^2 (b) (i) 24 (cm) (ii) 5 × 7 = 35	B1 B1 B1 B1 B1 M1 A1 7	C.A.O. C.A.O. **Accept kilos** C.A.O. C.A.O. C.A.O. C.A.O.	
8. (a) **10% = 6 70% = 6 × 7** **= 42** (b) 536 × 43 **OR** 1608 **258** 21440 **1290** 23048 **21500**	M1 A1 M1 A1 A1 5	Any correct method for finding 70% C.A.O. **Penalise −1 for any subsequent work.** Any correct **complete** method for the multiplication by 43 For either 1608 or 21440 **OR A1 for one of 258, 1290 , 21500** C.A.O. Place value errors get M0, A0, A0	
9. (a) Plots Line (b) Any correct strategy, e.g. 2 times value at 100 pounds Around 90 – 92 (kg)	P1 L1 M1 A1 4	P0 on 2nd error Within 2mm square. **If incorrect plot(s), allow L1 for any appropriate line or line segments or curve through the plotted points.** **F.T. their work from the graph or the table.** **Unsupported answers in the range 90 – 92 get M1, A1.**	
10. (a) 20 30 40 12 18 24 (b) 6/16 I.S.W. Ignore subsequent reductions of fractions I1	B2 B2 4	C.A.O. B1 for any 1 correct row OR 2 correct columns. F.T. their table B1 for a numerator of 6 in a fraction less than 1 OR B1 for the 16.	NOTES Penalise −1 for use of words such as "6 out of 16", "6 in 16" OR "6:16". When fraction and wrong notation seen, DO NOT penalise wrong notation.
11. (a) Correct cuboid (Allow ± 2mm) (b) 30 × 30 × 30 = 27000 (cm^3) I2	B2 M1 A1 4	If not all correct, then B1 for one of the dimensions being drawn correctly for all of the required sides. Ignore the 'hidden' lines, drawn or not drawn. C.A.O. SC1 for 120 (cm^3)	
12. Correct triangle AB=10(cm), BC=9(cm), $A\hat{B}C = 50^\circ$ I3	 B3 3	Use the overlay (Allow ± 2mm and ± 2º). Ignore their use of A,B,C. B1 for each correct up to 2marks. As a check, AC should be 8(·1) cm. Use of different scale is MR−1.	
13. (a) (0)·06 (b) 7·62 (c) 144 I4	B1 B1 B2 4	C.A.O. C.A.O. Allow 07·62 B1 for either 16 or 9	
14. (a) (i) 8x (ii) x – 4 (iii) 11(x – 4) I.S.W. I6abc (b) 6x – 2 + 3x + 4 = 9x + 2	 B1 B1 B1 B1 B1, B1 6	Do not penalise extra =x or x= or =n or n= in this question. C.A.O. Ignore subsequent working in parts (a), (b) and (c). C.A.O. Change of letter is penalised –1 once only. F.T. 11 × their (b) if (b) is of the form ax+b. B1 for 11 × x – 4 OR x – 4 × 11. 11x – 4 gets B0. Clearing the bracket correctly B1 for the 9x, B1 for the 2. F.T. their bracket clearance.	

2008 Autumn Paper 1 (Non calculator) 2 Tier Foundation Tier	Marks	POST CONFERENCE MARK SCHEME (13/11/2008) Comments (Page 3)
15. (a) 302 ± 2°	B1	C.A.O. Do not accept 058°.
(b) Their 145° bearing from A Their 243° bearing from B Town C.	M1 M1 A1	± 2° Use overlay. Watch for an unambiguous point on one or both of the correct bearings and award the mark(s). F.T. if at least M1 and 2 intersecting lines. If the correct point C is unambiguously indicated even without the bearing lines then award M1, M1, A1.
I10	4	
16. (a) For 200, 3000 and 600 (giving 1000) OR 150, 3000 and 600 (giving 750) OR 100, 3000 and 600 (giving 500) Estimate	M1 A1	For reasonable estimates that lead to a simple calculation. (Cancelling /single digit arithmetic). In the range 500 – 1000 inclusive.
I8		
(b) $\frac{165}{300}\times 100$	M1	
= 55 (%)	A1	C.A.O. SC1 for 55/100
I11a	4	
17. (a) Idea of ordered pairs plotted. At least 7 plotted correctly, not joined.	M1 A1	At least 4 points plotted correctly. Within 2mm square.
(b) Positive (correlation).	B1	C.A.O.
(c) Line of best fit by eye.	M1	Must have positive gradient, look fit for purpose and have at least 3 points above their line and 3 points below their line.
Line through (61,59)	A1	If point not plotted, then the line must pass through the 2mm square 60-62/58-60 inclusive.
(d) From their line	B1	F.T. if their line has a positive gradient. Reading should be exact, if the point is on the grid lines, else it should be read to either side of the 2mm square, if the point is inside a square.
I13	6	Axes interchange is marked as correct then MR−1
18. (a)	M1	For a method that produces 2 prime factors from the set {3, 3, 3, 7, 7} before their second error. If their 2nd prime and 2nd error occurs at the same 'level' then allow M1.
3 , 3 , 3 , 7 , 7	A1	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. Ignore prime number requirement for this B mark.
$3^3 \times 7^2$	B1	Use of brackets $(3^3)(7^2)$ OR dot $3^3.7^2$ gets the B1. The inclusion of any 1s as factors, for example, $3^3\times7^2\times1$ in their index form gets B0.
(b) 3	B1	F.T. their (a) if the M1 awarded. Allow B1 for 3969 OR $3^4 \times 7^2$
I14	4	
19. (a) Plots Curve	P1 C1	P0 on 2nd error Must be a curve at least for x = –2 to x = 2 Within ± ½ a small square.
(b) Line y = 6 x-values	L1 B1	F.T. their graph if at least 2 readings
I15	4	
20. Angle bisector of ∠ADC, Line parallel to AB distance 3cm from it.	 B1 B1	Use overlay Loci do not have to be accurate as long as the intention is clear. About 2 cm is required to identify the loci. **Initially ignore extra horizontal lines or extra lines through D. Then if first B2 awarded, extra lines get a penalty of −1. If a region is drawn this may remove the ambiguity and the lines offered will be identified and no penalty invoked.**
Correct region	B1	F.T. if their region is similar to the correct one, i.e. uses a line through the angle at D and a line parallel to AB.
I17	3	

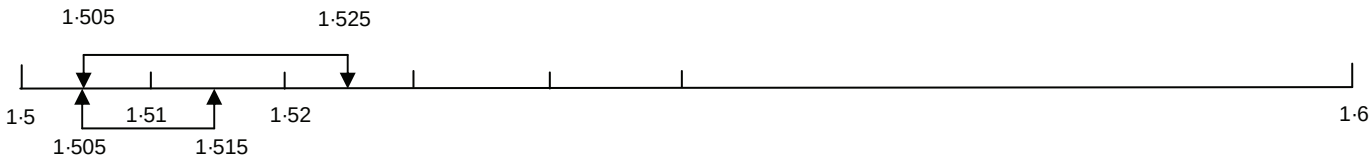
2008 Autumn Paper 2 (Calculator allowed) **2 Tier Foundation Tier**	**Marks**	**POST CONFERENCE MARK SCHEME (17/11/2008)** **Comments (Page 1)**
1. (a) (i) (99.60) 405.48 74.76 345.96 925.8(0)	 B1 B1 B1 B1	 C.A.O. C.A.O. C.A.O. F.T. their figures for one error
(ii) 925.80 x $\frac{10}{100}$ = (£) 92.58 I.S.W.	M1 A1	Any correct method for finding 10% F.T. their total. **Allow the M1, A1 for (£) 833.22**
(b) (i) 64 (ii) 24 (iii) 7	B1 B1 B1 9	C.A.O. C.A.O. C.A.O.
2. (a) (i) 70 (ii) Pointer at 55	B1 B1	C.A.O. Allow 54 – 56 **exclusive**
(b) (i) 250 (g) (ii) 440 – 250 = 190 (g)	B1 M1 A1 5	C.A.O. F.T. 440 – 'their (i)' Correct subtraction of their reading **SC1 for 200.**
3. (a) For seeing an attempt at counting squares 66 – 70 **inclusive**	M1 A1	
(b) pentagon parallelogram hexagon	B1 B1 B1 5	C.A.O. C.A.O. C.A.O.
4. (a) (i) parallel line (ii) perpendicular line	B1 B1	C.A.O. C.A.O.
(b) 2 lines of symmetry 1 line of symmetry	B1 B1 4	C.A.O. C.A.O.
5. (a) (i) certain (ii) impossible (iii) an even chance (iv) unlikely	B1 B1 B1 B1	C.A.O. C.A.O. C.A.O. C.A.O.
(b) 40	B1 5	C.A.O.
6. (a) (i) 8p (ii) 4x – 5y	B1 B1	C.A.O. C.A.O.
(b) (i) Subtract 5 (from the previous term) (ii) Multiply (previous term) by 3	B1 B1	C.A.O. Allow −5 C.A.O. Allow ×3, times 3.
(c) **68**	**B2**	**B1 for sight of 60 or 8** **60W + 8T gets B0.**
(d) (i) (x =) 6	B1	C.A.O. **Allow embedded solutions, 8 × 6 = 48** **8 × 6 = 48 = x gets B0**
(ii) (x =) 8	B1 8	C.A.O. **Allow embedded solutions, 8 + 7 = 15** **Similarly, 8 + 7 = 15 = x gets B0.**

2008 Autumn Paper 2 (Calculator allowed) 2 Tier Foundation Tier	Marks	POST CONFERENCE MARK SCHEME (17/11/2008) Comments (Page 2)
7. **Multiplying factor = 9 (man) OR 7 (door)** **Estimate of the man's height OR door's height** Estimate height of flats = **estimate × factor** **For example, 6 (ft) × 9 (man) OR 220 × 7 (door)** = **F.T. their estimates**	B1 B1 M1 A1 4	C.A.O. **Estimate for man's height should be between 5.5 – 6.5 feet inc. OR 165 – 200 cm** **Estimate for door's height should be between 6.5 – 7.5 feet inc. OR 200 – 230 cm** **For 'their man's height estimate' × 'their 9' OR 'their door's estimate 'their 7' for whatever unit chosen** **F.T. their estimate for the man OR door and their factor** **IF NO UNITS MENTIONED THROUGHOUT THEN A0.**
8. (a) Sum of the numbers (224) Sum/7 32 (b) 12 14 26 (35) 40 46 51 = 35	M1 **m1** A1 M1 A1 5	For attempt to add the numbers . **Unsupported 170-270 gets M1** **Dependent on the M1.** C.A.O. For putting the numbers in order C.A.O.
9. (a) (£)5 − 4 × 78 **or (£)5 – 312(p)** = (£) 1.88 **OR 188 (p)** (b) 1/6 of 84 = 14 **5/6 of 84 = 5 × 14** **= 70**	M1 A1 M1 A1 4	For seeing the whole method C.A.O. For any correct method C.A.O.
10. (a) (4, 2) (b) Plot for T at (–3, 2) (c) (–1, 1)	B1 B1 B1 3	C.A.O. C.A.O. C.A.O.
11. (a) (£)24·10 – (£)5·20 = (£)18·9(0) (£)18·9(0) ÷ (£)3·15(0) = 6 7 days (b) $\frac{26}{100} \times 79$ = 20·54 I.S.W. I1	M1 A1 B1 M1 A1 5	For the complete method that leads to the number of additional days. F.T. 'their 6'+1. Allow '6 additional days' Must be a whole number of days, and rounded up if needed. Allow M1 for methods such as 10% = 7·9 C.A.O. 20% = 15·8, 5% = 3·95 etc as long as there is enough correct work to convince that they understand percentages and are finding 26% by a proper method of partitioning. Allow 20·54% **SC1 for unsupported 20·5**
12. Correct image (Allow ± 2mm) I2	B2 2	If not all correct, then B1 for three correct vertices. Use of a different scale factor should be marked then MR–1
13. (a) x = 180 – 65 – 65 = 50 (b) y = 360 – 90 – 72 – 116 = 82 I3	M1 A1 M1 A1 4	 C.A.O. C.A.O.
14. (a) 3 –11 (b) 14.39(476) OR 14·4 (c) (x =) 36 I4ab	B1 B1 B1 B1 4	F.T. 'their 3' – 14 provided their answer is negative. C.A.O. C.A.O. Allow embedded solutions, 36/4 = 9 **OR 36 = 9×4 (=x)**

2008 Autumn Paper 2 (Calculator allowed) 2 Tier Foundation Tier	Marks	POST CONFERENCE MARK SCHEME (17/11/2008) Comments (Page 3)
15. (a) Euros = 800 × 1·49 = (€) 1192	M1 A1	 C.A.O.
(b) Money left = 96·85/1·49 = (£) 65	M1 A1	 C.A.O.
I5	4	
16. (a) 25	B1	
(b) <u>You cannot tell from the pie charts because you</u> would need to know the number of boys and number of girls.	B2	Along these lines
OR <u>You can tell from the pie charts</u> if the number of boys and girls were equal OR 1/3 of the boys was more than about 2/3 of the girls	OR B2	OR Along these lines
I6.	3	
17. Cost of units used = 2508 × 10·25 = (£)257·07 OR 25707 **(p)**	M1 A1	For their difference of meter readings × 10·25 OR for (£)754·605 – (£)497·535 in pence or in £. C.A.O. **Division of the units by 10·25 gets M0, A0 then F.T.**
Services = (£) 14·44(4) OR 1444(·4) (p)	B1	C.A.O.
VAT = 5/100× (£) 271·51**(4)** OR 5/100 × (£)257·07	B1	**F.T. correct VAT on cost of units with or without service charge.**
Total = £285·08, £285·09	B1	(£)13·57(57) OR (£) 13·58 OR (£) 12.85 (35) **OR in pence F.T. 105% of their (£)271.51.** **If the 14·44 is added at this stage OR the service charge has been completely omitted then B0.**
I8.	5	Their final answer must be presented in 2 d.p. with £ sign.
18. (a) 4x = 18 **OR equivalent** x = 18/4 ISW (=4.5)	B2 B1	B1 for each, but must be in a correct equation for B2 **F.T.** F.T. provided ax = b with a≠1 **until 2nd error** **x = −18/−4 gets final B0**
	3	
19. Trapezium = ½(45·6+32·4) × 7·2 = 280·8 cm²	M1 A1 U1	Must have the brackets C.A.O. Allow 281 For the cm²
I11	3	
20. 35000.00 6300.00 28700.00 5166.00 23534.00 4236.12 19297(·88) Value = (£) 19300 OR **35000(1 − 0·18)³** M1 19297(·88) A2	B1 M1 A1 A1	For the evaluation of a correct 18%. Alternatively they may get the B1 for (£)18900. For the overall method (3 stages of subtracting <u>different</u> 'bone fide' 18%). For any correct alternative method. C.A.O. for amount. OR for the correct 3 depreciations. F.T. rounding nearest £100 only if M awarded. Candidates using appreciation: Allow SC1 (as well as the B1) for seeing the amount of (£)57506(·12) OR 57500 OR (£)22506 OR (£)22500 OR Allow SC1 for $35000(1 + ·18)^3$ If 2 years used, then mark it as if correct, then MR–1 provided A or B marks have been awarded. If 4 years used, then mark up to 3 years and ignore subsequent working. (Maximum of 3 marks)
I12	4	

