WJEC
CBAC

GCSE MARKING SCHEME

MATHEMATICS 2-TIER

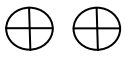
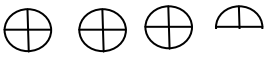
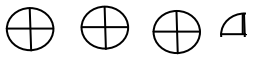
SUMMER 2011

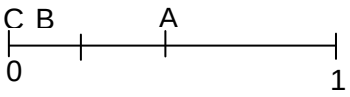
INTRODUCTION

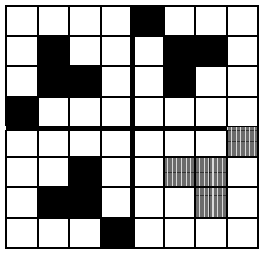
The marking schemes which follow were those used by WJEC for the Summer 2011 examination in GCSE MATHEMATICS - TWO TIER. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken 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.

2011 Summer Paper 1 (Non calculator) Foundation Tier	✓	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (12/06/2011) (Page 1)
1. (a) (i) Four thousand (and) fifty six (pounds only)		B1	C.A.O.
1. (a) (ii) (£) 15407		B1	C.A.O.
1. (b) (i) 24 (ii) 25		B1 B1	Accept 3×8 Accept 5^2 OR 5×5
1. (c) (i) 9370 (ii) 9400		B1 B1	C.A.O. C.A.O.
2. (a) 4000 OR 4 thousand OR four thousand		B1	C.A.O. Do NOT accept 1000 OR thousand(s)
2. (b) 765		B1	C.A.O.
2. (c) 312		B1	Do not accept -312
2. (d) 1, 2, 3, 6, 9, 18		B2	B1 for any 4 correct factors and up to 2 incorrect Allow repeated factors . Watch for 'tree' presentations.
2. (e) Method for finding how many £1.50 in £10 = 6 Change = (£)1		M1 A1 B1	A list of 6 or 7 (£)1.50s can get the M1. C.A.O. F.T. 10 – 'their 6' × £1.50 Answer of (£)1 gets all 3 marks.
2. (f) e.g 50 × 10 OR 50 × 9 OR 49.8 × 10 500 OR 450 OR 498		M1 A1	Accept other values provided calculations are easy. Allow 49×9 (M1) = 441 (A1). Allow 49.8×10 = 498 (M1, A1) OR =498-50=448 (i.e. 'adjustments' for using 10 instead of 9)
3. (a) Cost = (18 × 20) + 50 = (£) 410		M1 A1	Correctly substituted AND correct attempt to evaluate. 18 × 70 = 1260 gets M0, A0 C.A.O.
3. (b) **View with formula from stem** Monthly payment = (520 − 60) ÷ 20 = (£) 23		M1 A1	For correct substitution with subtraction and division C.A.O. Allow embedded references to the correct answer.
4. (a) A  B  C  D 		B1 B1 B1 B1	Penalise −1 once only for fragmented symbols C.A.O. Unquartered circles like ◯ are acceptable C.A.O. Accept other configurations of the ½ 'Open' shapes like ⌒ get 0 in B and C and D C.A.O. Accept other configurations of the 3/4 C.A.O. Accept other configurations of the ¼
4. (b) Schools A-D along one axis Uniform scale for frequency axis starting at 0 Four bars at correct heights 80 140 110 130	✓ ✓ ✓	B1 B1 B2	If no scale then B0, allow one 2 cm square to represent 20 B1 for any 2 or 3 correct bars.
5. (a) (14 − 10) = 4 (4 × 6) = 24		B1 B1	Sight of 4 (with no 'suspicious' work) F.T. 'their 4' × 6 Answer of 24 gets B2,but watch for 14+10= 24 which gets B0 Allow embedded answers like 24 ÷6 +10 = 14
5. (b) (y =) 14		B1	Allow embedded answers like 14 – 6 = 8
5. (c) **View with diagram** Recognition that A = 2B A = 4 (kg) B = 2 (kg)		B1 B1 B1	SC1 for answers to A and B reversed

2011 Summer Paper 1 (Non calculator) Foundation Tier	✓	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (12/06/2011) (Page 2)
6. (a) All side segments = 4 Perimeter = Sum of all sides = 48 (cm)		S1 M1 A1	Must see at least one extra 4. Attempt to add **all 12 sides** of the cross C.A.O. Answer of 48 (cm) gets all 3 marks unless an obvious wrong method seen
6. (b) **View with diagram** Area = Sum of all the areas of the cross = 80 cm^2		 M1 A1 U1	 Attempt to add all areas of the cross C.A.O. Independent of all other marks.
7. (a)  		B1 B1 B1	A at the mid point B between 0 and ¼ EXCLUSIVE C at 0.
7. (b) $\frac{9}{24}$ I.S.W. $(=\frac{3}{8})$		B2	B1 for the 9 as a numerator in a fraction < 1 B1 for the 24as a denominator in a fraction < 1 Penalise -1 for words (9 out of 24) or ratio (9:24)
Both parts (a) – (b) marked at the same time 8. (a) **Overlay (viewed with diagram)** Plots Line(s) or curve 8. (b) **View with graph from (a)** Any correct strategy, e.g. 9 times value at 5 litre Their answer, correct on their figures.		 P1 B1 M1 A1	 Within a small square (± ½ 2mm square) of correct posn. **This mark is for connecting their points in order to interpolate between points.** **Must be drawn at least from pints = 7 to 21** Any correct method using graph or table. F.T. their graph. Unsupported answers in the range 77–81 inclusive get M1, A1.
All parts (a) – (d) marked at the same time 9. (a) 12 18 24 8 12 16 **View with table from (a)** 9. (b) $\frac{4}{12}$ (I.S.W.) OR $\frac{1}{3}$ OR ·33 OR 33% F.T. the numerator from their table even if they have not entered any new numbers into the table. 9. (c) $\frac{4}{12}\times 180$ = 60 9. (d) Receipts = £90 Payouts = £60 Profit =(£)30 OR 3000 (p)		 B2 B2 M1 A1 M1 A1	 B1 for at least 3 correct entries F.T. their table Penalise -1 once only for words (4 out of 12) or ratio (4:12) B1 for a numerator of 4 in a fraction less than 1. B1 for a denominator of 12 in a fraction less than 1. **F.T. 'their 4/12'** M1, A0 if incorrect reduction from (b) is used in (c) 60/180 gets M1, A0 60 out of 180 gets M1, A1 F.T. full method of 180 × 50(p) − their (c) × (£)1 Rounded up or down figure if their (c) is not a whole number.

