WJEC
CBAC

GCSE MARKING SCHEME

MATHEMATICS 2-TIER

SUMMER 2010

INTRODUCTION

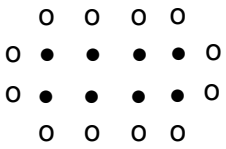
The marking schemes which follow were those used by WJEC for the Summer 2010 examination in GCSE MATHEMATICS - 2-TIER. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken 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 Paper 1 - Foundation Tier

Paper 1 (Non calculator) -Foundation Tier Summer 2010	✓	Marks	Comments
1. (a) (i) 12314 (ii) Six hundred and fifty one thousand three hundred		B1 B1	C.A.O. C.A.O.
1. (b) (i) 43 and 47 (ii) 12 and 37 (iii) 55 (iv) 16		B1 B1 B1 B1	In either order In either order C.A.O. C.A.O.
1. (c) 6580		B1	C.A.O.
1. (d) 30 (%)		B1	C.A.O.
1. (e) 1, 35, 5, 7		B2	B1 for any 2 OR 3 factors and no incorrect numbers. OR the 4 correct factors and 1 incorrect number.
2. (a) (i) 32 (ii) 66		B1 B1	C.A.O. C.A.O.
2. (b) (0)·7(0) (0)·75 ·7(0) or 70% ·73 ·75 or ¾		B1 B1 B1	C.A.O. C.A.O. If no answer offered on the dotted lines, allow the first two B1s if (0)·7 and/or (0)·75 seen in subsequent work. F.T. their values.
3. **(Viewed with diagram)** Attempt to count squares 62 – 70 cm^2		 M1 A1 U1	 Within the range inclusive Independent of the other marks Answers such as 65^2 get M1, A1, U0
4. (a) **Overlay** Point E so that DE = 9·8 (cm)		B1	Inclusive bounds are shown on overlay. Allow the letter E only to mark the point.
4. (b) **Overlay (viewed with diagram)** (i) angle 103º (ii) angle 42º AC = 15·3 (cm) Must be a line from A cutting the given line through B. Their point of intersection is C. If line is a 'dog leg', use part starting at A to decide the 42º and AC gets B0. Generally, use the overlay to check that their line AC is consistent with their value for AC. Otherwise use measuring tool.		 B1 B1 B1	 Allow ± 2º Inclusive bounds are shown on overlay. F.T. their diagram. If their angle is 40º AC = 14.4 (cm) ± 2mm If their angle is 44º AC = 16.0 (cm) ± 2mm (Interpolate other angles between 40 – 44) For angles outside this range, use a measuring tool. Note: A straight line drawn from A to end of the line through B, gives AC=16·5 ± 2mm. and gains the 3rd B1. (The 42° would be B0).
5. (a) (i) certain (ii) (an) even chance (iii) impossible (iv) unlikely		B1 B1 B1 B1	C.A.O. Accept 'evens' C.A.O. C.A.O.
(b) (i) ¼ OR 90/360 (ISW) OR equivalent. (ii) 120/360 of 240 **OR 120×2/3** = 80	✓ ✓ ✓ ✓	B2 M1 A1	B1 for sight of 90± 2°. OR B1 for F.T. their fraction : their angle (85 – 95) / 360 Allow 115º – 125º F.T. their '115 – 125' (76 – 84) 80/240 gets M1, A0. If they work out C and D separately then M1 for either C or D worked out by a correct method and A1 for BOTH answers correct. (Values for C and D between 38 and 42 inclusive).

Paper 1 (Non calculator) Foundation Tier Summer 2010	✓	Marks	Comments	
6. A (5, 1) B (−3, 0) C (−2, −3)		B1 B1 B1	C.A.O. C.A.O. C.A.O.	Reverse coordinates gets 0. Allow plots within a 2mm square inclusive. Ignore incorrect labelling. Accept the letters A,B, C instead of points
Parts (a) & (b) marked at the same time 7. (a) Correct pattern with 8 black and 12 white discs  7. (b) 8 10 12 14		B1 B2	C.A.O. B1 for each column. F.T. from 1st column (+2)	
7. (c) (i) 16/2 = 8 (ii) 16 + 4 OR 2×8 + 4 = 20		M1 A1 M1 A1	 C.A.O. F.T. 2× 'their 8' + 4	
8. a = 5 b = 2 c = 4 d = 7	✓ ✓ ✓ ✓	B1 B1 B1 B1 4	C.A.O. F.T. 17 − 3× 'their a' F.T. [12 − 2× 'their b']/2 F.T. 18 − 'their a+ b +c'	
9. (a) 47 × 36 = 282, 1410, 1692 = 1692 seats OR 36 × 47 = 252, 1440, 1692 = 1692 seats	✓ ✓ ✓	M1 A1 A1	Any correct method for the multiplication of 47 by 36 For either 282 or 1410 OR for 252 or 1440 (Apply 'one error' in other methods) C.A.O. Place value errors get M0, A0	
9. (b) (1/9 of 72) = 8 4/9 of 72 = 32		B1 B1	Allow B1 for 4/9×72 OR 288/9 OR sight of 8 C.A.O.	
9. (c) 10		B1	Accept −10	
10.(a) (i) 19·24 (ii) 19240 (iii) 5·2		B1 B1 B1	C.A.O. C.A.O. C.A.O.	
10. (b) (i) 1000 (ii) 9·02		B2 B1	B1 for the 8 OR 125 OR 10^3. B0 for 2×2×2×5×5×5 C.A.O.	
10. (c) (i) 6400 (ii) 0·053		B1 B1	C.A.O. C.A.O. 0·05300 etc gets B0	
11. (a) 360 – 66 – 58 = 236 118	✓ ✓ ✓	M1 A1 B1	Any correct method, e.g. using isosceles triangles. F.T. 'their 236' ÷ 2	
11. (b) S R Q		B1 B1 B1		