2008 Autumn Paper 2 (Calculator allowed) 2 Tier Foundation Tier	Marks	POST CONFERENCE MARK SCHEME (17/11/2008) Comments (Page 4)
21. (a) Suitable axes, with uniform scales (not necessarily labelled)	B1	Must be numbers only. Use of $10 \le t < 15$ etc gets 0. 'Reverses' axes should be marked without penalty.
Rectangles of equal width, with no gaps between them, with feet at 0, 5, 10, …. Correct heights **B0 if only a polygon given. If bars merit B2, then −1 if a polygon or curve is superimposed on the bars.**	B2	If there is no scale on the time axis, mark as if there was a scale, if the rectangles are drawn with vertical sides on consecutive 2cm OR 1cm grid lines. Must be bars, but allow any constant width. B1 for one error in the heights OR for equal width bars with all heights correct, but with a constant gap between the bars. OR for completely correct bars if translated horizontally.
(b) Mid-points at 2·5, 7·5, 12·5, 17·5, 22·5, 27·5	B1	If all the mid-points are equal then 0 marks. For the correct mid-points seen. (Look at their table also). (All mid-points must be correct)
fx **90** **435** **325** **315** **225** **55** 36×2·5 + 58×7·5 + 26×12·5 etc (OR 1445)	B1	The correct value of the sum of their fx terms. ('Their 1445')
$\frac{36\times2\cdot5 + 58\times7\cdot5 + 26\times12\cdot5 \text{ etc}}{150}$ (OR 1445)	M1	For the sum of the 6 fx terms divided by 150. F.T. INCORRECT MID-POINTS, and/or incorrect evaluation of 'their 1445', but ONLY IF THEY USE 6 f.x TERMS AND DIVIDE IT BY 150.
= 9·6(33) I14	A1 7	UNSUPPORTED 9·6(33) GETS 4 MARKS.
22. **One correct (see note on the right for def^n.) evaluation of $x^3 + 3x - 8$ for an x satisfying:** $1\cdot5 \le x \le 1\cdot6$ Watch for pupils who are trying to make x^3+3x equal to 8 rather than $x^3 + 3x - 8$ equal to 0.	B1	**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.** If no calculations are given, accept use of "too low" or "too high" OR >0 and <0.
Two correct **(see note on the right for def^n.) evaluations of $x^3 + 3x - 8$ for an x satisfying:** $1\cdot505 \le x < 1\cdot525$ which give opposite signs for f(x).	B1	
Two correct (OR F.T.) evaluations (1 sig. fig.) $1\cdot505 \le x \le 1\cdot515$ which give opposite signs for f(x).	M1	
Thus solution is 1·51 correct to 2 decimal place. Candidates must give a method that proves that the solution is 1·51 correct to 2 decimal places.	A1 4	

x	x^3+3x-8	x	x^3+3x-8	x	x^3+3x-8
1·5	–0.1250	1.51	–0.0270	1.505	–0.0761
1·51	–0.0270	1.511	–0.0172	1.506	–0.0663
1·52	0.0718	1.512	–0.0074	1.507	–0.0565
1·53	0.1716	1.513	0.0025	1.508	–0.0467
1·54	0.2723	1.514	0.0124	1.509	–0.0369
1·55	0.3739	1.515	0.0223		
1·56	0.4764	1.516	0.0322		
1·57	0.5799	1.517	0.0421		
1·58	0.6843	1.518	0.0520		
1·59	0.7897	1.519	0.0619		
1·6	0.8960	1.52	0.0718		



I17

MATHEMATICS - 2 TIER
PAPER 1 - HIGHER WITH COURSEWORK

Higher 2 Tier GCSE Autumn 2008 Paper 1		Notes
1. 300 / 10 (=30) (£) 270 and (£) 30	M1 A1 2	
2. 14 x ¾ = 10.5 11 bottles	M1 A1 A1 3	Or equivalent strategy that leads to 10.5 or 11 Need not be stated if answer of 11 is given Accept an answer of 11 for all 3 marks
3. 360 / 6 $= 60^{(0)}$	M1 A1 2	
4. (a) 4x 28 x = 28/4 I.S.W. (=7) (b) 3x – 21 = 27 3x = 48 x = 48/3 I.S.W. (=16) (c) 2x = 6 x 3 x= 18/2 ISW (=9)	B1 B1 B1 B1 B1 B1 B1 B1 8	Collecting the x terms F.T. until 2nd error Allow implicit solutions such as : 6×7 – 11 = 17 + 2×7 F.T. until 2nd error Clearing bracket. B2 for x – 7 = 9 Collecting terms Answers only get full marks. Allow implicit solns. e.g.3(16 – 7) = 27
5. ∠DCB = 180 – 80 = 100° ∠DCE = (360° – 100° – 135°) = 125 (°) x = 125 (°)	M1 A1 B1 B1 4	C.A.O. Allow on the diagram. F.T. their angles, but not 80
6. (a) 302 ± 2° (b) Their 145° bearing from A Their 243° bearing from B Town C.	B1 M1 M1 A1 4	C.A.O. Do not accept 058°. ± 2° Use overlay. Watch for an unambiguous point on one or both of the correct bearings and award the mark(s). F.T. if at least M1 and 2 intersecting lines. If the correct point C is unambiguously indicated even without the bearing lines then award M1, M1, A1.
7. (a) $\frac{165}{300}\times 100$ = 55 (%) (b) $\frac{14}{2\frac{1}{3}} = 14\times\frac{3}{7}$ = = 6 (mph)	M1 A1 M1 B1 A1 5	 C.A.O. SC1 for 55/100 For substituted distance/time. Accept 2·3(3) or 2·2 for this mark For dealing with time correctly. 14/140 gets M1, B1. C.A.O. 42/7 gets M1,B1,A0. 0·1 (miles per minute) gets M1, B1, A0.
8. (a) Line of best fit by eye. Line through (61,59) (b) From their line	M1 A1 B1 3	Must have positive gradient, look fit for purpose and have at least 3 points above their line and 3 points below their line. If point not plotted, then the line must pass through the 2mm square 60-62/58-60 inclusive. F.T. if their line has a positive gradient. Reading should be exact, if the point is on the grid lines, else it should be read to either side of the 2mm square, if the point is inside a square. Axes interchange is marked as correct then MR−1

Higher 2 Tier GCSE Autumn 2008 Paper 1		Notes
9. (a)	M1	For a method that produces 2 prime factors from the set {3, 3, 3, 7, 7} before their second error. If their 2nd prime and 2nd error occurs at the same 'level' then allow M1.
3 , 3 , 3 , 7 , 7	A1	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. Ignore prime number requirement for this B mark.
$3^3 \times 7^2$	B1	Use of brackets $(3^3)(7^2)$ OR dot $3^3.7^2$ gets the B1. The inclusion of any 1s as factors, for example, $3^3 \times 7^2 \times 1$ in their index form gets B0.
(b) 3	B1	F.T. their (a) if the M1 awarded. Allow B1 for 3969 OR $3^4 \times 7^2$
	4	
10. (a) Plots	P1	P0 on 2nd error Within ± ½ a small square.
Curve	C1	Must be a curve at least for x = –2 to x = 2
(b) Line y = 6	L1	
x-values	B1	F.T. their graph if at least 2 readings
	4	
11.		Use overlay
Angle bisector of ∠ADC,	B1	Loci do not have to be accurate as long as the intention is clear.
Line parallel to AB distance 3cm from it.	B1	About 2 cm is required to identify the loci. **Initially ignore extra horizontal lines or extra lines through D. Then if first B2 awarded, extra lines get a penalty of −1. If a region is drawn this may remove the ambiguity and the lines offered will be identified and no penalty invoked.**
Correct region	B1	F.T. if their region is similar to the correct one, i.e. uses a line through the angle at D and a line parallel to AB.
	3	
12. (a) Correct image (–4, –1) (0, –3) (1, 2)	B2	B1 for 2 correct vertices. B1 for correct reflection in y = x (0, 3) (–1, –2) (4, 1)
(b) Correct image (1, 2) (1,–1) (3, 1)	B2	B1 for 2 correct vertices. B1 for clockwise rotation of 90º about (–1, –2). (3, –1) (3, 2) (5, 1) B1 for anti-clockwise rotation of 90º about (–2, –1). (–5, –1) (–5, –4) (–7, –3)
	4	The last point will require extra grid lines.
13. (a) Least = 975	B1	C.A.O.
Greatest = 1025	B1	C.A.O.
(b) Use of 50 × "their greatest volume"	M1	F.T. providing 1000 < "their greatest volume" ≤ 1100
= 50 × 1025 = 51250 (cm^3) (= 51·25 litres)	A1	
51·5 (litres) ≤ tank (≤ 52·5 litres)	B1	C.A.O. No need for upper bound. **Note also the correct division arguments: 51·5/1·025 gets M1, and evaluated as 50·2(4) gets the A1. The 51·5 gets the B1 OR 51·5/50 gets M1 and 1·03 gets the A1.**
50 of the largest jugs will always fit into the tank because 51·25 is < minimum tank (51·5 litres).	E2	E1 for an explanation that only uses 52 litres for the tank and states that it is always possible.
	7	
14. (a) $20c^9d^5$	B2	B1 for $20c^9d^k$ OR $20c^nd^5$ OR kc^9d^5 Ignore any extra × signs.
(b) $2a(3b - a)$	B2	B1 for $a(6b - 2a)$ OR $2(3ab - a^2)$
	4	

Higher 2 Tier GCSE Autumn 2008 Paper 1		Notes
15. $2(4x - 1) - (2x + 7) = \frac{5}{2} \times 6$ $8x - 2 - 2x - 7 = 15$ $6x = 24$ $x = 24/6$ I.S.W. (= 4)	 M1 M1 A1 A1 4	Must clear fractions by a valid method For handling 2 of the 3 terms correctly For the Ms, 2x+ 7 is acceptable, but the first A mark is A0. For handling all 3 terms correctly Collecting terms. F.T. until 2nd error if at least M1 awarded Unsupported answer of x = 4 gets all 4 marks.
16. (a) $\frac{\text{largest}}{\text{largest}} = \frac{18}{12} = (1{\cdot}5)$ $\frac{\text{middle}}{\text{middle}} = \frac{15}{10} = (1{\cdot}5)$ $\frac{\text{smallest}}{\text{smallest}} = \frac{9}{6} = (1{\cdot}5)$ (All same ratio, therefore similar triangles) (b) For example, $\frac{QR}{10} = \frac{15}{12}$ RQ = 12·5 (cm)	B2 M1 A1 4	B1 for finding any 2 corresponding ratios B2 for 'The triangles have been multiplied by 3/2 OR 2/3' OR 'the scale factor is 3/2 OR 2/3', etc OR 'both cancel to 3:5:6' – must be all 3 correct values. Any correct equation with only QR unknown C.A.O.
17. (a) $\frac{3}{5}$ and $\frac{2}{5}$ on the first branch $\frac{2}{9}$ and $\frac{7}{9}$ on the second branches (b) $\frac{2}{5} \times \frac{7}{9}$ $= \frac{14}{45}$	B1 B1 M1 A1 4	C.A.O. C.A.O. Accept only on one branch provided the other branch is empty. F.T. their tree if probabilities are between 0 and 1 exclusive and NOT all ½.
18. (a) (3x + 1)(7x – 1) x = -1/3 and 1/7 (b)(i) (7x + 8)(7x – 8) (ii) 7x + 8	B2 B1 B2 B1 6	B1 for (3x 1)(7x 1) FT their pair of brackets B1 for (7x….8)(7x….8) FT if possible
19. (Area) scale factor 16/100 (or equivalent) Length scale factor 4/10 or √16 / √100 5 (cm)	M1 M1 A1 3	SC1 for relevant sight of 4 and 10 or √16 and √100 CAO
20. (a) 220^0 (b) 52^0 Explantion or calculation	B1 B1 E1 3	 Alternate segment, cyclic quadrilateral and triangle
21. 5be – 3e = 7c – 10b e (5b – 3) = 7c – 10b e = (7c – 10b) / (5b – 3)	B1 B1 B1 3	Collect e terms Factorise Division FT for equivalent stages and level of difficulty
22. Use of the y values 9, 10 and their 9 Use of trapezium rule or idea of sum areas 23.5	M1 M1 A1 3	 CAO
23. (a) ½ LN - ON (= 2a -4b + 4a +16b) OR - ½ LN - OL (=-2a +4b + 8a +8b = 6a + 12b (b) Showing k = 2/3 (c) Collinear or parallel PO is 2/3 x length OM or OM = 1.5 x PO	 M1 A1 B1 B1 B1 5	 Intention clear, e.g. **ON** + **NP** Must be simplified form

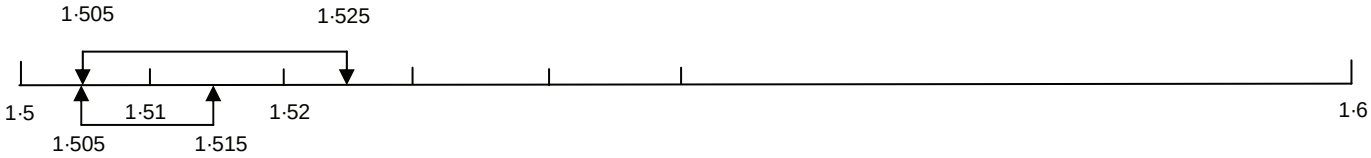
Higher 2 Tier GCSE Autumn 2008 Paper 1		Notes
24. (n-3)(n+2) as a denominator n(n+2) – n(n-3) as a numerator 5n / (n-3)(n+2)	M1 M1 A1 3	 FT if M1 mark awarded. Penalise further incorrect work -1. If no marks *SC1* for 5n
25. (a) 2 (b) $3\sqrt{6}$	B1 B1 2	
26. $3a^{5}(a+1)^{-4}$	B3 3	B2 either or both index left as fraction, B1 one correct index in fraction form or otherwise. Penalise further incorrect work -1

MATHEMATICS - 2 TIER
PAPER 2 - HIGHER WITH COURSEWORK

Higher 2 Tier GCSE Autumn 2008 Paper 2		**Notes**
1. Intention to divide 28 by 20 or 20 by 28 20/28 x 350 OR 350 / (28/20) (£) 250	M1 M1 A1 3	Finding worth of £1 or 1Euro
2. 3.1	B2 2	B1 for 3.0727…
3. Area = ½ (8.4 + 11.3) x 6.2 = 61.07 cm^2	M1 A1 U1 3	Or alternative 8.4x6.2 + ½ x2.9x6.2 U mark depends on M1
4. Sum angles = 360 2x + 5x + 43 + 177 = their sum of angles 7x + 220 = 360 x = 20 Smallest angle = 40^0	B1 M1 A1 A1 B1 5	Irrespective of equation Must be =360 *SC1 for answer of 20 without an equation, then FT* FT for their smallest, 2x or 43
5. (a) **Correct** straight line graph y=3x+1 (b) (0 , 1)	B3 B1 4	Thru at least two points, e.g (0,1) and (1,4). B2 for two points on the line, stated or plotted B1 for one point on the line, stated or plotted CAO. NOT FT
6. $\frac{38}{100} \times 570$ AND £570 + their answer (£)216·6(0) (£)786·6(0) OR $\frac{138}{100} \times 570$ (£) 786·6(0)	M1 B1 A1 **OR** M1 B1 A1 3	Complete method. Need to show a correct process for finding 38% AND adding it to £570. For sight of (£)216·6 F.T. their 38% if M1 awarded. Need to show a correct process for finding 138% For sight of the 138 C.A.O.
7. (a) Area = $\pi \times 6{\cdot}3^2$ = 124·6(898124) (cm^2) OR 125 (b) Perimeter = $2 \times \pi \times 6{\cdot}3$ OR $\pi \times 12{\cdot}6$ = 39·5(8406) (cm) OR 40	M1 A1 M1 A1 A1 5	 Allow 124·6 – 124·8 OR 125 Allow 39·5 – 39·6 Perimeter in (a) and Area in (b) get 0 marks. For whole number OR 1 dec. pl. answers in EITHER (a) or (b) provided the corresponding M1 has been awarded.
8. 35000.00 6300.00 28700.00 5166.00 OR 23534.00 **$35000(1-0{\cdot}18)^3$** M1 4236.12 19297(·88) A2 19297(·88) Value = (£) 19300	B1 M1 A1 A1 4	For the evaluation of a correct 18%. Alternatively they may get the B1 for (£)18900. For the overall method (3 stages of subtracting different 'bone fide' 18%). For any correct alternative method. C.A.O. for amount. OR for the correct 3 depreciations. F.T. rounding nearest £100 only if M awarded. If 2 years used, then mark it as if correct, then MR–1 provided A or B marks have been awarded. If 4 years used, then mark up to 3 years and ignore subsequent working. (Maximum of 3 marks)