2011 Summer Paper 1 (Non calculator) Foundation Tier	✓	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (12/06/2011) (Page 3)
10. **Overlay (viewed with diagram)** 3 correct patterns 		B3 3	B1 for each correct quadrant.
11. (a) 1/8 of 56 = 7 AND 3 × 7 = 21		M1 A1	Any valid method. Allow M1 for 3/8 × 56 C.A.O. Equivalent answers such as 168/8 get M1, A0
11. (b) (i) 3·23		B1	C.A.O.
11. (b) (ii) (0)·06		B1	OR 6/100 OR 6%
11. (b) (iii) 7/10 – 4/10 = 3/10 or equivalent		M1 A1	Any valid method including decimals or percentages ·7 – ·4 = ·3 70% – 40% = 30% Incorrect reductions even from correct equivalent fractions get A0, e.g. 15/50 gets M1, A1, but 15/50 = 4/10 gets M1, A0
11. (c) (i) 7300		B1	C.A.O.
11. (c) (ii) 0·0065		B1	C.A.O.
12. **(View with diagram)** ∠DBA = (180 – 90)/2 = 45 (º) ∠DEA = 45 (º) ∠BEF = 60 (º) ∠DEF = 105 (º)	 ✓ ✓ ✓ ✓ ✓	 M1 A1 B1 B1 B1 5	**Look for answers on diagram** C.A.O. F.T their ∠DBA C.A.O. F.T their ∠DBA + ∠BEF
13 (a) Sight of any **two** from: 200 **and** (either 40 or 50) **and** (either 150 or 100) 600 or 400		M1 A1	Maybe implied if correct response is given. Accept values that could lead to a simple calculation Accept other responses only from correct evaluation of their simple calculation. *Answers only accept 400, 414, 500, 600, 621, 630 for both marks*
13. (b) 2350		B1	
13. (c) 65 (%)		B1	
13. (d) Comparison of 2 fractions in the same format (correct) All 4 correct in the same format, e.g. 21/60, 15/60, 28/60 with 24/60 (or equivalent) 7/20 or its equivalent		M1 M1 A1	Decimals, common denominator or % Or 35%, 25%, 46.66..% Or equivalent. with 40%, or as decimals C.A.O. Depends on M2. Unsupported 7/20 gets no marks. *Accept 2.8, 4, 2.1, 2.5 with 7/20 as a comparison for M1, M1, A1.* *(Comparison of any two of these correct for M1)*

2011 Summer Paper 1 (Non calculator) Foundation Tier	✓	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (12/06/2011) (Page 4)
14.(a) Mark responses in the answer space, unless blank			If answer space not completed accept responses on the diagram
x = 55°	✓	B1	
y = 125°	✓	B1	FT 180 – x
(z=) 180 – (80 + 55) or equivalent	✓	M1	FT from their x and/or y, i.e. z = y – 80 or z = 100 − x
z = 45°	✓	A1	Accept missing brackets in notation
14. (b) $\frac{360}{5}$ = 72(°)		M1 M1 A1	For sight of 360 For division of **their angle** by 5 Needs both method marks. Do not ignore further working, e.g. continues to give a final answer of '108' *Alternative: M2 for 180 - 180×3/5 or M1 for 180×3/5 Then A1 for 72(°)* *An answer only of 108 gets no marks* *An answer only of 72 gets all 3 marks.* *An answer of 72 followed by an answer of 108 gets M1,M1, A0*
15. (a) – 9 and 19		B2	B1 for each
15. (b) **Overlay**			
Plots correct		B1	FT from (a)
Allowing one error or the 2 omissions (x = -1 and x= 3)			
All 7 points correct & joined with a curve		B1	FT from (a)
15. (c) Sight or use of y = 40 (maybe implied)		M1	**N.B. This is for a graphical method, this could just be between the two points at x=3 and x=4.**
x = 3.6 or correct reading from their graph		A1	**If no graph then M0, A0**
16. (a) **Overlay (viewed with diagram)**			Mark intention.
Correct region shaded	✓ ✓ ✓	B3	B1 for line B1 for arc B1 for shading (FT from an arc centre X and a straight line crossing XY). Shading needs to be on both sides of XY
16. (b) **(Viewed with diagram)**			
Area triangle = ½ ×40 × 50	✓	M1	Seen or implied
Converting 1.2m to 120cm, e.g. sight of 120	✓	B1	
Volume = area triangle × length (= 1000 × 120)	✓	M1	FT **their area** multiplied by **1.2 or 120**
= 120 000 (cm^3)	✓	A1	CAO (An answer of 1200 implies M1 B0 M1 A0) Examples 1·2 × 40 × 50 = 2400 gets M0, B0, M1, A0 120 × 40 × 50 = 240 000 gets M0, B1, M1, A0