Paper 1 (Non calculator) Foundation Tier Summer 2010	✓	Marks	Comments	
All parts (a) – (d) marked at the same time 12. (a) 6 6 5 5 4 5 4 5 4 5 4 5 (b) (i) 5/36 ISW (ii) 31/36 ISW (c) 4/36 ISW (d) (i) 4/36 × 360 = 40 (ii) Profit = 360 × £1 – 40 × £5 = £160		B2 B2 B1 B1 M1 A1 M1 A1	B1 for any 1 correct column OR B1 for 6, 6 with 5, 5 with any one of the four rows of 4, 5 F.T. their table B1 for a numerator of 5 in a fraction less than 1. B1 for the 36 in a fraction <1. Do not penalise incorrect reduction of fractions in (b)(i). F.T. 1 – 'their 5/36' (≠ ½). B0 here if there is incorrect reduction. F.T. consistent use of 'their 36' F.T. 'their (c) × 360' (≠ ½). A0 here if there is incorrect reduction. M1, A0 for 40/360. F.T. 'their 40'	NOTES Penalise –1 for use of words such as "5 out of 36", "5 in 36" OR "5:36". When fraction and wrong notation seen, DO NOT penalise wrong notation.
13. (a) 2 and 8 in any order 5 in the square and 12.5 in the cross **H1**		B1 B1		
13. (b) $x + y$ in the circle and xy in the cross **H1**		B2	B1 for either. Accept $x \times y$ for xy	
14. (**Viewed with diagram)** (a) 120(^{0}) **H3a**		B1	Must be 3 figure bearing	
14. (b) 180 + 52 OR 360 – (180 – 52) OR equivalent **H3b** 232(^{0})		M1 A1		
15. (a) $2 \times \pi \times 5$ or equivalent **H4a** 31.(4… cm)		M1 A1	Accept their value of π for M1 Watch for $5^2 = 10$ which gets M0, A0.	
15. (b) $\pi \times 10^2$ 314. (..cm^2) **H4b**		M1 A1	Accept their value of π for M1. Needs intention of 10^2 $\pi \times 5^2$ is NOT a misread. It gets M0, A0 $\pi \times r^2 \times 10 \times 10$ gets M0, A0	
15. (c) $0.5 \times 2.8 \times (3 + 7)$ 14 (cm^2) **H4c**		M1 A1	OR equivalent	
16. (a) 12.5, 17 and 21.5 **H5a**	✓	B3	B2 for any 2 correct. B1 for any one correct or sight of 4.5	
16. (b) 5n + 3 OR $5 \times n + 3$ **H5d**		B2	B1 for 5n. Accept 5N, but penalise – 1 for using any other letter.	
16. (c) $n \times n$ OR n^2		B1	Accept nn OR (any letter)^2 without penalty, B0 for pattern × pattern etc	
17. (a) Method with at least 2 correct prime factors Sight of correct factors (2, 2, 2, 3, 3, 11) $2^3 \times 3^2 \times 11$ or $2^3 . 3^2 . 11$ **H6a**	✓ ✓ ✓	M1 A1 B1	Starting with 792, two correct primes before 2nd error. Ignore 1s seen FT their factors (with at least one index >1 used). Do not ignore 1s.	
17. (b) e.g. 2×3^2 not even powers, or 2×9 but not square **H6b**		E1	OR 4×4=16 and 5×5=25 so 18 not square *Do not accept "even powers" without relevant working, nor "no number times itself gives 18". But do accept " no WHOLE number times itself gives 18".*	
18. **Overlay** Correct region shaded Tick outside the region covered by the overlay. **H7**	 ✓ ✓ ✓	 B3	Mark intention. B1 for line (at least 1cm), B1 for arc (at least 1 cm) , B1 for shading (F.T. arc centre A and a line crossing AB) (Shading needs to be on both sides of AB) **Note:** Arc centre B is MR−1 and continue to mark	