Value = (£) 19300

Higher 2 Tier GCSE Autumn 2008 Paper 2		Notes
9. $27 - 6x = 83 - 13x$ $7x = 56$ $x = 56/7$ I.S.W. (= 8)	B1 B1 B1 3	Clearing bracket F.T. until 2nd error Collecting terms Answers only get full marks. Ignore incorrect subsequent working, e.g. 56/7 = 9 13. $27 - 6x = 83 - 13x$ $7x = 56$ $x = 56/7$ I.S.W. (= 8)
10. (a) Suitable axes, with uniform scales (not necessarily labelled)	B1	Must be numbers only. Use of $10 \leq t < 15$ etc gets 0. 'Reverses' axes should be marked without penalty.
Rectangles of equal width, with no gaps between them, with feet at 0, 5, 10, …. Correct heights **B0 if only a polygon given. If bars merit B2, then −1 if a polygon or curve is superimposed on the bars.**	B2	If there is no scale on the time axis, mark as if there was a scale, if the rectangles are drawn with vertical sides on consecutive 2cm OR 1cm grid lines. Must be bars, but allow any constant width. B1 for one error in the heights OR for equal width bars with all heights correct, but with a constant gap between the bars. OR for completely correct bars if translated horizontally.
(b) Mid-points at 2·5, 7·5, 12·5, 17·5, 22·5, 27·5	B1	If all the mid-points are equal then 0 marks. For the correct mid-points seen. (Look at their table also). (All mid-points must be correct)
fx **90** **435** **325** **315** **225** **55** $36\times2{\cdot}5 + 58\times7{\cdot}5 + 26\times12{\cdot}5$ etc (OR 1445) $\frac{36\times2{\cdot}5 + 58\times7{\cdot}5 + 26\times12{\cdot}5 \text{ etc}}{150}$ (OR 1445) = 9·6(33)	B1 M1 A1 7	The correct value of the sum of their fx terms. ('Their 1445') For the sum of the 6 fx terms divided by 150. F.T. INCORRECT MID-POINTS, and/or incorrect evaluation of 'their 1445', but ONLY IF THEY USE 6 f.x TERMS AND DIVIDE IT BY 150. UNSUPPORTED 9·6(33) GETS 4 MARKS.
11. $BC^2 = 90^2 - 65^2$ (3875) BC = 62·2(494) **OR 62** Perimeter = 130 + 2BC = 254·4(989) OR 254·5 **OR 254**	M1 A1 M1 A1 4	Correct substituted Pythagoras C.A.O. F.T. their BC if M1 awarded in (a) **OR F.T. if BC = 111(.02)** **Correct F.T. answer is 352(·04)** OR F.T. their BC **for SC1 only**, if M NOT awarded in (a). Ignore incorrect writing of their process if their answers are correct.
12. Area of parallelogram = 10·6 × 8·2 = 86·92 Volume (= area × 15·7) = 1364(·644) **OR 1365**	M1 A1 B1 3	F.T. their area

Higher 2 Tier GCSE Autumn 2008 Paper 2		Notes
13. **One correct (see note on the right for def^n.) evaluation of $x^3 + 3x - 8$ for an x satisfying:** $1{\cdot}5 \le x \le 1{\cdot}6$ Watch for pupils who are trying to make x^3+3x equal to 8 rather than $x^3 + 3x - 8$ equal to 0. Two correct **(see note on the right for def^n.) evaluations of $x^3 + 3x - 8$ for an x satisfying:** $1{\cdot}505 \le x < 1{\cdot}525$ which give opposite signs for f(x). Two correct (OR F.T.) evaluations (1 sig. fig.) $1{\cdot}505 \le x \le 1{\cdot}515$ which give opposite signs for f(x). Thus solution is 1·51 correct to 2 decimal place. Candidates must give a method that proves that the solution is 1·51 correct to 2 decimal places.  	B1 B1 M1 A1 4	**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.** If no calculations are given, accept use of "too low" or "too high" OR >0 and <0. 1·505 –0.0761 1·506 –0.0663 1·507 –0.0565 1·508 –0.0467 1·509 –0.0369 1·5 –0.1250 1·51 –0.0270 1·511 –0.0172 1·512 –0.0074 1·513 0.0025 1·514 0.0124 1·515 0.0223 1·516 0.0322 1·517 0.0421 1·518 0.0520 1·519 0.0619 1·52 0.0718 -0.9183 1·51 –0.0270 1·52 –0.0074 1·53 0.0025 1·54 0.3739 1·55 0.5799 1·56 0.7897 1·57 0.8960 1·58 1·59 1·6 1·51 0.0718 1·52 0.1716 1·53 0.2723
14. 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 $x = -4$ OR $y = 3{\cdot}5$ F.T. F.T. If ONLY both answers of $x = -4$ AND $y = 3{\cdot}5$ THEN B4	Substitution method M1 for correctly substituting for one variable into the other equation, then A1 for the correct answer.
15. $3{\cdot}(034) \times 10^{-10}$	B2 2	C.A.O. Accept numbers to 1 dp B1 for $30{\cdot}34 \times 10^{-11}$ <u>OR EQUIV</u> <u>Or incorrect notation</u>	
16. (a) $x^2 - 24$ $+ 2x$ <u>(Ignore =0)</u> (b) $a^2 = bc - d$ $a^2 + d = bc$ $c = \frac{a^2 + d}{b}$	B1 B1 B1 B1 B1 5	B2 only if written as a trinomial, $x^2 + 2x - 24$ (any order) If B2 then penalise –1 once only for any subsequent inappropriate work such as using equations. F.T. until second error	

Higher 2 Tier GCSE Autumn 2008 Paper 2		Notes
17. (a) Inter-quartile = reading at 225 – reading at 75 = 37 to 41	M1 A1	Accept any reading in the range (71 to 73) – (32 to 34) and therefore answers in the range 37 to 41. **Allow consistent misread of the 'Time' scale for the M mark. For example, 66 – 26 = 40 OR 66 – 27 =39 get M1, A0 However unsupported 39 or 40 get M1, A1.**
(b) 300 – reading at 90 (300 – 265) = 35	M1 A1 4	Accept any reading for 265 in the range 260 – 270 and therefore answers in the range 30 – 40 (whole numbers only). All ranges are inclusive).
18. AD = 16 × sin56º AD = 13·2(646) OR 13·3 (cm) **OR 13** EC = (23 – 13·2(646)) = 9·735 tan x = 9·735/15 (= 0·649026) ∠CBF = 32·98 OR 33	M2 A1 B1 M1 A1 6	Correct substituted sin ratio. M1 for sin56º = AD/16 C.A.O. **F.T. 'their AD'.** Correct substituted tan ratio, **based on their AD and/or EC** F.T. 'their AD'. **PA−1 will apply if, e.g. , AD=13 is used (answer =33·67)**
19. (a) Vol = $3x^2(x+7)$ $3x^3 + 21x^2 = 3x^3 + 2x + 1$ (b) $x = (2 \pm \sqrt{\{(-2)^2 – 4x21x-1\}}) / 2 \times 21$ $= (2 \pm \sqrt{88})/42$ 0.27 (and -0.18) (c) 1.6 (cm^3)	M1 A1 M1 A1 A1 B1 6	Allow 1 slip in substitution FT their x only if M1 in (b)
20. (a) $y \alpha 1/x$ OR $y = k/x$ $3 = k/2$ $y = 6/x$ (b) x: -1, 2, **60** y: **-6**, 3, 0.1	B1 M1 A1 B2 5	 FT non linear only Maybe implied in part (b) FT their non linear expression B1 for each value, do not accept 6/-1 for -6
21. x = 0.8232323… and 100x=82.323.. 815/990	M1 A1 2	Or 10x and 1000x, or equivalent 81.5/99 gains M1 only
22. Use of 109^0 with sine rule 12.6/sin109 = AC/sin30 6.66… (cm)	M1 M1 A1 3	
23.(a) Method of finding an area of 1 bar 4 correct areas AND intention to add all areas 100 (b) Group 20 to 25 identified 9/30 or 21/30 considered 20 + 9/30 x 5 OR 25 – 21/30 x 5 21.5	M1 M1 A1 M1 M1 M1 A1 7	 Areas are 10, 14, 17, 30, 14, 15 CAO
24. Tangent drawn at t = 15 Difference in v / difference in t Answer reasonable for their tangent	M1 M1 A1 3	 Only award if both M marks awarded
25. (a) Correct sin curve using axes given (b) 233^0 and 307^0	B1 B2 3	 No other angles given, or B1 for a correct angle, or B1 FT from their 1st angle to a "correct FT" 2nd angle

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MARKING SCHEME

MATHEMATICS
2 TIER ALTERNATIVE (PILOT)

NOVEMBER 2008

INTRODUCTION

The marking schemes which follow were those used by WJEC for the November 2008 examination in GCSE MATHEMATICS - 2 TIER ALTERNATIVE. 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.

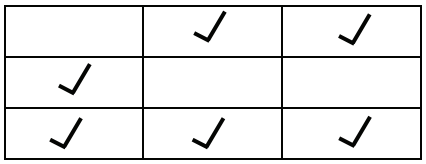
It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

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

MATHEMATICS - 2 TIER ALTERNATIVE (PILOT)
PAPER 1 - FOUNDATION

2008 Autumn Paper 1 (Non calculator) **2 Tier Alternative Foundation Tier**	**Marks**	**POST CONFERENCE MARK SCHEME (13/11/2008)** **Comments (Page 1)**
1. (a) 7046 (b) 865 (c) 319 (d) (i) 7940 (ii) 7900 (e) 500 (f) 1, 2, 7, 14	B1 B1 B1 B1 B1 B1 B2 8	C.A.O. C.A.O. C.A.O. C.A.O. C.A.O. Allow 100. B1 for any 2 factors and no incorrect numbers. OR B1 for all 4 correct factors and one incorrect number.
2. (a) £5 – 4 × 70 = (£) 2.20 OR 220(p) (b) e.g. 40 × 10 = 400 (c) $\frac{1}{4}$ **OR equiv. e.g. 25/100** , ·2, ·28 $\frac{1}{5}$ (0 ·2) ; 0.25 ($\frac{1}{4}$) ; 28% (0·28)	M1 A1 M1 A1 B3 B1 8	 C.A.O. Accept 39 × 10, 40 × 11, 39 × 11, 38 × 10 F.T. their estimates B1 for each Or their equivalent F.T. their values
3. (a) Cost = 15 × 30 + 40 = (£)490 (b) monthly payment × 30 = 420 − 60 monthly payment = (£)12	M1 A1 M1 A1 4	Correctly substituted and attempt to multiply and add C.A.O. Correctly subst. and an attempt at isolating the monthly payment C.A.O. Allow embedded answers in (a) and (b), e.g C = 12×30+60.
4. (a) 11 9 8 12 (b) G(reen) (c) B, R, Y, G along one axis Uniform scale starting at 0 Four bars at correct heights (d) $\frac{9}{40}$	B2 B1 B1 B1 B2 B2 9	B1 for any **two or** three correct (tallies and) frequencies. B1 for only correct tallies given. B0 for 12, but G(reen) and 12 is B1 Frequencies take F.T. their table of frequencies precedence over tallies OR indicated on the bars themselves F.T. their table of frequencies (or tallies if no frequencies). If no scale then B0, but allow one square to represent a frequency of 1. B1 for any 2 or 3 correct bars on F.T. Bars can be of any **equal width, else B1 only.** F.T. their table of frequencies B1 for $\frac{9}{x}$ in a fraction < 1 OR B1 for $\frac{x}{40}$ in a fraction < 1. **Penalise –1 for incorrect notation such as 9:40, 9 in 40 etc.**
5. (a) 12 (b) (x =) 3 (c) 15	B2 B1 B2 5	B1 for sight of 48 **OR 42 + 6 ÷ 4** Allow embedded answers, e.g. 12×4 – 6 = 42 C.A.O. Allow embedded answers, e.g. 3 + 7 = 10 C.A.O. B1 for the 12 or 3
6. (a) Missing length = 4 (cm) **3+7+3+7+3+7 +4** = **34** (cm) (b) Area of one rectangle = 7 × 3 = 21 Area of shape = 42 cm^2	B1 B1 B1 M1 A1 B1 U1 7	C.A.O. For adding up 3 lots of (3 and 7) to 'their 4', **provided 3 ≤ 'their 4' < 7.** F.T. 30 + 'their 4' C.A.O. F.T. twice 'their 21' C.A.O. independent of all other marks.

2008 Autumn Paper 1 (Non calculator) 2 Tier Alternative Foundation Tier	Marks	POST CONFERENCE MARK SCHEME (13/11/2008) Comments (Page 2)	
7. (a) 50% = 40 5% = 4 44	M1 A1	Any correct method for finding 55% C.A.O.	
(b) 74 × 37 OR 518 148 2220 2590 2738 = (£) 2738	M1 A1 <u>**A1**</u> 5	Any correct complete method for the multiplication of 74 by 37 For either 518 or 2220 OR A1 for 148 or 2590 C.A.O. Place value errors get M0, A0, A0	
8. (a) Plots Line (b) Any correct strategy, e.g. 3 times value at 100cm Around 118·5	P1 L1 M1 A1 4	P0 on 2nd error Within 2mm square. If incorrect plot(s), allow L1 for any appropriate line or line segments or curve through the plotted points. F.T. their work from the graph or the table. Unsupported answers in the range 117 – 120 get M1, A1.	
9. (a) 13 15 17 11 13 15 9 11 13 (b) 3/20	B2 B2 4	C.A.O. B1 for any 6 correct entries F.T. their table B1 for $\frac{3}{x}$ in a fraction < 1 OR B1 for $\frac{x}{20}$ in a fraction < 1.	NOTES Penalise –1 for use of words such as "3 out of 20", "3 in 20" OR "3:20". When fraction and wrong notation seen, DO NOT penalise wrong notation.
10. All 3 quadrants correct	B3 3	B1 for each correct quadrant	
11. (a) (i) 64 (ii) 61 (b) 200	B1 B1 B2 4	C.A.O. C.A.O. B1 for either 8 or 25	
12. (a) (i) 12x (p) I.S.W. (ii) 30 – y I.S.W. (iii) a + 12 I.S.W. (b) (i) (x =) 24 (ii) 3x = 6 x = $\frac{6}{3}$ ISW (= 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. Allow 12 × x and x × 12. Ignore p. C.A.O. Ignore m(etres) Allow 6 + a + 6 etc Ignore cm C.A.O. C.A.O. F.T. their ax=b (a≠1) Allow embedded answers, e.g. 3×2+5 = 11 Penalise –1 for the above followed by x=wrong answer.	
13. <u>**LOOK AT THEIR DIAGRAM**</u> ∠DCB = 40 ∠DBC = 100 ∠DBA = 80 x = 20	 B1 B1 B1 B1 4	<u>**F.T. but you must feel confident that each angle has been found by the correct method before awarding the B1s.**</u> C.A.O. Finding the interior angle F.T. 180 – 2 × 'their 40' F.T. 'their 100' F.T. 180 – 2 × 'their 80' <u>**Unsupported (x =) 20 gets SC2.**</u>	
14. Correct use of scale AB = 6 (cm), AC = 7, BC = 9	 B1 B3 4	Use the overlay (Allow ± 2mm). B1 for each correct length. F.T. consistent use of incorrect scale Use of different scale is MR–1.	