Higher Tier Summer 2011 Paper 1	Mark	Comments
1(a) Sight of any **two** from: 200 **and** (40 or 50), **and (**150 or 100) 600 or 400	M1 A1	Maybe implied if correct response is given. Accept values that could lead to a simple calculation Accept other responses only from correct evaluation of their simple calculation *Answers only accept 400, 414, 500, 600, 621, 630 for both marks*
1(b) 2350	B1	
1(c) 65 (%)	B1	
1(d) Comparison of 2 fractions in the same format (correct) All 4 correct in the same format, e.g. 21/60, 15/60, 28/60 with 24/60 (or equivalent) 7/20 or its equivalent	M1 M1 A1	All decimals, common denominator or % Or 35%, 25%, 46(.66..)% with 40%, or as decimals CAO. Depends on M2 Unsupported 7/20 gets no marks *Accept 2.8, 4, 2.1, 2.5 with 7/20 as a comparison for M1, M1, A1.* *(Comparison of any two of these correct for M1)*
2(a) Enlargement scale factor 2 Correct position	B2 B1	B1 2 lines correct, or consistent incorrect scale ($\neq$1) FT consistent incorrect scale
2(b) Correct rotation (90° clockwise)	B2	B1 for rotation through 90° anticlockwise
2(c) Correct translation	B1	
2(d) Shape at (2,1), (4,4), etc. indicated	B1	
3(a) $9(2a - 3)$	B1	
3(b) $b(b^2 - 3)$	B1	
3(c) $10x + 35$	B1	
3(d) $x = 3$	B1	Accept embedded answers. Do not accept 12/4
3(e) $8x - 4x = 7 - 5$ $4x = 2$ $x = ½$ ISW	B1 B1 B1	FT until 2nd error Accept 2/4, ISW
4.(a) Mark responses in the answer space, unless blank $x = 55°$ $y = 125°$ (z=) 180 – (80 + 55) or equivalent $z = 45°$	 B1 B1 M1 A1	If answer space not completed accept responses on the diagram FT 180 – x FT from their x and/or y, i.e. z = y – 80 or z = 100 – x. Accept missing brackets in notation
4(b) $\frac{360}{5}$ = 72(°)	M1 M1 A1	For sight of 360 For division of **their angle** by 5 Needs both method marks. Do not ignore further working, e.g. continues to give a final answer of '108' *Alternative: M2 for 180 - 180×3/5 or M1 for 180×3/5* *Then A1 for 72(°)* *An answer only of 108 gets no marks* *An answer only of 72 gets all 3 marks* *An answer of 72 followed by an answer 108 gets M1, M1, A0*
5(a) -9 and 19 5(b) Plots correct, allowing one error or the 2 omissions (x=-1 and x=3) All 7 points correct & joined with a curve 5(c) Sight or use of y = 40 (maybe implied) x = 3.6 or correct reading from their graph	B2 B1 B1 M1 A1	B1 for each FT from (a) FT from (a). Need to have all 7 plots no omissions **N.B. This is for a graphical method, this could just be between the two points at x=3 and x=4. If no graph then M0, A0**
6(a) Correct region shaded	B3	Mark intention. B1 for line, B1 for arc, B1 for shading (FT from an arc centre X and a straight line crossing XY). Shading needs to be on both sides of XY