2008 Autumn Paper 1 (Non calculator) 2 Tier Alternative Foundation Tier	Marks	POST CONFERENCE MARK SCHEME (13/11/2008) Comments (Page 3)
15. (a) x15 seen or implied 1200, 1200, 30, 1950, 2100, 30	M1 A2	**One correct answer from the six gets the M1** A1 for any 4 correct. Accept conversion to kg
(b) 2kg = 2000g seen or implied 1300 seen (oats) 700 (grams)	B1 B1 B1	**OR converting 1300g to 1·3(00) kg** Or FT from 2/3 answer for oats in (b). Use of oats for 150 bars is NOT a MR − **award B0** CAO
(c) NO 160 grams needed but 5 ounces is 125 grams H2	B1 E2 9	**Arithmetical error(s) making the decision 'yes' get B0.** E1 for either 160g or 125g seen. **The' 125' part could be any equivalent reason, such as "6oz is 150 (and that's not enough)" OR "it will need 7oz".**
16. (a) 6, 9, 14 (b) 4(n + 7) H1	B2 B2 4	B1 for any 2 terms correct, OR 5, 6, 9 seen **OR 1^2+5 AND 2^2+5 AND 3^2+5** B1 for n + 7 × 4, missing brackets **If B2, then penalise −1 for subsequent incorrect working.**
17. (a) Mid points 4, 12 and 20 (25×4 + 60×12+ 20×15)/100 (= 100+720+300)/100 = 11·2 (b) Polygon with at least 3 vertices correctly plotted (vertical & horizontal) All 5 vertices of the polygon correct H7	B1 M1 A1 M1 A1 5	 FT their midpoints for M1 only CAO No polygon M0. Ignore bars. Mid points 5·5, 15·5, 25·5, 35·5, 45·5 *SC1* for a correct polygon translated horizontally or all correct plots with no polygon (or curved polygon!)
18. Angle bisector of ∠ADC, Line parallel to AB distance 3cm from it. Correct region I17	 B1 B1 B1 3	Use overlay Loci do not have to be accurate as long as the intention is clear. About 2 cm is required to identify the loci. Initially ignore extra horizontal lines or extra lines through D. Then if first B2 awarded, extra lines get a penalty of −1. If a region is drawn this may remove the ambiguity and the lines offered will be identified and no penalty invoked. F.T. if their region is similar to the correct one, i.e. uses a line through the angle at D and a line parallel to AB.
19. (a)  (b) (i) (square based) pyramid (ii) triangular prism H6	B2 B1 B1 4	B1 for any 2 columns or rows correct, OR 1 row and 1 column correct. **'pyramid' alone gets the mark, but names like 'triangular pyramid' get B0.** **'prism' on its own gets B0.**

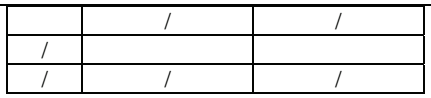
MATHEMATICS - 2 TIER ALTERNATIVE (PILOT)
PAPER 2 - FOUNDATION

2008 Autumn Paper 2 (Calculator allowed) **2 Tier Alternative Foundation Tier**	**Marks**	**POST CONFERENCE MARK SCHEME (18/11/2008)** **Comments (Page 1)**
1. (i) 25 (ii) 21 (iii) 18	B1 B1 B1 3	C.A.O. C.A.O. C.A.O.
2. (a) $\frac{5}{10}$, $\frac{2}{12}$ (b) 6 rectangles shaded (c) $\frac{8}{15}$	B2 B1 B1 4	B1 for 1 correct and up to one incorrect B1 for 2 correct and 1 incorrect C.A.O. C.A.O.
3. (a) (£)1.45 OR 145p (b) (£) 3.08 – 2.49 = (£) (0).59 OR 59p (c) (£) 1.63 + (£)5.70 = (£) 7.33 **I.S.W.**	 B1 B1 B1 B1 B1 B1 B1 7	Penalise −1, once only, for omitting the p in pence answers. C.A.O. p needed in 145p C.A.O. For subtracting 2.49 from their '3.08' F.T. for 1 error C.A.O. For adding 5.70 to their '1.63' F.T. for 1 error **SC1 for £6.40**
4. kg OR N(ewtons) cm^2 OR mm^2 l(itres) OR cc or cm^3 OR **ml** km or kilometres	B1 B1 B1 B1 4	C.A.O. C.A.O. C.A.O. C.A.O.
5. (a) ¼ (b) Fraction for children = 1/3 of 600 Number of children = 200	**B2** M1 A1 4	**B1 for 90 (°) ± 2 (°) even only marked on the diagram AND B1 for F.T. 'their 90'/360 if between 88 – 92 inclusive** C.A.O. **·3 × 600 = 180 gets M1, A0 ; ·33 × 600 = 198 gets M1, A0**
6. (a) (i) 11p (ii) 3a – 5b (b) (i) Subtract 6 (from the previous term) (ii) Multiply (previous term) by 4 (c) (i) 4 tables **DRAWN** with 10 chairs **IN A DIAGRAM** (ii) 6 tables 14 chairs	B1 B1 B1 B1 B1 B1 B1 B1 8	C.A.O. C.A.O. C.A.O. Allow −6 C.A.O. Allow ×4, times 4 C.A.O. C.A.O. C.A.O. C.A.O.
7. Multiplying factor = 9 (man) **OR 7 – 8 (door)** Estimate of the man's height OR door's height Estimate height of flats = estimate × factor For example, 6 (ft) × 9 (man) OR 220 × 7 (door) = F.T. their estimates	B1 B1 M1 A1 4	C.A.O. Estimate for man's height should be between 5.5 – 6.5 feet inc. OR 165 – 200 cm Estimate for door's height should be between 6.5 – 7.5 feet inc. OR 200 – 230 cm For 'their man's height estimate' × 'their 9' OR 'their door's estimate **'their 7 – 8'** for whatever unit chosen F.T. their estimate for the man OR door and their factor IF NO UNITS MENTIONED THROUGHOUT THEN A0. **Unsupported answer in the ranges 45·5 – 60 (ft) OR 14 – 18·5 (m) get B1, B1, M1 and final A1 if units also given.**

2008 Autumn Paper 2 (Calculator allowed) 2 Tier Alternative Foundation Tier	Marks	POST CONFERENCE MARK SCHEME (18/11/2008) Comments (Page 2)
8. (a) Sum of the numbers (427)	M1	For attempt to add the numbers. **Unsupported 360 – 515 gets M1**
Sum/7	m1	Dependent on the M
61	A1	C.A.O.
(b) 35 54 54 (60) 66 72 86 median = 60	M1 A1 5	For putting the numbers **in** order C.A.O.
9. (a) (£)40 ÷ 6.85 **OR (£) 5.8(394...)** 5 CDs	M1 A1	C.A.O.
(b) 1/7 of 91 = 13 4/7 of 91 = 4 × 13 = 52	M1 A1 4	For any correct complete method C.A.O. **Use of decimals such as ·57 of 91 should get M1 then if A1 awarded PA−1 should be applied, e.g 51·87 is M1, A1, PA−1**
10. (a) (4, 3)	B1	C.A.O.
(b) (i) Any one corr. pair of (2, –1) (–3, –1) (ii) A different corr. pair of (4, –1) (–1, –1) (2, 3) (–3, 3)	B1, B1 B1, B1 5	C.A.O. C.A.O. In (b) reversed 'correct' coords throughout gets B2 only. Correct points marked on diagram (without coords) gets B2 only. **If they offer a parallelogram congruent to ABCD, but using a different AB: SC1 for the correct coordinates of its 'E and F', if at least one negative number used in the coordinates,**
11. a = 5 b = 3 c = 6	B1 B1 B1 3	C.A.O. F.T. 'their a' F.T. 'their a'
12. (a) (£)8.43 − 2.5 × (£)1.58 = (£)4.48	M1 A1	For the complete method that leads to cost of the pears. C.A.O.
4.48/3.5 = (£)1.28	M1 A1	F.T. 'their 4.48. 8.43/3.5 gets M0, A0 Reversal of pears and apples is MR–1. **(£2.90 and £1.16)**
(b) $\frac{38}{100} \times 135$ = 51·3 **I.S.W.**	M1 A1	Allow M1 for methods such as 10% = 13·5 30% = 40·5, 5% = 6·75 etc as long as there is C.A.O. enough correct work to convince that they Allow 51·3% understand percentages and are finding 38% by a proper method of partitioning.
(c) 36 27	B1 B1 8	C.A.O. F.T. 'their 36' – 9
13. Correct image (Allow ± 2mm)	B2 2	If not all correct, then B1 for three correct vertices. Use of a different scale factor should be marked then MR–1
14. (a) x = (180 – 38)/2 = 71	M1 A1	C.A.O.
(b) y = 360 – 90 – 82 – 136 = 52	M1 A1 4	C.A.O.
15. 950 × 1.27 = 1206**(.5)** 1210 euros	M1 A1 B1	C.A.O. F.T. rounding up their answer to nearest 5 euros
Cost = (1210 ÷ 1.27) = (£) 952.75(59) (4) **OR £953**	M1 A1 5	F.T. **'their 1210' OR even unsupported 1205** Accept (£) 952.75 OR 952.76

2008 Autumn Paper 2 (Calculator allowed) 2 Tier Alternative Foundation Tier	Marks	POST CONFERENCE MARK SCHEME (18/11/2008) Comments (Page 3)
16. (a) (i) & (ii) ANY TWO OF: What does 'very often' mean. Too vague. No 'never' No quantifying, no time period	B2	The objective is to criticise the question in part (a) and write a better one in part (b). Use both parts to help understand what the pupil is doing.
(b) Gives mutually exclusive AND exhaustive numerical classes. e.g. 0, 1-2, 3-4, more than 4 times (a week, a month) e.g. 0-1, 1-2, 2-3, 4+ OR 0-2, 3-6, 6+	B2 4	B2 for mutually exclusive AND exhaustive numerical classes B1 for the idea of quantifying/partitioning the number of visits. Intervals do NOT have to be of equal length or exclusive or exhaustive for this B1. **Use of a time period in (b) gets B1, but B2 can be awarded for mutually exclusive AND exhaustive numerical classes without mention of a time period.**
17. (a) All points plotted correctly	B2	**B1 for at least 3 correct plots.** **Penalise joined point to point −1**
(b) Positive (c) Line of best fit with points above and below (d) Number of visitors from their line of best fit	B1 B1 B1 5	Do not accept descriptions.
18. Two correct points	B2	B1 for one correct point
Correct straight line drawn	B1 3	CAO SC1 for a straight line with correct gradient of 5 or the correct intercept
19. 2x + 20 + 2x + 3x + 5x + 40 = number 12x = 300 x = 25	M1 A1 A1 3	 C.A.O. CAO. Accept x = 300/12. Answer only gets SC1 only
20. Rhombus drawn correctly	B3 3	Allow ±2mm. B2 for triangle of 6, 10, 6 OR B1 for any two lines one of length 6cm and the other of length 10cm **B1 if idea correct but slightly out of tolerance (≤ 6·4)**
21. 5/19 x 665 OR 6/19 x 665 OR 8/19 x 665 (£)175 OR (£) 210 OR (£)280 The other two shares	M1 A1 A1 3	Or sight of 35
22. States Not true OR No Stating both same probability or showing 1/6x1/6 for both	B1 B1 2	 Stating same probability (chance) implies also 1st B1 not true **Ignore incorrect probabilities if statement states or implies that the probabilities are the same.**
23. Overall strategy, Pythag. & area rect. with triangle	B1	
19.7 – 13.4 (= 6.3)	B1	
$8.2^2 = h^2 + (19.7 - 13.4)^2$	M1	Correct Pythagoras statement. 19.7 − 13.4 may be incorrectly evaluated but intention to subtract values is clear.
$height^2 = 27.55$ height = 5.2(49…)	A1 A1	CAO FT their $height^2$ only if M1 awarded.
Complete method to find area of rectangle and triangle	M1	**OR correct substituted formula for trapezium** FT their height **(even BE = 6·3)**
86.87….(cm^2)	A1 7	CAO. **Useful numbers: If BE = 6·3,** **then area = 104.265 by trapezium formula** **OR 84.42 (rectangle) + 39.69 (triangle) = 124·11**

MATHEMATICS - 2 TIER ALTERNATIVE (PILOT)
PAPER 1 - HIGHER

Q	Alternative Autumn 2008. Higher Paper 1	Mark	Comment
1	(a) 6, 9, 14 (b) 4(n + 7)	B2 B2 4	B1 for any 2 terms correct, OR 5, 6, 9 seen B1 for n+7 x 4, missing brackets
2	(a) x15 seen or implied 1200, 1200, 30, 1950, 2100, 30 (b) 2kg = 2000g seen or implied 1300 seen (oats) 700 (grams) (c) NO 160 grams needed but 5 ounces is 125 grams	M1 A2 B1 B1 B1 B1 E2 9	A1 for any 4 correct. Accept conversion to Kg Or FT from 2/3 answer for oats in (b). Use of oats for 150 bars is NOT a MR, B0 CAO E1 for either 160g or 125g seen
3	(a) Intention of correct location All lines x3 (b) Reflection In line y = 1 (c) 360 – (180 – 150) 330^0 (d) Correct rotation	B1 B2 B1 B1 M1 A1 B2 9	Award B1 for any 3 lines x3. *SC1 for enlargement whole scale in correct position* Sight of 30 is M0 B1 for anticlockwise 90^0 rotation
4	(a) 10x – 5x = 30 or 5x = 30 x = 30/5 (=6) (b) x - 3 = 7 or 6x - 18 = 42 x = 10 (c) 5a + 15b + ….. 8a - 5b	B1 B1 B1 B2 B1 B1 B1 8	FT 15x = 30 only giving x = 30/15 (=2) *FT until 2nd error* Accept x = 60/6. B1 for 6x=60 Expansion of brackets FT for their expansion Ft for their expansion
5	(a) Method that produces primes, at least 2 2 , 2, 2, 3, 3, 11 $2^3 \times 3^2 \times 11$ (b) 2 x 11 OR 22 (c) "Not all even indices" or equivalent	M1 A1 A1 B1 E1 5	6 correct factors, ignore 1s, irrespective of notation FT. Brackets or dots ok, "+" is no r inclusion of 1s. FT if M1 awarded
6	 (b) (i) (square based) pyramid (ii) triangular prism	B2 B1 B1 4	B1 for any 2 columns or rows correct, or 1 row and 1 column correct
7	(a) Mid points 4, 12 and 20 (25x4 + 60x12+ 20x15) / 100 (= 100+720+300)/100 = 11.2 (b)Polygon with at least 3 vertices correctly plotted (vertical & horizontal) All 5 vertices of the polygon correct	B1 M1 A1 M1 A1 5	FT their midpoints for M1 only CAO No polygon M0. Ignore bars. Mid points - allow intention *SC1* for a correct polygon translated horizontally or all correct plots with no polygon (or curved polygon!)
8	(a) -4 (b) Plots Curve (c) -1 and about 1.7 (d) Line x = -1.5 (-1.5 , about 6)	B1 P1 C1 B1 L1 B1 6	Allow one error Must be a curve joining through at least 6 points FT their graph. x-values, coordinates are not required FT their graph. Needs to be written as coordinates
9	(a) E E.g. "More throws", "Uses all the data" (b)(i) 0.75 x 40 = 30 (ii) 100 – 64 = 36	B1 E1 M1 A1 M1 A1 6	 SC1 for sight of 0.36 or 1 - 0.64
10	Two correct equations for eliminating one variable First variable's value. Correctly substituting their first variable Second variable's value	M1 A1 M1 A1 4	Allow 1 error, except for the equal coeffs. Either x = -3 OR y = 1/2 FT NB y=4/8 followed by y = 2 is A0 FT *B0 for answers only*