Higher Tier Summer 2011 Paper 1	Mark	Comments
6(b) Area triangle = ½ ×40 × 50 Converting 1.2m to 120cm, e.g. sight of 120 Volume = area triangle × length (= 1000 × 120) = 120 000 (cm^3)	M1 B1 M1 A1	Seen or implied FT **their area** multiplied by **1.2 or 120** CAO (An unsupported answer of 1200 implies M1 B0 M1 A0)
7(a) (m =) -2 must be clear that this is the gradient (c =) 4 must be clear that this is the intercept y = -2x + 4	B1 B1 B1	Accept -4/2 -4/2 must be simplified to -2. Allow final B1 for an answer of y=-2x + a, a>0 FT their value of 'm' if clearly a gradient *An answer of y = 2x + 4 gets B0, B1, B1*
7(b) y = 5x ± "any value ≠0"	B1	Accept y = 5x + c
7(c) Either (2+6)/2 or (-7+13)/2 (4 , 3)	M1 A2	Accept missing brackets A1 for either coordinate correct or unsimplified form of (8/2, 6/2) Again accept missing brackets *An answer of (3,4) implies M1*
8(a) Correct set up of 2 equations for eliminating one variable First variable's value Method to find second variable, FT from their first value Second variable's value x = -3 and y = 7	M1 A1 M1 A1	Allow 1 error in the non equated variable *Substitution method* *M1 for correctly substituting for one variable into the other equation, then A1 for the correct answer.* Award all 4 marks for unsupported correct answers
8(b) 3(x+3) + 6(2x-5) = 2×2 or equivalent 15x - 21 = 4 or equivalent x = 25/15 ISW (=5/3 = 225/135)	M1 M1 A1 A1	Correctly clearing fractions by a valid method for any 2 terms. Correctly clearing fractions by a valid method for all 3 terms. The two A1s are dependent on only one M1 being awarded F.T. until 2nd error starting after the M marks Award 4 marks for an unsupported correct answer *If 0 marks then SC1 for (15x-21) / 18 = 4/18 or equivalent*
9(a)(i) 5.8×10^3 (ii) 4×10^{-3} 9(b) 2.8×10^9 9(c) 6000 OR 6×10^3 (ISW from their first answer)	B1 B1 B2 B1	*Penalise incorrect notation once only -1 throughout* B1 for … $\times 10^9$. B0 for 2.8×10^n where n≠9
10(a) 16, 50, 60 10(b) Idea, plotting upper class boundary 2 points plotted correctly All points correct and joined by straight lines or curve 10(c)(i) Median (from their cumulative graph) (ii) Intention to subtract horizontal readings for vertical 45 & 15 Interquartile range form their cumulative graph	B1 M1 A1 A1 B1 M1 A1	FT their **cumulative** table of values for all marks *Accept plots at 20,40,60,80 OR 19.5,39.5,59.5,79.5* *OR 19, 39, 59,79*
11(a) Black 200, White 200	B2	B1 for each answer or B1 if their 'black+white = 400'
11(b) Black 112, White 113	B2	B1 for each answer or B1 if their 'black+white = 225'
11(c) Black $x^2/2$, White $x^2/2$ OR equivalent	B2	B1 for each answer. ISW after seeing correct response Ignore change of letter as the variable from that given
11(d) Black $(y^2-1)/2$, White $(y^2+1)/2$ OR equivalent	B2	B1 for each answer, or B1 for reversed answers, or B1 for '$y^2/2$ – a and $y^2/2$ + a' where a≠0 and maybe a term in y, or B1 for '$y^2/2$ and $y^2/2$ + 1', or B1 for '$y^2/2$ – 1 and $y^2/2$'. ISW after seeing correct responses Ignore change of letter as the variable from that given
12(a)Entries 2, 4.2, 2.4, 0.2 Attempt to draw a histogram Correct histogram	B1 M1 A1	 FT frequency density. Bars without gaps Should be not have any other graph included
12(b) 4/5 of 20 or 1/5 of 20 considered 4 + 24 + 42 + portion of 160≥x>170 group (not 20) 86	M1 M1 A1	Could be indicated on histogram – need to scroll back OR 114 – (8+16+ portion of 160≥x>170 group (not 20)) CAO. *SC1 for an answer of 28* *N.B. An answer of 88 get M2*

Higher Tier Summer 2011 Paper 1	Mark	Comments
13(a)(i) $(x + 8)(x – 8)$ 13(a)(ii) **Denominator** shown as $(2x + 1)(x – 8)$ $\frac{(x+8)}{(2x+1)}$	B1 M2 A1	If answer space blank but shown in (ii) then award B1 M1 for $(2x + 1)(x – 8)$ but not used as a denominator, or M1 for $(2x - 1)(x + 8)$ (reverse signs) shown as a denominator FT for their correct cancelling provided M1 awarded. Penalise further incorrect working.
13(b) $100x = 82.323..$ & $x = 0.8232..$ with intention to subtract 815/990 ISW	M1 A1	OR 1000x and 10x with intention to subtract, sight of 81.5/99 Or 163/198
13(c) Use of $\sqrt{72} = 6\sqrt{2}$ i.e. $(6\sqrt{2} - \sqrt{2})^2$ $= (5\sqrt{2})^2$ $= 50$ CAO	 M1 A1 A1	Alternatively: $72 - \sqrt{72}\sqrt{2} - \sqrt{72}\sqrt{2} + 2$ *M1 Allow one error in one term* *(Needs to show the whole numbers- this could be in later working)* $72 – 2\times12 +2$ *A1 FT from 1 error if* ***equivalent level of difficulty*** 50 *A1 CAO* *SC1 for answer only 46 if no other marks awarded*
13(d)(i) $1/81^{1/2}$ or $\sqrt{(1/81)}$ $= 1/9$ (ii) $(\sqrt[3]{125})^2$ or equivalent $= 25$	M1 A1 M1 A1	First step of working *SC1 for an answer of* $(\pm)9$ OR $125 = 5^3$
14(a) $3/11 \times 2/10$ $= 6/110$ ISW $(=3/55)$	M1 A1	Or equivalent
14(b) $5/11 \times 6/10$ $2 \times 5/11 \times 6/10$ Or listing 2 ways **only** 60/110 ISW $(=6/11)$	 M1 M1 A1	**Need to demonstrate no replacement before any marks awarded** P(R) × P(R') OR P(RY) and P(RB) considered P(R) × P(R') + P(R') × P(R) OR P(RY)+P(RB)+P(YR)+P(BR) Or equivalent *Alternatively:* *1 – P(all except 1 red)* *M1* *1 – (sum of appropriate probabilities)* *M1* *1 – (6/110 + 6/110 + 20/110 + 9/110 + 9/110 = 1 – 50/110)* *60/110 A1*

2011 Summer Paper 2 (Calculator allowed) Foundation Tier	✓	Marks	POST CONFERENCE FINAL MARK SCHEME Comments (19/06/2011) (Page 1)
1. **Parts (a) & (b) marked at the same time** (a) (87.34) 26.8(0) (paper) 33.12 (ink) 4.44 (discs) 151.7(0) (b) Discount = (£) 15.17 ISW		 B1 B1 B1 B1 B1	 Accept spaces , e.g. 33 12 F.T. their figures for 1 error F.T. their total. Either rounded or truncated or > 2 dec. pl. (£) 136.53 even unsupported gets this B1
2. metres m litres l kilometres km kilograms OR tonnes kg		B1 B1 B1 B1	 Accept ml or cm^3 or cc. Do not accept kilos or ton(s)
3. (a) **(Viewed with diagram)** Evidence of square counting 53 – 63 inclusive		 M1 A1	
3. (b) **(Overlay)** Lines Arc		B1 B1	 F.T. from the ends of their lines
4. (a) cuboid hexagon (triangular) prism cylinder		B1 B1 B1 B1	'cube' gets B0
4. (b) diameter tangent radius		B1 B1 B1	
4. (c) **(Overlay)** Perpendicular		B1	
4. (d) (i) Line of symmetry (ii) Both lines of symmetry	✓ ✓	B1 B2	 B1 for either one of them and no incorrect lines OR both correct lines and 1 incorrect line.
5. (a) 5/25 and 2/10 circled **AUTO MARKING**		B2	B1 for either one of them and up to 1 incorrect one OR B1 for both correct and 1 incorrect.
5. (b) 6 shaded triangles		B1	OR 2 NOT shaded
5. (c) 50 (%)		B1	Do NOT accept equivalent fractions or decimals.
6. (a) (i) Add 9 (to the previous term) (ii) Divide (the previous term) by 3		B1 B1	Accept +9 but not 9 OR n+9 Accept ÷ 3 but not n/3
6. (b) V = 90 – 10 × 5 = 40		M1 A1	For the correct substitution C.A.O.
7. (a) **(Viewed with diagram)** ¼ OR 90/360 (ISW) OR equivalent, e.g. 24/96.	✓ ✓	B2	B1 for sight of 90± 2° alone or in the numerator of a fraction less than 1. OR F.T. $\frac{\text{their angle (85 – 95 inclusive)}}{360}$ Use 0·23 − ·264 to check their fraction. 90% gets B0
7. (b) **(Viewed with diagram)** 120/360 of 96 = 32	✓ ✓	M1 A1	Allow 115º – 125 (instead of the 120º) F.T. their '115 – 125' (30 – 34) Even unsupported answers of 30 to 34 get M1, A1. Allow 32% for M1, A1. 32/96 gets M1, A0; 32 out of 96 gets M1, A1

2011 Summer Paper 2 (Calculator allowed) Foundation Tier	✓	Marks	POST CONFERENCE FINAL MARK SCHEME Comments (19/06/2011) (Page 2)
8. (a) 7		B1	C.A.O.
8. (b) **(Viewed with stem)** −1		B1	C.A.O.
8. (c) **(Viewed with stem)** She got the other (3) questions wrong		E2	Misread of the number of questions (4) is NOT allowed. 3 − 2 − 2 −2 (= −3) OR 3 – 6 gets E2 E1 for only 'she got some questions wrong'
Throughout Q9, if candidates use arrows to indicate changing the position of their answer, then mark the work for arrows COMING IN TO the part you are marking. 9. (a) Sum of the numbers (544) Sum/8 68		 M1 m1 A1	 For attempt to add the numbers For dividing a number in the range 455 – 635 inc. by 8. C.A.O.
9. (b) 49 55 58 65 69 78 83 87 Median = 67		M1 A1	For identifying the middle TWO numbers in either order. OR for arranging the 8 numbers in order (ascending or desc.) C.A.O.
9. (c) 38		B1	C.A.O.
Parts (a) & (b) marked at the same time 10. (a) A plotted at (5, –3) B plotted at (–1, –5) 10. (b) (2, −4)		 B1 B1 B2	Reverse coordinates gets 0. Allow plots within a 2mm square inclusive. Ignore incorrect labelling. Accept the letters A,B instead of points Accept unlabelled correct points marked by dots etc B1 for each. F.T. their plotted points for both marks. OR B1 for seeing either pair of coords averaged. Allow B2 for (−4, 2) if reversed coordinates used consistently throughout part (a) Accept any unambiguous representation for the coordinates.
Parts (a) & (b) marked at the same time 11. (a) cedis = 1400 × 2.31 = 3234 (cedis) 11. (b) Pounds = 157.08/2.31 = (£) 68		M1 A1 M1 A1	 C.A.O. C.A.O.
12. (a) $\frac{119}{140}$ × 100 = 85 (%)		M1 A1	 C.A.O.
12. (b) $\frac{104}{100}$ × (£)850 OR 4% AND added to 850 = (£) 884		M1 A1	Any correct method of finding 104% C.A.O.
12. (c) Cost of fish = £16.35 – 1·15 × 4 = (£) 11.75 Cost of 1 fish = 11.75/5 = (£) 2.35	✓ ✓ ✓ ✓	M1 A1 M1 A1	 C.A.O. F.T. 'their 11.75' but NOT (£)16.35 Accept rounding, truncating or more than 2 d.p. 235p gets this A1, but 235 gets A0.
13. (a) **(Viewed with stem)** (∠ABC) = ∠ACB = (180 – 36)/2 = 72 (º) x = 108 (º)		M1 A1 A1	 C.A.O. F.T. 180 – 'their 72'. x = 72 gets M1, A1, A0 WATCH OUT FOR INCORRECT METHODS e.g. 36×2 = 72 then 180 – 72 = 108 which gets M0, A0, A0.
13. (b) **(Viewed with stem)** y = 180 – 134 OR (360 – 268)/2 = 46 (º)		M1 A1	 C.A.O.