Q	Alternative Autumn 2008. Higher Paper 1	Mark	Comment
11	(a)(i) 1/16 (ii) 1 (b) 7 (c) (i) 4.5×10^4 (ii) 2.3×10^{-3} (d) Explanation 9.8×10^3 (e) 2.3×10^{-2} (f) 7/11 (g)Either improper fraction correct and attempt to multiply (4/3 x 11/4) = 44/12 $=3\ ^2/_3$ (h) 38 (cm)	B1 B1 B1 B1 B1 E1 B1 B2 B1 M1 A1 A1 B1 14	In (c) only SC1 for consistent notation problem Accept "not in standard form" B1 for 2.3×10^n or …. $\times 10^{-2}$ Accept 11/3
12	$10x + 3 < 7 - x$ $x < 4/11$	B1 B1 2	FT until 2nd error. Accept $11x<4$ ISW
13	(a) Method of finding area Any 2 of the areas: 160, 100, 120, 60, 80 520 (pieces of driftwood) (b) 60 (cm)	M1 M1 A1 B1 4	CAO
14	(a) $\boldsymbol{y} - 2\boldsymbol{x}$ (b) $\mathbf{CQ} = \mathbf{CB} + ½\ \mathbf{BA}$ or $-\mathbf{OC} + \boldsymbol{x} + ½\ \mathbf{AB}$ or … $= 5/2\ \boldsymbol{x} - 1/2\boldsymbol{y}$	B1 M1 A1 3	For the vector route. Accept missing brackets.
15	(a) P(YY)=7/11 x 6/10 = 42/110 (b) Use of P(at least one W) = 1 – P(no white) = 1 – 8/11 x 7/10 = 54/110	M1 A1 M1 M1 A1 5	Accept equivalent fraction or decimal F.T. slips from (a), except with replacement errors. Or other **complete** method Or other probabilities for complete method Accept equivalent fraction or decimal **Ignore incorrect cancelling of final answers.**
16	(a) Correct sketch (shift up) Correct sketch with (0, 3) indicated (b) Reflection (in *x*-axis) Correct reflection and (0, -4) indicated	B1 B1 B1 B1 4	Allow for reflection in any horizontal line
17	$(5x - 2)(3x + 1)$ $4x(3x + 1) + 3(5x - 2)$ (= ……) $12x^2 + 4x + 15x - 6$ (=…….) (…….. =) $3(5x - 2)(3x + 1)$ (……. =) $45x^2 – 18x + 15x – 6$ Attempt to form $33x^2 – 22x = 0$ or equivalent $11x(3x – 2) = 0$ or equivalent factorised for x $x = 0$ and $x = 2/3$	B1 B1 B1 B1 B1 M1 M1 A1 8	As multiplying factor or common denominator, implied in working As LHS working or numerator. Allow B1 for one error Brackets above may be implied. As RHS working. Allow B1 for one error. Brackets above may be implied. Allow FT for forming an equation, by correctly collecting like terms, equivalent level of difficulty. FT equivalent level of difficulty only

MATHEMATICS - 2 TIER ALTERNATIVE (PILOT)
PAPER 2 - HIGHER

Q	Alternative Autumn 2008. Higher Paper 2	Mark	Comment
1	1.(a) All points plotted correctly	B2	B1 for at least 3 correct plots Ignore line of best fit, *Penalise joined point to point -1*
	(e) Positive	B1	*Do not accept descriptions.*
	(f) Line of best fit with points above and below	B1	
	(g) Number of visitors from their line of best fit	B1	*No line of best fit, B0*
		5	
2	Two correct points	B2	B1 for one correct point
	Correct straight line drawn	B1	CAO
			SC1 for a straight line with correct gradient of 5or the correct intercept
		3	
3	$2x + 20 + 2x + 3x + 5x + 40$= number	M1	
	$12x = 300$	A1	CAO
	$x = 25$	A1	CAO. Accept x=300/12. Answer only gets SC1 only
		3	
4	(a) 87/150x100	M1	Or alternative complete method
	= 58 (%)	A1	
	(b) 80/100 x 35 + 35	M1	Or alternative complete method, e.g 1.8x35
	28 seen or implied	B1	Maybe implied by correct answer
	(£) 63	A1	FT their 80% of 35 if 35 added AND M1 awarded
	(c) (i) 70.1583371….	B1	CAO. Rounded or truncated to at least 1 decimal place
	(ii) 6.349112…	B1	CAO. Rounded or truncated to at least 1 decimal place
	70.16 AND 6.35	B1	FT their answers rounded to 2 dp <u>from evidence</u>
	(d) Distance / time (67.5 / 4.5)	M1	For 67.5 / "their 4 ½ hours " (Accept 4.3, 270 as 4 ½)
	4 hours 30 minutes correctly expressed as 4.5 or 4 ½	B1	<u>Or 270/60 used</u>
	15 (km/hour)	A1	CAO
		11	
5	Rhombus drawn correctly	B3	Allow <u>+</u>2mm. B2 for triangle of 6, 10 6 or B1 for <u>any</u> two lines one of length 6cm and the other of length 10cm. B1 if idea correct but slightly out of tolerance
		3	
6	Overall strategy, Pythag. & area rect. with triangle	B1	
	19.7 – 13.4 (= 6.3)	B1	
	$8.2^2 = h^2 + (19.7\text{-}13.4)^2$	M1	Correct Pythag. statement, 19.7-13.4 maybe incorrectly evaluated but intention to subtract values is clear.
	$\text{height}^2 = 27.55$	A1	CAO
	height = 5.2(49…)	A1	FT their height^2 only if M1 awarded.
	Complete method to find area	M1	FT their height (not equal to 8.2)
	86.(….cm^2)	A1	CAO.
		7	
7	States Not true	B1	
	Stating both same probability or showing 1/6x1/6 for both	B1	Stating same probability (chance) implies also 1st B1 not true
		2	<u>Ignore incorrect probabilities if statement is correct or implied</u>
8	(a) $x^2 + 4x - 12$	B2	B1 for either x^2 with -12 OR for 4x
	(b) $15x^{12}$	B1	
	(c) $7x^4$	B1	
	(d) $25x^6y^2$	B2	B1 for 2 parts of the product
	(e) 1/5	B1	
	-2	B1	
	(f) $8x = 35$	M1	
	$x = 35/8$ or equivalent (4.375)	A1	Ignore incorrect simplification. x=35/8 gets M1 A1. Accept 4.4 or 4.38
		10	
9	5/19 x 665 OR 6/19 x 665 OR 8/19 x 665	M1	Or sight of 35
	(£)175 OR (£) 210 OR (£)280	A1	
	The other two shares	A1	
		3	
10	(Mass =) 22.3 x 18.4 x 5.21	M1	
	Division by 1000	m1	Depends on award of M1
	2.1(377672 kg)	A1	
		3	
11	Any 3 of the lines	B3	Award B2 for any 2 lines OR B1 for any 1 line drawn or indicated
	y=x+5, y=-x-10, y=2 and x=-1 drawn		
	Correct region indicated	B1	CAO
		4	

12	(a) 2/3, 1/3 and 7/8, 1/8, 7/8, 1/8 correctly placed (b) Considering RB and BR as possibilities 2/3 x 1/8 + 1/3 x 7/8 = 9/24 ISW (=3/8)	B3 B1 M1 A1 6	B2 box pair correct with one bag pair correct OR B1 for any pair (total 1) correct Or values for RB or BR. F.T. their tree if probabilities are between 0 and 1, but not ½
13	$\frac{89.46}{105} \times 100$ = (£) 85.2(0)	M1 B1 A1 3	 For sight of 105 OR 1·05 C.A.O. *3 marks for an unsupported (£)85.2*
14	DB = 26 × sin54º DB = 21·(0344..) (cm) tan BCD = 'their BD'/32 ∠BCD = 33·(3179…^{0})	M2 A1 M1 A2 6	OR M1 for the stage sin54º = DB/26 CAO FT 'their DB' A1 for tan BCD = 0.65732…. or $\tan^{-1}$ 'their BD'/32
15	51^0	B1 1	
16	(a) (i) (2x - 1) (7x - 3) (ii) (9x 4) (9x 4) (9x + 4) (9x – 4) (b) 13f – 7 = 6fg + 12g 13f – 6gf = 12g + 7 f (13 – 6g) = 12g + 7 f = (12g + 7) / (13 – 6g)	B2 M1 A1 B1 B1 B1 B1 8	B1 for (2x … 1)(7x … 3) Expanding bracket Collecting f terms to one side Factorising Dividing by factor *FT stages at equivalent level of difficulty.* *Penalise further incorrect work -1*
17	(a) Use of Pythagoras Theorem $x^2 + (x + 2.1)^2 = 12.3^2$ $x^2 + x^2 + 4.2x + 4.41 = 151.29$ (b) $x = \{ -4.2 \pm \sqrt{(4.2^2 – 4 . 2 . -146.88)} \} / 4$ $= [-4.2 \pm \sqrt{1192.68}] /4$ 7.583799…… (and -9.683799….) PQ = 7.6 (cm) and QR = 9.7 (cm)	B1 M1 A1 M1 A1 A1 B1 7	Brackets maybe omitted Allow one error Context does not require negative solution FT their PQ and PQ+ 2.1 to 1 dp provided M1 awarded Trial & improvement accepted in (b)
18	34 = ½ x 4/3 Π r^3 or equivalent Rearrange for r^3 r = 2.5(3205…. cm) Vol sphere = 4/3 Π $(2x2.5)^3$ = 544 $\pm$2(cm^3)	M1 M1 A1 B1 4	 (r^3 = 16.2338…) FT if sphere not hemisphere for M1 CAO CAO *Or 2 x 2^3 x 34 M3 544 A1*
19	Overall strategy of cos rule then sine rule $DB^2 = 28^2 + 21^2 – 2x28x21x \cos 97$ DB = 36.99…. or 37 BC/ sin 23^0 = DB/ sin 112^0 OR equivalent 15.58855 (… cm) rounded or truncated 15.6 (cm) or 16 cm	B1 M1 A2 M1 A1 A1 7	 A1 for (DB^2)= 1368(.3183….) OR DB = 36 or 36.9 FT candidate's DB Or equivalent Suitable degree of accuracy
20	Mean = 7.6 ($\sum fx^2$ =) 584 **OR** ($\sum fx^2/\sum f$ =) 58.4 $\sqrt{(58.4 – 57.76)}$ OR $\sqrt{\{(584/100 – (76/10)^2\}}$ S.D. = 0.8	B1 B1 M1 A1 4	 Or alternate method FT their mean and "584" if possible.

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MARKING SCHEME

MATHEMATICS - 3 TIER

NOVEMBER 2008

INTRODUCTION

The marking schemes which follow were those used by WJEC for the November 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.

MATHEMATICS - 3 TIER
PAPER 1 - INTERMEDIATE WITH COURSEWORK

2008 Autumn Paper 1 (Non calculator) Intermediate Tier	**Marks**	**POST CONFERENCE MARK SCHEME (10/11/2008) Comments (Page 1)**	
1. (a) 20 30 40 12 18 24	B2	C.A.O. B1 for any 1 correct row OR 2 correct columns.	NOTES Penalise –1 for use of words such as "6 out of 16", "6 in 16" OR "6:16". When fraction and wrong notation seen, DO NOT penalise wrong notation.
(b) 6/16 **I.S.W** Ignore subsequent reductions of fractions	B2 4	F.T. their table B1 for a numerator of 6 in a fraction less than 1 **OR** B1 for the 16.	
2. (a) Correct cuboid (Allow ± 2mm)	B2	If not all correct, then B1 for one of the dimensions being drawn correctly for all of the required sides. Ignore the 'hidden' lines, drawn or not drawn.	
(b) $30 \times 30 \times 30$ $= 27000\ (cm^3)$	M1 A1 4	C.A.O. **SC1 for 120 (cm^3)**	
3. Correct triangle AB=10(cm), BC=9(cm), $A\hat{B}C = 50^\circ$	B3 3	Use the overlay (Allow ± 2mm **and ± 2º**). Ignore their use of A,B,C up to B2. B1 for each correct up to 2marks. As a check, AC should be 8(·1) cm. Use of different scale is MR–1.	
4. (a) (0)·06 (b) 7·62 (c) 144	B1 B1 B2 4	C.A.O. C.A.O. Allow 07·62 B1 for either 16 or 9	
5. (a) $\frac{7}{12} - \frac{4}{12}$ **or** $\frac{7\times3}{12\times3} - \frac{4\times3}{12\times3}$ $= \frac{3}{12}$ $(= \frac{1}{4})$ **OR equivalent**	M1 A1	Changing to a common denominator correctly. Decimal representation is acceptable IF EXACT decimals are used. Thus $0.58\dot{3} - 0.\dot{3} = \cdot25$ gets M1, A1, but ·58(3) – ·3(3) gets M1, A0.	
(b) 5	B1	C.A.O. B0 for 5^3.	
(c) Dividing 8 into 7 = (0)·875 **I.S.W.**	M1 A1 5	Any correct method, e.g. 4/8 = ·5, 2/8 = ·25, 1/8 = ·125 C.A.O. **SC2 for 87·5%, SC1 for 87·5**	
6. (a) 8x (b) x – 4 (c) 11(x – 4) I.S.W.	 B1 B1 B1	Do not penalise extra =x or x= or =n or n= in this question. C.A.O. Ignore subsequent working in parts (a), (b) and (c). C.A.O. Change of letter is penalised –1 once only. F.T. 11 × their (b) if (b) is of the form ax+b. B1 for $11 \times x - 4$ OR $x - 4 \times 11$ in this part. 11x – 4 gets B0.	
(d) 11(x – 4) + 8x 11x – 44 + 8x 19x – 44	B1 B1 B1 6	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. If B3 awarded, then – 1 once only for any inappropriate extra algebra such as 19x = 44 OR x = 44/19.	
7. (a) 4x OR 28 4x = 28 x = 28/4 I.S.W. (=7)	B1 B1 B1	For either 4x or 28 C.A.O. OR $-4x = -28$ <u>in an equation</u> Allow implicit solutions such as $6\times7 - 11 = 17 + 2\times7$	F.T. until 2nd error F.T. until 2nd error
(b) 3x – 21 = 27 3x = 48 OR B2 for x – 7 = 9 x = 48/3 I.S.W. (=16) **Note: $\frac{3x}{3} = \frac{48}{3}$ gets B0** **But $\frac{\cancel{3}x}{\cancel{3}} = \frac{48}{3}$ gets B1**	B1 B1 B1 6	Clearing bracket. Collecting terms Answers only get full marks. Allow embedded solutions such as $3(16 - 7) = 27$	x – 21 = 27 B0 x = 48 B1, B0

2008 Autumn Paper 1 (Non calculator) Intermediate Tier	Marks	POST CONFERENCE MARK SCHEME (10/11/2008) Comments (Page 2)
8. For 200, 3000 and 600 (giving 1000) OR 150, 3000 and 600 (giving 750) OR 100, 3000 and 600 (giving 500) Estimate	M1 A1 2	For reasonable estimates that lead to a simple calculation. (Cancelling /single digit arithmetic). In the range 500 – 1000.
9. **Watch for work on the diagram** **Top parallelogram** **Either ∠ADC = 80 OR ∠BCD = 100** **Lower parallelogram** ∠DCE = (360° – 100° – 135°) x = 125 (°)	 M1 A1 B1 B1 4	 F.T. their angles **OR ∠CDF = 135° – 80** **x = 125 (°) OR any other valid method**
10. (a) 302 ± 2° (b) Their 145° bearing from A Their 243° bearing from B Town C.	B1 M1 M1 A1 4	C.A.O. Do not accept 058°. ± 2° Use overlay. Watch for an unambiguous point on one or both of the correct bearings and award the mark(s). F.T. if at least M1 and 2 intersecting lines. If the correct point C is unambiguously indicated even without the bearing lines then award M1, M1, A1.
11. (a) $\frac{165}{300}\times 100$ = 55 (%) (b) $\frac{14}{2\frac{1}{3}}=14\times\frac{3}{7}$ = = 6 (mph)	M1 A1 M1 B1 A1 5	 C.A.O. SC1 for 55/100. For substituted distance/time. Accept 2·3(3) or 2·2 for this mark For dealing with time correctly. 14/140 gets M1, B1 as does 1 mile in 10 mins C.A.O. 42/7 gets M1,B1,A0. 0·1 (miles per minute) gets M1, B1, A0.
12. (a) 9x = 7(x + 10) + 25 (b) 2x = 95 x = 47·5	B2 B1 B1 4	Award B1 for sight of x+10 OR for 7x + 70 OR 7x+95 in part (a) or (b) **OR 9x and 25 on opposite sides or equivalent.** Follow through their equation, if it is linear AND **of the form ax+b = cx+d where only one of a,b,c and d is 0.** F.T. until second error. For collecting the terms of their equation into the form ax = b, F.T. ax = b (a≠1) x = 47·5 on its own gets the B2 for part (b) only.
13. (a) Idea of ordered pairs plotted. At least 7 plotted correctly, not joined. (b) Positive (correlation). (c) Line of best fit by eye. Line through (61,59) (d) From their line	M1 A1 B1 M1 A1 B1 6	At least 4 points plotted correctly. Within 2mm square. C.A.O. Must have positive gradient, look fit for purpose and have at least 3 points above their line and 3 points below their line. If point not plotted, then the line must pass through the 2mm square 60-62/58-60 **inclusive.** F.T. if their line has a positive gradient. Reading should be exact, if the point is on the grid lines, else it should be read to either side of the 2mm square, if the point is inside a square. **Axes interchanges is marked as correct then MR−1**

2008 Autumn Paper 1 (Non calculator) Intermediate Tier	Marks	POST CONFERENCE MARK SCHEME (10/11/2008) Comments (Page 3)
14. (a)	M1	For a method that produces 2 prime factors from the set {3, 3, 3, 7, 7} before their second error. If their 2nd prime and 2nd error occurs at the same 'level' then allow M1.
3 , 3 , 3 , 7 , 7	A1	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. Ignore prime number requirement for this B mark.
$3^3 \times 7^2$	B1	Use of brackets $(3^3)(7^2)$ OR dot $3^3.7^2$ gets the B1. The inclusion of any 1s as factors, for example, $3^3 \times 7^2 \times 1$ in their index form gets B0.
(b) 3	B1 4	F.T. their (a) if the M1 awarded. **Allow B1 for 3969 OR $3^4 \times 7^2$**
15. (a) Plots	P1	– 1 on 2nd error Within ± ½ a small square.
Curve	C1	
(b) Line y = 6	L1	
x-values	B1 4	F.T. their graph if at least 2 readings
16. (a) Correct image (–4, –1) (0, –3) (1, 2)	B2	B1 for 2 correct vertices. B1 for correct reflection in y = x (0, 3) (–1, –2) (4, 1)
(b) Correct image (1, 2) (1,–1) (3, 1)	B2 4	B1 for 2 correct vertices. B1 for clockwise rotation of 90º about (–1, –2). (3, –1) (3, 2) (5, 1) B1 for anti-clockwise rotation of 90º about (–2, –1). (–5, –1) (–5, –4) (–7, –3) The last point will require extra grid lines.
.		Use overlay
Angle bisector of ∠ADC,	B1	Loci do not have to be accurate as long as the intention is clear.
Line parallel to AB distance 3cm from it.	B1	About 2 cm is required to identify the loci. **Initially ignore extra horizontal lines or extra lines through D. Then if first B2 awarded, extra lines get a penalty of −1. If a region is drawn this may remove the ambiguity and the lines offered will be identified and no penalty invoked.**
Correct region	B1 3	F.T. if their region is similar to the correct one, i.e. uses a line through the angle at D and a line parallel to AB
18. (a) Least = 975	B1	C.A.O.
Greatest = 1025	B1	C.A.O.
(b) Use of 50 × "their greatest volume" = 50 × 1025	M1	F.T. providing 1000 < "their greatest volume" ≤ 1100
= 51250 (cm^3) (= 51·25 litres)	A1	
51·5 (litres) ≤ tank (≤ 52·5 litres)	B1	C.A.O. No need for upper bound. **Note also the correct division arguments: 51·5/1·025 gets M1, and evaluated as 50·2(4) gets the A1. The 51·5 gets the B1 OR 51·5/50 gets M1 and 1·03 gets the A1.**
50 of the largest jugs will always fit into the tank because 51·25 is < minimum tank (51·5 litres).	E2 7	E1 for an explanation that only uses 52 litres for the tank and states that it is always possible.
19. (a) $20c^9d^5$	B2	B1 for $20c^9d^k$ OR $20c^nd^5$ OR kc^9d^5 Ignore any extra × signs.
(b) 2a(3b – a)	B2 4	B1 for a(6b – 2a) OR 2(3ab – a^2)

2008 Autumn Paper 1 (Non calculator) Intermediate Tier	Marks	POST CONFERENCE MARK SCHEME (10/11/2008) Comments (Page 4)
20. $4x \geq -22$ **OR equivalent**	B2	B1 for each side provided there is a correct inequality sign. F.T. until 2nd error.
$x \geq -22/4$ (I.S.W.) (–5·5)	B1	F.T. equivalent difficulty if B1 has been awarded. 0 marks if they only use = sign. **Condone use of the > sign.**
	3	
21. 1 3 1 2	B2	For all 4 correct. B1 for any 3 correct.
	2	
22.		Must clear fractions by a valid method
$2(4x-1)-(2x+7) = \frac{5}{2}\times 6$	M1	For handling 2 of the 3 terms correctly For the Ms, 2x+ 7 is acceptable, but the first A mark is A0.
$8x-2-2x-7 = 15$	M1	For handling all 3 terms correctly
$6x = 24$	A1	Collecting terms. F.T. until 2nd error if at least M1 awarded
$x = 24/6$ I.S.W. (= 4)	A1	Unsupported answer of x = 4 gets all 4 marks.
	4	
23. (a) $\frac{\text{largest}}{\text{largest}} = \frac{18}{12} = (1{\cdot}5)$	B2	B1 for finding any 2 corresponding ratios
$\frac{\text{middle}}{\text{middle}} = \frac{15}{10} = (1{\cdot}5)$		B2 for 'The triangles have been multiplied by 3/2 OR 2/3' OR 'the scale factor is 3/2 OR 2/3', etc OR 'both cancel to 3:5:6' – must be all 3 correct values.
$\frac{\text{smallest}}{\text{smallest}} = \frac{9}{6} = (1{\cdot}5)$		
(All same ratio, therefore similar triangles)		
(b) For example, $\frac{QR}{10} = \frac{15}{12}$	M1	Any correct equation with only QR unknown
RQ = 12·5 (cm)	A1	C.A.O.
	4	
24. (a) $\frac{3}{5}$ and $\frac{2}{5}$ on the first branch	B1	C.A.O.
$\frac{2}{9}$ and $\frac{7}{9}$ on the second branches	B1	C.A.O. Accept only on one branch provided the other branch is empty.
(b) $\frac{2}{5}\times\frac{7}{9}$	M1	F.T. their tree if probabilities are between 0 and 1 exclusive and NOT all ½.
$= \frac{14}{45}$	A1	
	4	

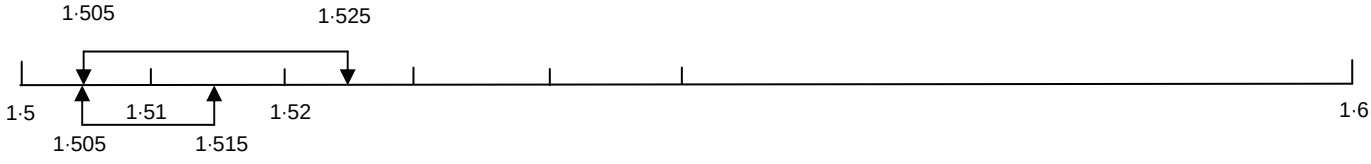
MATHEMATICS - 3 TIER
PAPER 2 - INTERMEDIATE WITH COURSEWORK

2008 Autumn Paper 2 (Calculator allowed) Intermediate Tier	Marks	POST CONFERENCE MARK SCHEME (15/11/2008) Comments (Page 1)
1. (a) (£)24·10 – (£)5·20 = (£)18·9(0) (£)18·9(0) ÷ (£)3·15(0) = 6 7 days	M1 A1 B1	For the complete method that leads to the number of additional days. F.T. 'their 6'+1. Allow '6 additional days' Must be a whole number of days, **and rounded up if needed.**
(b) $\frac{26}{100} \times 79$ = 20·54 I.S.W.	M1 A1 5	Allow M1 for methods such as 10% = 7·9 20% = 15·8, 5% = 3·95 etc as long as there is C.A.O. enough correct work to convince that they Allow 20·54% understand percentages and are finding 26% by a proper method of partitioning.
2. Correct image (Allow ± 2mm)	B2 2	If not all correct, then B1 for three correct vertices. Use of a different scale factor should be marked then MR–1
3. (a) x = 180 – 65 – 65 = 50	M1 A1	C.A.O.
(b) y = 360 – 90 – 72 – 116 = 82	M1 A1 4	C.A.O.
4. (a) 3 –11 (b) (x =) 36 (c) 6a – 10b (d) –5	 B1 B1 B1 **B2** B2 7	Do not penalise extra =x or x= or =n or n= in this question. F.T. 'their 3' – 14 provided their answer is negative. C.A.O. **Allow embedded solutions, 36/4 = 9** **B1 for either term.** If B2 awarded, then – 1 once only for any inappropriate extra algebra, e.g. 6a – 10b = –4ab gets B2 then –1. B1 for the 16 OR the –21 **16d – 21e gets B0**
5. (a) Euros = 800 × 1·49 = (€) 1192	M1 A1	C.A.O.
(b) Present = 96·85/1·49 = (£) 65	M1 A1 4	C.A.O.
6. (a) 25 (%) OR ¼	B1	
(b) You cannot tell from the pie charts because you would need to know the number of boys and number of girls. OR You can tell from the pie charts if the number of boys and girls were equal OR 1/3 of the boys was more than about 2/3 of the girls.	B2 OR B2 3	Along these lines OR Along these lines
7. (a) x(x – 2)	B1	C.A.O.
(b) 6x + 18 **I.S.W.**	B1	C.A.O.
(c) $\frac{n+5}{7}$ OR (n+5)/7 **OR n+5/7**	B2	C.A.O. **B1 for n + 5 ÷ 7**
(d) –1 95	B1 B1 6	SC1 for $2^2 – 5$ AND $10^2 – 5$ **OR Equivalent**

2008 Autumn Paper 2 (Calculator allowed) Intermediate Tier	Marks	POST CONFERENCE MARK SCHEME (15/11/2008) Comments (Page 2)
8. Cost of units used = $2508 \times 10{\cdot}25$	M1	For their difference of meter readings × 10·25 OR for (£)754·605 – (£)497·535 in pence or in £.
= (£)257·07 OR 25707 **(p)**	A1	C.A.O. **Division of the units by 10·25 gets M0, A0 then F.T.**
Services = (£) 14·44(4) OR 1444(·4) (p)	B1	C.A.O.
VAT = 5/100× (£) 271·51**(4)** OR 5/100 × (£)257·07	B1	**F.T. correct VAT on cost of units with or without service charge.**
Total = £285·08, £285·09	B1	(£)13·57(57) OR (£) 13·58 OR (£) 12.85 (35) **OR in pence F.T. 105% of their (£)271.51.** If the 14·44 is added at this stage then B0.
	5	Their final answer must be presented in 2 d.p. with £ sign.
9. $\frac{38}{100} \times 570$ AND £570 + their answer	M1	Complete method. Need to show a correct process for finding 38% AND adding it to £570.
(£)216·6(0)	B1	For sight of (£)216·6
(£)786·6(0)	A1	F.T. their 38% if M1 awarded.
OR	**OR**	
$\frac{138 \times 570}{100}$	M1	Need to show a correct process for finding 138%
	B1	For sight of the 138
(£) 786·6(0)	A1	C.A.O.
	3	
10. (a) Area = $\pi \times 6{\cdot}3^2$	M1	
= 124·6(898124) (cm^2) OR 125	A1	Allow 124·6 – 124·8 OR 125
(b) Perimeter = $2 \times \pi \times 6{\cdot}3$ OR $\pi \times 12{\cdot}6$	M1	
= 39·5(8406) (cm) OR 40	A1	Allow 39·5 – 39·6 Perimeter in (a) and Area in (b) get 0 marks.
	A1	For whole number OR 1 dec. pl. answers in EITHER (a) or (b) provided the corresponding M1 has been awarded.
	5	
11. Trapezium = ½(45·6+32·4) × 7·2	M1	Must have the brackets
= 280·8	A1	C.A.O. Allow 281
cm^2	U1	For the cm^2 (independent)
	3	
12. 35000.00	B1	For the evaluation of a correct 18%.
6300.00	M1	Alternatively they may get the B1 for (£)18900.
28700.00		For the overall method (3 stages of subtracting different 'bone fide' 18%).
5166.00 OR		
23534.00 $35000(0{\cdot}82)^3$ M1 ←		For any correct alternative method.
4236.12 19297(·88) A2 ←		
19297(·88)	A1	C.A.O. for amount.
		OR for the correct 3 depreciations.
Value = (£) 19300	A1	F.T. rounding nearest £100 only if M awarded.
		Candidates using appreciation: Allow SC1 (as well as the B1) for seeing the amount of (£)57506(·12) OR 57500 OR (£)22506 OR (£)22500 OR Allow SC1 for $35000(1 + {\cdot}18)^3$
		If 2 years used, then mark it as if correct, then MR–1 provided A or B marks have been awarded.
	4	If 4 years used, then mark up to 3 years and ignore subsequent working. (Maximum of 3 marks)
13. 27 – 6x = 83 – 13x	B1	Clearing bracket F.T. until 2nd error
7x = 56	B1	Collecting terms
x = 56/7 I.S.W. (= 8)	B1	Answers only get full marks. Ignore incorrect subsequent working, e.g. 56/7 = 9
	3	