2011 Summer Paper 2 (Calculator allowed) Foundation Tier	✓	Marks	POST CONFERENCE FINAL MARK SCHEME Comments (19/06/2011) (Page 3)
14. (a) 2 − 5		B1 B1	C.A.O. F.T. 'their 2' – 7 if answer is negative.
14. (b) (i) (x=) 32		B1	Allow embedded answers like 32/4 = 8 32x gets B0.
14. (b) (ii) 6x = 27 x = 27/6 I.S.W. (OR 4½ OR 4·5)		B1 B1	Allow embedded answers like 6×4·5–9=18 OR 6×4·5=27 for B2 ISW. 6x = 27 = 4.5 gets B1, B0. F.T. ax = b provided a≠1
14. (c) 7a + 2b		B2	B1 for either 7a OR 2b in an expression of the form 7a+f(b) OR g(a)+2b, including 7a + 2 or 7 + 2b. If B2 awarded then penalise −1 for extra incorrect work such as = 9ab.
15. (a) 180 (cm), 100 (cm)		B2	B1 for either or if reversed
15. (b) Positive		B1	Do not accept a description
15. (c) **(Viewed with diagram)** Suitable line, with some points above and below		B1	No requirement to pass through the means. Intention needs to be 'straight', could be free hand. **Suitable** means: follows the trend not horizontal at least 3 points on/above/below
15. (d) **(Viewed with diagram)** Answer in the range 160 (cm) to 175 (cm) inclusive		B1	OR FT suitable answer from 'their line of best fit'
16. **(Viewed with diagram)** Sight of 360 (maybe on the diagram) 3x + x + 132 + 60 = K where K≠0 or equivalent (K – (132+60)) /4 where K≠0 or equivalent. x = 42(°)	 ✓ ✓ ✓ ✓	 B1 M1 m1 A1	<u>An equation is not required</u> Accept informal notation Accept [(132+60) – 360]/4 CAO *<u>Alternative:</u>* *Sight of 360 B1 May be on the diagram* *Where **K≠0**, may be informally expressed* *K – (132 +60) M1 Accept (132 + 60) - K* *[K – (132 +60)]/4 m1 Accept [(132 +60) - K]/4* *42(°) A1 CAO* **N.B. An incorrect answer without working gets no marks**
17. <u>Mark the axes for the first 2 marks then the bars</u> Suitable vertical scale AND labelled frequency or 'number of boys'. AND Suitable horizontal scale AND labelled chest	 ✓ ✓	 B2	 B1 for each OR B1 for both correct scales without or only one label(s) Accept 'boy', 'number', etc.
Correct grouped frequency diagram 4 12 3 1	✓ ✓	B1 B1	For bars of equal width with no gaps For the heights of the bars OR heights of equally spaced crosses OR equally spaced vertical lines. B1, B0 for bars and frequency polygon, but B0, B0 for polygon only. If axes reversed, mark as above, but bars will be horizontal.

2011 Summer Paper 2 (Calculator allowed) Foundation Tier	✓	Marks	POST CONFERENCE FINAL MARK SCHEME Comments (19/06/2011) (Page 4)
18. (a) 1491 / 7 (= 213) Ruth (£) 426 and Tony (£) 1065		M1 A1	Reverse answers or either value correct (in the correct or incorrect space) implies the M1
18. (b) 6000·00 240·00 6240.00 249·60 6489.60 259.58(4) 6749.18(4) or 6749.19 (£) 749.18(4) (or accept (£)749.19)	 ✓ ✓ ✓ ✓	 B1 M1 OR $6000(1.04)^3$ M1 6749.18(4) or 6749.19 A2 A1 A1	For a correct 4%. Implied by sight of 720 or 6720 For the overall method (3 stages of adding different 4%). Arithmetical errors are allowed for the M1 This also implies the previous A1 FT provided M1 awarded Candidates using depreciation: Allow SC1 for seeing an amount of (£)5308.41 or (£)5308.42. Also award the first B1. 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. In this case, the final A mark is A0.
19. Use of length × width = 5.12 2x × x = 5.12 Length 3.2 (metres) Width 1.6 (metres)	✓ ✓ ✓	S1 M1 A2	E.g. One trial finding correct product with one number double the other, or one trial of numbers with product 5.12. E.g. At least 2 trials finding correct product with one number double the other, or at least 2 trials with numbers giving product 5.12 A1 for either length or width correct or for reversing the answers **Correct answers should be credited with all 4 marks** **If no marks, award SC2 for digits 32 and 16, i.e. incorrect place value**
20. $(y^2 =) 9.6^2 + 7.2^2$ $y^2 = 144$ y = 12 (cm)		M1 A1 A1	Correct statement of Pythagoras' Theorem Accept 'y=144' provided evidence shows the intention to √ FT from their y^2 only if M1 awarded