2008 Autumn Paper 2 (Calculator allowed) Intermediate Tier	Marks	POST CONFERENCE MARK SCHEME (15/11/2008) Comments (Page 3)
14. (a) Suitable axes, with uniform scales (not necessarily labelled)	B1	Must be numbers only. Use of $10 \le t < 15$ etc gets 0. 'Reverses' axes should be marked without penalty.
Rectangles of equal width, with no gaps between them, with feet at 0, 5, 10, …. Correct heights **B0 if only a polygon given. If bars merit B2, then −1 if a polygon or curve is superimposed on the bars.**	B2	If there is no scale on the time axis, mark as if there was a scale, if the rectangles are drawn with vertical sides on consecutive 2cm OR 1cm grid lines. Must be bars, but allow any constant width. B1 for one error in the heights OR for equal width bars with all heights correct, but with a constant gap between the bars. OR for completely correct bars if translated horizontally.
(b) Mid-points at 2·5, 7·5, 12·5, 17·5, 22·5, 27·5	B1	If all the mid-points are equal then 0 marks. For the correct mid-points seen. (Look at their table also). (All mid-points must be correct)
fx **90** **435** **325** **315** **225** **55** 36×2·5 + 58×7·5 + 26×12·5 etc (OR 1445)	B1	The correct value of the sum of their fx terms. ('Their 1445')
$\frac{36\times2\cdot5 + 58\times7\cdot5 + 26\times12\cdot5 \text{ etc}}{150}$ (OR 1445)	M1	For the sum of the 6 fx terms divided by 150.
	A1	F.T. INCORRECT MID-POINTS, and/or incorrect evaluation of 'their 1445', but ONLY IF THEY USE 6 f.x TERMS AND DIVIDE IT BY 150.
= 9·6(33)	7	UNSUPPORTED 9·6(33) GETS 4 MARKS.
15. $BC^2 = 90^2 - 65^2$ (3875)	M1	Correct substituted Pythagoras
BC = 62·2(494) **OR 62**	A1	C.A.O. Ignore incorrect writing of their process if their answers are correct.
Perimeter = 130 + 2BC	M1	F.T. their BC if M1 awarded in (a) **OR F.T. if BC = 111(.02) Correct F.T. answer is 352(·04)**
= 254·4(989) OR 254·5 **OR 254**	A1 4	OR F.T. their BC **for SC1 only**, if M NOT awarded in (a).
16. (a) Area of parallelogram = 10·6 × 8·2 = 86·92	M1 A1	
Volume (= area × 15·7) = 1364(·644) **OR 1365**	B1	F.T. their area
(b) Density = $\frac{10\cdot5 \times 1000}{\text{volume}}$	M1	For 10·5/ their volume
	B1	For correct use of 1000 **(with the 10·5)**
= 7·69 (431) OR 7·7	A1 6	F.T. 'their volume'.
17. One correct (see note on the right for def^n.) evaluation of $x^3 + 3x - 8$ for an x satisfying: $1\cdot5 \le x \le 1\cdot6$ **Watch for pupils who are trying to make x^3+3x equal to 8 rather than $x^3 + 3x - 8$ equal to 0.**	B1	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. If no calculations are given, accept use of "too low" or "too high" OR >0 and <0.
Two correct (see note on the right for def^n.) evaluations of $x^3 + 3x - 8$ for an x satisfying: $1\cdot505 \le x < 1\cdot525$ which give opposite signs for f(x).	B1	
Two correct (OR F.T.) evaluations (1 sig. fig.) $1\cdot505 \le x \le 1\cdot515$ which give opposite signs for f(x).	M1	
Thus solution is 1·51 correct to 2 decimal place. Candidates must give a method that proves that the solution is 1·51 correct to 2 decimal places.	A1 4	

x	x^3+3x-8	x	x^3+3x-8	x	x^3+3x-8
1·5	–0.1250	1.51	–0.0270	1.505	–0.0761
1·51	–0.0270	1.511	–0.0172	1.506	–0.0663
1·52	0.0718	1.512	–0.0074	1.507	–0.0565
1·53	0.1716	1.513	0.0025	1.508	–0.0467
1·54	0.2723	1.514	0.0124	1.509	–0.0369
1·55	0.3739	1.515	0.0223		
1·56	0.4764	1.516	0.0322		
1·57	0.5799	1.517	0.0421		
1·58	0.6843	1.518	0.0520		
1·59	0.7897	1.519	0.0619		
1·6	0.8960	1.52	0.0718		



2008 Autumn Paper 2 (Calculator allowed) Intermediate Tier	Marks	POST CONFERENCE MARK SCHEME (15/11/2008) Comments (Page 4)	
18. Correctly setting up two equations for eliminating one variable, i.e. coeffs. of one variable have the same absolute value.	M1	Allow <u>one error</u> in calculating the 4 coefficients, which do not involve the variable being eliminated.	Substitution method M1 for correctly substituting for one variable into the other equation, then A1 for the correct answer.
First variable's value.	A1	C.A.O. Either x = –4 OR y = 3·5	
Correctly substituting their first variable	M1	F.T.	
Second variable's value	A1	F.T.	
	4	If ONLY both answers of x = –4 AND y = 3·5 THEN B4	
19. (a) **3(·034)** $\times 10^{-10}$	B2	C.A.O. B1 for $30{\cdot}34 \times 10^{-11}$ <u>OR EQUIV.</u>	Accept numbers given to 1 decimal place throughout. Penalise –1, once only for consistent use of incorrect notation, e.g. $3{\cdot}034^{-10}$
(b) $6{\cdot}5 \times 10^{-5}$	B2	C.A.O. B1 for $\cdot 65 \times 10^{-4}$ <u>OR EQUIV.</u>	
	4		
20. (a) $x^2 - 24$	B1	B2 only if written as a trinomial, $x^2 + 2x - 24$ (any order)	
$+ 2x$ <u>(Ignore =0)</u>	B1	If B2 then penalise –1 once only for any subsequent inappropriate work such as using equations.	
(b) $2c - t = 20 - 4c$	B1	Clearing the bracket F.T. until second error	
$6c = 20 + t$	B1	**<u>For isolating and collecting the terms in c,</u>**	
$c = \frac{20 + t}{6}$	B1	**<u>F.T. c = 'their 20 + t'/a (provided a ≠ 1)</u>**	
(c) $(x - 2)(x - 3)$	B2	B1 for $(x + 2)(x + 3)$	
	7		
21. (a) Inter-quartile = reading at 225 – reading at 75	M1		
= 37 to 41	A1	Accept any reading in the range (71 to 73) – (32 to 34) and therefore answers in the range 37 to 41. **<u>Allow consistent misread of the 'Time' scale for the M mark. For example, 66 – 26 = 40 OR 66 – 27 =39 get M1, A0 However unsupported 39 or 40 get M1, A1.</u>**	
(b) 300 – reading at 90 (300 – 265)	M1		
= 35	A1	Accept any reading for 265 in the range 260 – 270 and therefore answers in the range 30 – 40 <u>(whole numbers only). All ranges are inclusive).</u>	
	4		
22. AD = $16 \times \sin 56^\circ$	M2	Correct substituted sin ratio. M1 for $\sin 56^\circ$ = AD/16	
AD = 13·2(646) OR 13·3 (cm) **<u>OR 13</u>**	A1	C.A.O.	
EC = (23 – 13·2(646)) = 9·735	B1	**<u>F.T. 'their AD'.</u>**	
tan x = 9·735/15 (= 0·649026)	M1	Correct substituted tan ratio, **<u>based on their AD and/or EC</u>**	
∠CBF = 32·98 OR 33	A1	F.T. 'their AD'. **<u>PA−1 will apply if, e.g. , AD=13 is used (answer =33·67)</u>**	
	6		

MATHEMATICS - 3 TIER
PAPER 1 - HIGHER WITH COURSEWORK

Higher Tier GCSE Mathematics **Paper 1 Autumn 2008**	**Mark**	**Comments**
1. (a) $9x = 7(x + 10) + 25$	B2	Award B1 for sight of x+10 OR for 7x + 70 OR 7x+95 in part (a) or (b) **OR 9x and 25 on opposite sides or equivalent.**
(b)		Follow through their equation, if it is linear AND **of the form ax+b = cx+d where only one of a,b,c and d is 0.** F.T. until second error.
$2x = 95$	B1	For collecting the terms of their equation into the form ax = b,
$x = 47{\cdot}5$	B1 4	F.T. ax = b (a≠1) x = 47·5 on its own gets the B2 for part (b) only.
2. (a) Line of best fit by eye.	M1	Must have positive gradient, look fit for purpose and have at least 3 points above their line and 3 points below their line.
Line through (61,59)	A1	If point not plotted, then the line must pass through the 2mm square 60-62/58-60 **inclusive.**
(b) From their line	B1 3	F.T. if their line has a positive gradient. Reading should be exact, if the point is on the grid lines, else it should be read to either side of the 2mm square, if the point is inside a square. **Axes interchanges is marked as correct then MR−1**
3. (a)	M1	For a method that produces 2 prime factors from the set {3, 3, 3, 7, 7} before their second error. If their 2nd prime and 2nd error occurs at the same 'level' then allow M1.
3 , 3 , 3 , 7 , 7	A1	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. Ignore prime number requirement for this B mark.
$3^3 \times 7^2$	B1	Use of brackets $(3^3)(7^2)$ OR dot $3^3.7^2$ gets the B1. The inclusion of any 1s as factors, for example, $3^3 \times 7^2 \times 1$ in their index form gets B0.
(b) 3	B1 4	F.T. their (a) if the M1 awarded. **Allow B1 for 3969 OR $3^4 \times 7^2$**
4. (a) Plots	P1	– 1 on 2nd error Within ± ½ a small square.
Curve	C1	
(b) Line y = 6	L1	
x-values	B1 4	F.T. their graph if at least 2 readings
5. (a) Correct image (–4, –1) (0, –3) (1, 2)	B2	B1 for 2 correct vertices. B1 for correct reflection in y = x (0, 3) (–1, –2) (4, 1)
(b) Correct image (1, 2) (1,–1) (3, 1)	B2 4	B1 for 2 correct vertices. B1 for clockwise rotation of 90º about (–1, –2). (3, –1) (3, 2) (5, 1) B1 for anti-clockwise rotation of 90º about (–2, –1). (–5, –1) (–5, –4) (–7, –3) The last point will require extra grid lines.
6. Angle bisector of ∠ADC, Line parallel to AB distance **3cm** from it. Correct region	**B1** **B1** B1 3	Use overlay Loci do not have to be accurate as long as the intention is clear. About 2 cm is required to identify the loci. F.T. if their region is similar to the correct one, i.e. uses a line through the angle at D and a line parallel to AB. Ignore extra lines.

Higher Tier GCSE Mathematics **Paper 1 Autumn 2008**	**Mark**	**Comments**
7. (a) Least = 975 Greatest = 1025	B1 B1	C.A.O. C.A.O.
(b) Use of 50 × "their greatest volume" = 50 × 1025 = 51250 (cm^3) (= 51·25 litres) 51·5 (litres) ≤ tank (≤ 52·5 litres)	M1 A1 B1	F.T. providing 1000 < "their greatest volume" ≤ 1100 C.A.O. No need for upper bound. **Note also the correct division arguments:** **51·5/1·025 gets M1, and evaluated as 50·2(4) gets the A1.** **The 51·5 gets the B1** **OR 51·5/50 gets M1 and 1·03 gets the A1.**
50 of the largest jugs will always fit into the tank because 51·25 is < minimum tank (51·5 litres).	E2 7	E1 for an explanation that only uses 52 litres for the tank and states that it is always possible.
8. (a) $20c^9d^5$	B2	B1 for $20c^9d^k$ OR $20c^nd^5$ OR kc^9d^5 Ignore any extra × signs.
(b) $2a(3b - a)$	B2 4	B1 for $a(6b - 2a)$ OR $2(3ab - a^2)$
9. $4x \geq -22$ **OR equivalent** $x \geq -22/4$ (I.S.W.) (–5·5)	B2 B1 3	B1 for each side provided there is a correct inequality sign. F.T. until 2nd error. F.T. equivalent difficulty if B1 has been awarded. 0 marks if they only use = sign. **Condone use of the > sign.**
10. 1 3 1 2	B2 2	For all 4 correct. B1 for any 3 correct.
11. $2(4x - 1) - (2x + 7) = \frac{5}{2} \times 6$ $8x - 2 - 2x - 7 = 15$ $6x = 24$ $x = 24/6$ I.S.W. (= 4)	 M1 M1 A1 A1 4	Must clear fractions by a valid method For handling 2 of the 3 terms correctly For the Ms, 2x+ 7 is acceptable, but the first A mark is A0. For handling all 3 terms correctly Collecting terms. F.T. until 2nd error if at least M1 awarded Unsupported answer of x = 4 gets all 4 marks.
12. (a) $\frac{\text{largest}}{\text{largest}} = \frac{18}{12} = (1{\cdot}5)$ $\frac{\text{middle}}{\text{middle}} = \frac{15}{10} = (1{\cdot}5)$ $\frac{\text{smallest}}{\text{smallest}} = \frac{9}{6} = (1{\cdot}5)$ (All same ratio, therefore similar triangles) (b) For example, $\frac{QR}{10} = \frac{15}{12}$ RQ = 12·5 (cm)	B2 M1 A1 4	B1 for finding any 2 corresponding ratios B2 for 'The triangles have been multiplied by 3/2 OR 2/3' OR 'the scale factor is 3/2 OR 2/3', etc OR 'both cancel to 3:5:6' – must be all 3 correct values. Any correct equation with only QR unknown C.A.O.
13. (a) $\frac{3}{5}$ and $\frac{2}{5}$ on the first branch $\frac{2}{9}$ and $\frac{7}{9}$ on the second branches (b) $\frac{2}{5} \times \frac{7}{9}$ $= \frac{14}{45}$	B1 B1 M1 A1 4	C.A.O. C.A.O. Accept only on one branch provided the other branch is empty. F.T. their tree if probabilities are between 0 and 1 exclusive and NOT all ½.