Higher Tier Summer 2011 Paper 2	Mark	Comments
1(a) 180 (cm), 100 (cm)	B2	B1 for either or if reversed
1(b) Positive	B1	Do not accept a description
1(c) Suitable straight line, with some points above and below	B1	No requirement to pass through the means. Intention needs to be 'straight', could be free hand. **Suitable** means: follows the trend not horizontal at least 3 points on/above/below
1(d) Answer in the range 160 (cm) to 175 (cm) inclusive	B1	OR FT suitable answer from 'their line of best fit'
2(a) Sight of $(n + 7) \times 5$ or correct equivalent ISW	B1	B0 for $n + 7 \times 5$ Allow other letters
2(b) $6n - 5$ or equivalent ISW	B2	Accept $6\times n - 5$. B1 for sight of $6\times n$ or equivalent B0 for $n+6$. Allow other letters
2(c) $15^2 + 6$ OR $15 \times 15 + 6$ $= 231$	M1 A1	
3. Sight of 360 (maybe on the diagram) $3x + x + 132 + 60 = K$ where $K\neq0$ or equivalent $(K – (132+60)) /4$ where $K\neq0$ or equivalent. $x = 42^{(o)}$	B1 M1 m1 A1	An equation is not required Accept informal notation Accept $[(132+60) – K]/4$ CAO Accept informal notation *Alternative:* *Sight of 360 B1 Maybe on the diagram* *Where **K≠0**, maybe informal expressed* *$K – (132 +60)$ M1 Accept $(132 + 60) - K$* *$[K – (132 +60)]/4$ m1 Accept $[(132 +60) - K]/4$* *$42(^o)$ A1 CAO* Answer of 168/4 gets 3 marks **N.B. An incorrect answer without working gets no marks**
4(a) Mid points 35, 38, 41, 44 (check the table) $\frac{35\times4 + 38\times12 + 41\times3 + 44\times1}{20}$ (OR 763) $= 38(.15)$ ISW	B1 M1 m1 A1	If no other working then two shown is sufficient if no error Attempt $\sum fx$ for their mid points (must be in interval, inclusive) Attempt their $\sum fx$ divided by 20 Needs to be correct evaluation. *Award B1 M1 m1 A1 for an answer of 38 without working*
4(b) 37 to 39	B1	Do not accept 12, however accept '37 to 39 – 12 people'
4(c) Suitable vertical scale **AND** labelled frequency Correct frequency polygon	B1 B2	Accept label 'number of women', 'number of **pairs** of trainers', 'f' If no scale marked or inappropriate scale (e.g. in 100s), then no marks B1 for frequency polygon with one error in plotting, or for a translated polygon, or correct points plotted but not joined or joined by a curve B0 for correct plots but joined incorrectly (e.g. not in correct order) *Ignore frequency diagram if polygon seen.* Plots are (35,4) (38,12) (41,3) (44,1) Ignore joining (35,4) to (44,1) or either/both to the axes
4(d) Attempt to multiply (4, 12, 3 or 1) by 30 Table completed correctly: 120, 360, 90 and 30	M1 A2	Sight of 600/20 = 30 is insufficient, must attempt to use A1 if one error. Any one correct entry implies M1
5. Either $x = 3$ **or** $y = -2$ drawn correctly $y=x+1$ drawn correctly Correct region identified	B1 B1 B1	Ignore extra lines drawn Ignore extra lines drawn CAO. Accept shading out or shading in
6(a) $3r= f^2 + 4 – d$ $r = (f^2 + 4 – d)/3$	B1 B1	**FT until 2nd error** $r + d = (f^2 + 4)/3$ is 2 errors Clearly must all be divided by 3
6(b) $5t – 10 > 3t + 14$ $5t – 3t > 14 + 10$ $t > 24/2$ ISW $(t>12)$	B1 B1 B1	Accept "=" for first B1 only. FT until 2nd error If "=" replaced finally with correct response ">" accept for all marks The same applies to "≥" or "<"

Higher Tier Summer 2011 Paper 2	Mark	Comments
6(c) x = 0 and x = -4	B2	B1 for either Watch for and allow embedded answers
7(a) 1491 / 7 (= 213) Ruth (£) 426 and Tony (£) 1065	M1 A1	Reverse answers or either value correct (in the correct or incorrect space) implies the M1
7(b) 6000·00 240·00 6240.00 249·60 OR 6489.60 $6000(1.04)^3$ M1 259.58(4) 6749.18(4) or 6749.19 A2 6749.18(4) or 6749.19 A1 (£) 749.18(4) (or accept (£)749.19) A1 (Treat 4 years and 3% as MR-1)	 B1 M1 A1	For a correct 4%. Implied by sight of 720 or 6720 For the overall method (3 stages of adding different 4%). Arithmetical errors are allowed for the M1 This also implies the previous A1 FT provided M1 awarded Candidates using depreciation: Allow SC1 for seeing an amount of (£)5308.41 or (£)5308.42. Also award the first B1 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. In this case, the final A mark is A0.
7(c) Sight of 108 or 1.08 203.04 / 1.08 = (£) 188	B1 M1 A1	Equivalent
7(d) Least 94 (cm) AND Greatest 96 (cm)	B2	B1 for either correct. B1 if reversed.
8(a) Use of length × width = 5.12 $2x \times x = 5.12$ or equivalent Length 3.2 (metres) Width 1.6 (metres)	S1 M1 A2	E.g. One trial finding correct product with one number double the other, or one trial of numbers with product 5.12, E.g. At least 2 trials finding correct product with one number double the other, or at least 2 trials with numbers giving product 5.12 A1 for either length or width correct or for reversing the answers **Correct answers should be credited with all 4 marks** **If no marks, award SC2 for digits 32 and 16, i.e. incorrect place value**
8(b) Volume = $\pi \times 14^2 \times 44$ (maybe written in parts) Accept answers in the range 27079 to 27104 27(.093 litres)	M2 A1 A1	M1 with incorrect radius used, FT throughout this question 27093(.09….. cm^3)
8(c) 2 × 9.20 + 2 × 9.20 + 2 × 0.69 (and no extra) 38.18 (euros) or 3818 (cents) Their cost in euros / 1.15 = (£)33.2(0)	 M2 A1 M1 A1	Accept work in cents. However final A mark demands an answer in £s (with or without correct or incorrect units) M1 for any 2 of the three (or more) parts – *including combined totals which meet this criteria* or 9.20 + 9.20 + 0.69 (= 19.09) CAO ***ALTERNATE*** *9.20/1.15 and 0.69/1.15 M1* *8 and 0.6 A1* *FT their 8 and 0.6 $2 \times 8 + 2 \times 8 + 2 \times 0.60$ (no extra) M2* *(Any 2 of the 3 (or more) parts, or 8 + 8 + 0.6 gets M1)* *CAO (£)33.2(0) A1* Ignore incorrect units given Usually an answer of (£)16.6(0) gets 3 marks Usually correct work but with an inclusion of a pet(s) for 1 or 2 nights gets 3 marks