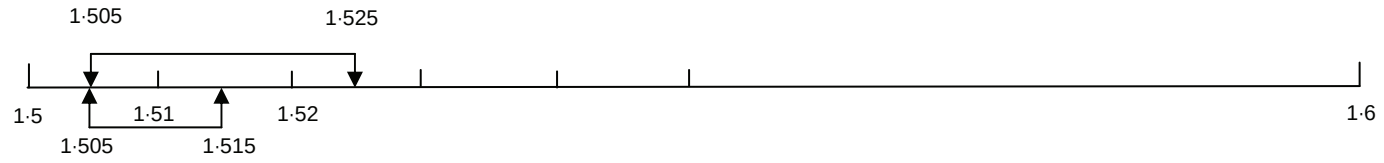
Higher Tier GCSE Mathematics **Paper 1 Autumn 2008**	**Mark**	**Comments**
14. (a) $(3x + 1)(7x – 1)$ $x = -1/3$ and $1/7$ (b) (i) $(7x + 8)(7x – 8)$ (ii) $7x + 8$	B2 B1 B2 B1 6	B1 for $(3x \quad 1)(7x \quad 1)$ FT their pair of brackets B1 for $(7x….8)(7x….8)$ FT if possible
15. (Area) scale factor 16/100 (or equivalent) Length scale factor 4/10 or $\sqrt{16}$ / $\sqrt{100}$ 5 (cm)	M1 M1 A1 3	 SC1 for relevant sight of 4 and 10 or $\sqrt{16}$ and $\sqrt{100}$ CAO
16. (a) (i) Correct transformation, more steep (ii) Correct transformation, shift vertically down -1 marked on y axis (b) Shift to right 1 marked on x axis	B1 B1 B1 B1 B1 5	 Accept transformation of either their sketch or initial sketch SC1 for shift left with -5 marked on the x axis
17. (a) 220^0 Explanation or calculations (b) 52^0 Explanation or calculations	B1 E1 B1 E1 4	NB 220^0 with twice angle circumference is correct Cyclic quad and angle centre. Allow SC1 for 140^0 Alternate segment, cyclic quad and triangle
18. $f (7 – 3e) = e (5 + g)$ $7f – 3ef = 5e + eg$ $5e + 3ef + eg = 7f$ $e (5 + 3f + g) = 7f$ $e = 7f / (5 + 3f + g)$	B1 B1 B1 B1 B1 5	Multiplication Expand brackets Collect e terms Factorise Division *FT for equivalent stages and level of difficulty*
19. (a) 9 (b) Use of the y values 9, 10 and their 9 Use of trapezium rule or idea of sum areas 23.5	B1 M1 M1 A1 4	 Or other suitable strips For 3 strips CAO
20. (a) $4\mathbf{a} - 8\mathbf{b}$ (b) $\frac{1}{2}$ **LN** - **ON** $(= 2\mathbf{a} - 4\mathbf{b} + 4\mathbf{a} + 16\mathbf{b})$ OR - $\frac{1}{2}$ **LN** - **OL** $(=-2\mathbf{a} + 4\mathbf{b} + 8\mathbf{a} + 8\mathbf{b}$ $= 6\mathbf{a} + 12\mathbf{b}$ (c) Showing $k = 2/3$ (d) Collinear or parallel PO is 2/3 x length OM or OM = 1.5 x PO	B2 M1 A1 B1 B1 B1 7	B1 for correct unsimplified form, $8\mathbf{a}+8\mathbf{b}-4\mathbf{a}-16\mathbf{b}$ Intention clear Must be simplified form
21. $(n-3)(n+2)$ as a denominator $n(n+2) – n(n-3)$ as a numerator $5n / (n-3)(n+2)$	M1 M1 A1 3	 FT if M1 mark awarded. Penalise further incorrect work-1 If no marks SC1 for 5n
22. (a) 2 (b) $3\sqrt{6}$ (c) $2 + 2\sqrt{2}\sqrt{6} + 6$ or $2 + \sqrt{2}\sqrt{6} + \sqrt{2}\sqrt{6} + 6$ $= 8 + 4\sqrt{3}$	B1 B1 M1 A1 4	 Needs to express $\sqrt{36}$ as 6
23. (a) $3a^5(a+1)^{-4}$ Penalise further incorrect work - 1 (b) $4x^2 + 6xy + 6xy + 9y^2 – 9y^2$ as a numerator $2x + 6y$ or $2(x+3y)$	B3 B1 B1 5	B2 either or both index left as fraction, B1 one correct index in fraction form or otherwise.
24. (a) Always odd Explanation (b) Sometimes even, sometimes odd Explanation	B1 E1 B1 E1 4	 If no E marks awarded allow SC1 for substitution for (a) and (b)

MATHEMATICS - 3 TIER
PAPER 2 - HIGHER WITH COURSEWORK

Paper 2 Higher Tier Autumn 2008	**Mark**	**Comments**
1. 35000.00 6300.00 28700.00 5166.00 OR 23534.00 $35000(0{\cdot}82)^3$ M1 ← 4236.12 $19297(\cdot 88)$ A2 ← $19297(\cdot 88)$ Value = (£) 19300	B1 M1 A1 A1 4	For the evaluation of a correct 18%. Alternatively they may get the B1 for (£)18900. For the overall method (3 stages of subtracting <u>different</u> 'bone fide' 18%). For any correct alternative method. C.A.O. for amount. OR for the correct 3 depreciations. F.T. rounding nearest £100 only if M awarded. Candidates using appreciation: Allow SC1 (as well as the B1) for seeing the amount of (£)57506(·12) OR 57500 OR (£)22506 OR (£)22500 OR Allow SC1 for $35000(1 + \cdot 18)^3$ If 2 years used, then mark it as if correct, then MR–1 provided A or B marks have been awarded. If 4 years used, then mark up to 3 years and ignore subsequent working. (Maximum of 3 marks)
2. $27 - 6x = 83 - 13x$ $7x = 56$ $x = 56/7$ <u>I.S.W.</u> (= 8)	B1 B1 B1 3	Clearing bracket F.T. until 2nd error Collecting terms Answers only get full marks. Ignore incorrect subsequent working, e.g. 56/7 = 9
3. Mid-points at 2·5, 7·5, 12·5, 17·5, 22·5, 27·5 **fx** **90** **435** **325** **315** **225** **55** $36\times2{\cdot}5 + 58\times7{\cdot}5 + 26\times12{\cdot}5$ etc (OR 1445) $\frac{36\times2{\cdot}5 + 58\times7{\cdot}5 + 26\times12{\cdot}5 \text{ etc}}{150}$ (OR 1445) = 9·6(33)	B1 B1 M1 A1 4	If all the mid-points are equal then 0 marks. For the correct mid-points seen. (Look at their table also). (All mid-points must be correct) The correct value of the sum of their fx terms. ('Their 1445') For the sum of the 6 fx terms divided by 150. F.T. INCORRECT MID-POINTS, and/or incorrect evaluation of 'their 1445', but ONLY IF THEY USE 6 f.x TERMS AND DIVIDE IT BY 150. UNSUPPORTED 9·6(33) GETS 4 MARKS.
4. $BC^2 = 90^2 - 65^2$ (3875) BC = 62·2(494) **<u>OR 62</u>** Perimeter = 130 + 2BC = 254·4(989) OR 254·5 **<u>OR 254</u>**	M1 A1 M1 A1 4	Correct substituted Pythagoras C.A.O. Ignore incorrect writing of their process if their answers are correct. F.T. their BC if M1 awarded in (a) **<u>OR F.T. if BC = 111(.02)</u>** **<u>Correct F.T. answer is 352(·04)</u>** OR F.T. their BC **<u>for SC1 only</u>**, if M NOT awarded in (a).
5. (a) Area of parallelogram = 10·6 × 8·2 = 86·92 Volume (= area × 15·7) = 1364(·644) **<u>OR 1365</u>** (b) Density = $\frac{10{\cdot}5 \times 1000}{\text{volume}}$ = 7·69 (431) OR 7·7	M1 A1 B1 M1 B1 A1 6	 F.T. their area For 10·5/ their volume For correct use of 1000 **<u>(with the 10·5)</u>** F.T. 'their volume'.

Paper 2 Higher Tier Autumn 2008	Mark	Comments
6. One correct (see note on the right for def^{n}.) evaluation of $x^3 + 3x - 8$ for an x satisfying: $1{\cdot}5 \le x \le 1{\cdot}6$ **Watch for pupils who are trying to make x^3+3x equal to 8 rather than $x^3 + 3x - 8$ equal to 0.**	B1	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. If no calculations are given, accept use of "too low" or "too high" OR >0 and <0.
Two correct (see note on the right for def^{n}.) evaluations of $x^3 + 3x - 8$ for an x satisfying: $1{\cdot}505 \le x < 1{\cdot}525$ which give opposite signs for f(x).	B1	
Two correct (OR F.T.) evaluations (1 sig. fig.) $1{\cdot}505 \le x \le 1{\cdot}515$ which give opposite signs for f(x).	M1	
Thus solution is 1·51 correct to 2 decimal place. Candidates must give a method that proves that the solution is 1·51 correct to 2 decimal places.	A1 4	

x	x^3+3x-8	x	x^3+3x-8	x	x^3+3x-8
1·5	–0.1250	1.51	–0.0270	1.505	–0.0761
1·51	–0.0270	1.511	–0.0172	1.506	–0.0663
1·52	0.0718	1.512	–0.0074	1.507	–0.0565
1·53	0.1716	1.513	0.0025	1.508	–0.0467
1·54	0.2723	1.514	0.0124	1.509	–0.0369
1·55	0.3739	1.515	0.0223		
1·56	0.4764	1.516	0.0322		
1·57	0.5799	1.517	0.0421		
1·58	0.6843	1.518	0.0520		
1·59	0.7897	1.519	0.0619		
1·6	0.8960	1.52	0.0718		



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 = –4 OR y = 3·5 F.T. F.T. If ONLY both answers of x = –4 AND y = 3·5 THEN B4	Substitution method M1 for correctly substituting for one variable into the other equation, then A1 for the correct answer.
8. (a) **<u>3(·034)</u>** $\times 10^{-10}$ (b) $6{\cdot}5 \times 10^{-5}$	B2 B2 4	C.A.O. B1 for $30{\cdot}34 \times 10^{-11}$ <u>OR EQUIV.</u> C.A.O. B1 for $\cdot 65 \times 10^{-4}$ <u>OR EQUIV.</u>	Accept numbers given to 1 decimal place throughout. Penalise –1, once only for consistent use of incorrect notation, e.g. $3{\cdot}034^{-10}$
9. (a) $x^2 - 24$ $+ 2x$ <u>(Ignore =0)</u> (b) $2c - t = 20 - 4c$ $6c = 20 + t$ $c = \frac{20 + t}{6}$ (c) $(x - 2)(x - 3)$	B1 B1 B1 B1 B1 B2 7	B2 only if written as a trinomial, $x^2 + 2x - 24$ (any order) If B2 then penalise –1 once only for any subsequent inappropriate work such as using equations. Clearing the bracket error **<u>For isolating and collecting the terms in c,</u>** **<u>F.T. c = 'their 20 + t'/a (provided a ≠ 1)</u>** B1 for $(x + 2)(x + 3)$	F.T. until second

Paper 2 Higher Tier Autumn 2008	Mark	Comments
10. (a) Inter-quartile = reading at 225 – reading at 75 = 37 to 41	M1 A1	Accept any reading in the range (71 to 73) – (32 to 34) and therefore answers in the range 37 to 41. **Allow consistent misread of the 'Time' scale for the M mark. For example, 66 – 26 = 40 OR 66 – 27 =39 get M1, A0 However unsupported 39 or 40 get M1, A1.**
(b) 300 – reading at 90 (300 – 265) = 35	M1 A1 4	Accept any reading for 265 in the range 260 – 270 and therefore answers in the range 30 – 40 (whole numbers only). All ranges are inclusive).
11. AD = 16 × sin56º AD = 13·2(646) OR 13·3 (cm) **OR 13** EC = (23 – 13·2(646)) = 9·735 tan x = 9·735/15 (= 0·649026) ∠CBF = 32·98 OR 33	M2 A1 B1 M1 A1 6	Correct substituted sin ratio. M1 for sin56º = AD/16 C.A.O. **F.T. 'their AD'.** Correct substituted tan ratio, **based on their AD and/or EC** F.T. 'their AD'. **PA−1 will apply if, e.g. , AD=13 is used (answer =33·67)**
12. (a) Vol = $3x^2(x+7)$ $3x^3 + 21x^2 = 3x^3 + 2x + 1$ (b) $x = (2 \pm \sqrt{\{(-2)^2 – 4x21x-1\}}) / 2 \times 21$ $= (2 \pm \sqrt{88})/42$ 0.27 (and -0.18) (c) 1.6 (cm^3)	M1 A1 M1 A1 A1 B1 6	Allow 1 slip in substitution FT their x only if M1 in (b)
13. Overall strategy $\prod r^2 = 380$ r = 10.998….. 72/360 x 2 x ∏ x r arc AB = 13.8(2… cm)	B1 M1 A1 M1 A1 5	Maybe in different sections of working FT their r
14. (a) y α 1/x OR y = k/x 3 = k/2 y = 6/x (b) x: -1, 2, **60** y: **-6**, 3, 0.1	B1 M1 A1 B2 5	FT non linear only Maybe implied in part (b) FT their non linear expression B1 for each value, do not accept 6/-1 for -6
15. x = 0.8232323… and 100x=82.323.. 815/990	M1 A1 2	Or 10x and 1000x, or equivalent 81.5/99 gains M1 only
16. (a) P(www) = 4/10 x 3/9 x 2/8 = 1/ 30 or equivalent (b) P(ssm) = 2/10 x 1/9 x 6/8 in any order P(ssm)+P(sms)+P(ssm) OR 2/10 x 1/9 x 6/ 8 x3 = 1/20 or equivalent	M1 A1 B1 M1 A1 5	
17. (a) Method of finding an area of 1 bar 4 correct areas AND intention to add all areas 100 (b) Group 20 to 25 identified 9/30 or 21/30 considered 20 + 9/30 x 5 OR 25 – 21/30 x 5 21.5	M1 M1 A1 M1 M1 M1 A1 7	Areas are 10, 14, 17, 30, 14, 15 CAO

Paper 2 Higher Tier Autumn 2008	Mark	Comments
18. Overall strategy	B1	
$BD^2 = 10.8^2+8.6^2-2x10.8x8.6xcos122$	M1	
$BD^2 = 289.03…$	M1	
BD = 17(.00 cm)	A1	
<BCD = 58^0	B1	*Watch for 122 used to give correct answer, B0 here then FT*
BD/sin<BCD = 13.2/sinDBC or equivalent	M1	FT their BD and <BCD
<DBC = $41.18…^0$ or rounded	A1	
	7	
19. Tangent drawn at t = 15	M1	
Difference in v / difference in t	M1	
Answer reasonable for their tangent	A1	Only award if both M marks awarded
	3	
20. (a) Uniform and suitable scales for y and x^2	B1	
x^2 horizontal plots at 1, 4, 9, 16 and 25	B1	Horizontally & vertically correct on uniform scale
Plot 4 points correctly	B1	On uniform scale
(b) $b \approx 6.2$	B1	
Use of gradient or other suitable method to find a	M1	FT their graph
$a \approx 2.4$	A1	
	6	
20. (a) Sin curve through origin	M1	
± 1, and 360^0 shown or implied	A1	
(b) 233^0 and 307^0	B2	No other angles given, or B1 for a correct angle, or B1 FT from their 1^{st} angle to a "correct FT" 2^{nd} angle
	4	

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