Higher Tier Summer 2011 Paper 2	Mark	Comments
9(a) $\sin x = 5.8/8.6$ $42(.409\ldots°)$	M1 A2	Or Sine rule statement equivalent A1 for 0.67(4…), OR accurate calculation, but may involve PA OR $x = \sin^{-1}(5.8/8.6)$
9(b) $(y^2 =)\ 9.6^2 + 7.2^2$ $y^2 = 144$ $y = 12$ (cm)	M1 A1 A1	Correct statement of Pythagoras' Theorem Accept 'y=144' provided evidence shows the intention to √ FT from their y^2 only if M1 awarded
9(c) $\cos 24 = 7.4/z$ $z = 7.4/\cos 24$ $z = 8(.1\ldots$ cm)	M1 m1 A1	 Correct rearrangement Check working carefully
10(a) 2/3 on the lose branch for the first game AND an attempt to draw at least 1 pair of branches for the second game (at least one pair) 1/3 and 2/3 on a pair of branches for the second game Completely correct tree diagram with labels for win / lose 10(b) $1/3 \times 1/3$ $= 1/9$	B1 B1 B1 M1 A1	 No need for name 'Beth', only if name change remember 'Beth loses is the same as Zainab wins' Or FT for $1/3 \times$ Beth win on their second branch Do not accept 0.3×0.3. Accept 0.33×0.33 Accept 0.1 only from correct working. Accept 0.11(….) If FT where **not** working with $0 \leq P(\text{Beth wins}) \leq 1$ then A0 If needed, ignore incorrect cancelling of the final answer
11(a)(i) $y \propto 1/x^2$ OR $y = k/x^2$ $100 = k/2^2$ $y = 400/x^2$ 11(a) (ii) x: 2 | 10 | **(+)40** y: 100 | **4** | ¼	B1 M1 A1 B2	Ignore use of incorrect symbol 'α' later FT non linear only Maybe implied in part (ii) in working leading to 1 correct answer or by sight of both answers correct FT their non linear expression B1 for each correct response
11(b) $x = \{ -20 \pm\sqrt{(20^2 - 4 \times 5 \times -4)} \} / (2 \times 5)$ $= [-20 \pm\sqrt{480}] / 10$ $x = 0.19$ and $x = -4.19$ (Answer to 2dp)	M1 A1 A1	Allow one error in sign or substitution, not in the formula Sight of $[-20 \pm\sqrt{320}] / 10$ implies M1 from 1 slip in sign CAO CAO
12(a) **PN** = **-OP** + **ON** or **PO** + **ON** (= -(-6**a**-11**b**) +(-2**a** + **b**)) $= 4\mathbf{a} + 12\mathbf{b}$ 12(b)(i) ½ **PN** - **ON** (= ½ (4**a** + 12**b**) - (-2**a**+ **b**)) $= 4\mathbf{a} + 5\mathbf{b}$ (ii) Showing k = 3 (iii) Collinear (or parallel) RO is 1/3 × length OM or OM = 3 × RO	M1 A1 M1 A1 B1 B1 B1	Accept intention, i.e. missing brackets e.g. -11**b** than +11**b** 2 sign error is M0, but 1 sign error could be M1 CAO FT their **PN** OR - ½ **PN** – **OP** (= -½ (4**a**+12**b**) – (-6**a**-11**b**)). Intention clear, brackets maybe missing, or sign error within **ON** or **OP** Must be simplified form FT from **RO** in (i) only Accept 'they are on a straight line', 'both lie on the same line' The order needs to be accurate
13. Sin A / 10.6 = sin 61 / 11.7 or equivalent (Sin A =) 10.6 × (sin 61 / 11.7) $52(.4\ldots°)$	M1 M1 A1	 For correct rearrangement CAO (Truncate or round to 52)
14. Strategy: Use of **area sector** of circle and **½ abSinC** Area DAO = 135/ 360 × π × 5.3^2 $= 33(.09275\ldots$ cm$^2)$ Sides of COB as 13.5 (cm) and 24.1 (cm) Area COB = ½ × 13.5 × 24.1 × sin135 $= 115(.0285\ldots$ cm$^2)$ Area shaded = Area COB – Area DAO = 82 (cm^2) or 81.9(35…cm^2)	S1 M2 A1 B1 M1 A1 A1 A1	Area sector means …/360× π × …^{2} M1 for sight $\pi \times 5.3^2$ (or a fraction of this), or for sight of 135/360 CAO FT their CO & OB, but must be greater than 8.2 and 18.8 respectively for M and A marks Depends on all M marks CAO Useful data: 135/360 is 37.5% $\pi \times 5.3^2 = 88.2$……..

WJEC
245 Western Avenue
Cardiff CF5 2YX
Tel No 029 2026 5000
Fax 029 2057 5994
E-mail: exams@wjec.co.uk
website: www.wjec.co.uk