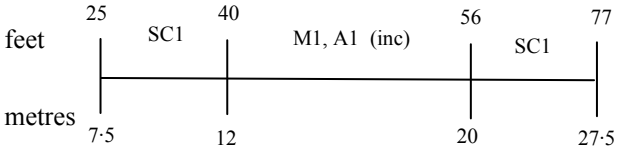
Mathematics Paper 1 - Higher Tier

Paper 1 (Non- calculator) - Higher Tier Summer 2010	Marks	Comments
1. (a) 2 **and** 8 in any order 5 in the square **and** 12.5 in the cross (b) x+y in the circle **and** xy in the cross	B1 B1 B2 4	 B1 for either. Accept *xxy* for xy.
2.(a) Correct reflection (in the line x= -2) (b) Correct translation	B2 B2 4	B1 for a reflection in any vertical line, or B1 for drawing x = -2, or B1 for reflection in y=-2 without line shown. B1 for translation 2 right or 3 up.
3. (a) 3x+20+x+60+x=180 OR equivalent x = 20 (0) y = 160(0) (z =) 3x + 20 or 3×20+20 z = 80 (0) (b) (i) 120(0) (ii) 180 + 52 OR 360 – (180 – 52) OR equivalent 232 (0)	M1 A1 B1 M1 A1 B1 M1 A1 8	 Award M1 A1 for 20^0 without working FT 180 – x. *SC1 4x+80 or 3x+20+x+60* FT from their x For evaluation
4. (a) 2 x Π x 5 or equivalent 31.(4… cm) (b) Π x 10^2 314.(..cm^2) (c) 0.5 x 2.8 x (3 + 7) 14 (cm^2)	M1 A1 M1 A1 M1 A1 6	Accept their value of Π for M1 Accept their value of Π for M1. Needs intention of 10^2 Or equivalent
5. (a) 12.5, 17 and 21.5 (b) -2, 1, 6 (c) (i) -2 (ii) 7(n-5) or 7x(n-5) or 7n - 35 ISW (d) 5n + 3 or 5 x n + 3 (e) n x n + 1 or $n^2 + 1$	B3 B2 B1 B2 B2 B2 12	B2 for any 2 correct. B1 for any one correct or sight of 4.5 B1 for any 2 terms correct. SC1 for -3, -2, 1 OR 1^2-3, etc B1 for missing or incorrect brackets, e.g. n -5 x 7, 7 n -5, n-5(7) B1 for 5n B1 for sight of n^2 or n x n, must be coefficient 1
6. (a) Method with at least 2 correct prime factors Sight of correct factors (2, 2, 2, 3, 3, 11) 2^3 x 3^2 x 11 or 2^3 . 3^2. 11 (c) E.g. 2 x 3^2 not even powers, or 2 x 9 but not square	M1 A1 B1 E1 4	Starting with 792, 2 correct primes before 2nd error Ignore 1s seen FT their factors (with at least one index >1 used). Do not ignore 1s. Or 4x4=16 and 5x5=25 so 18 not square *Do not accept "even powers" without relevant working, nor "no number times itself gives 18". But do accept "no <u>whole</u> number times itself gives 18"*
7. Correct region shaded	B3 3	Mark intention. B1 for line, B1 for arc, B1 for shading (FT arc centre A and a line crossing AB). Shading needs to be on both sides of AB. Remember arc centre B is MR-1 continue to mark
8. (a) 20 + *x* = 3x7 OR 20/3 + x/3 = 7 x = 3x7 – 20 OR x/3 = 7 - 20/3 x = 1 (b) 6x - 2x < 24 OR 4x < 24 x < 6	B1 B1 B1 B1 B1 5	OR first correct step FT until 2nd error (a)&(b) Working with 20+x incorrectly is 2 errors Or unsimplified equivalent Must be simplified *Use of "=" gets 0, unless replaced to finish, then B2*
9.(a) -1 (b) Plots correct, allowing one error All points correct & joined with a curve (c) y = -20 seen or implied About -1.8	B1 B1 B1 M1 A1 5	 FT from (a) FT from (a) FT their graph FT their graph

Paper 1 (Non- calculator) - Higher Tier Summer 2010	Marks	Comments
10.(a) 22 (b) Computer Tronics Reason, e.g. Mode lower, less time, ….. (c) 2, 18, 24, 28 (d) Intention to plot at upper bounds 3 unique vertical plots correct All plots correct and joined (e) (i) Median from cumulative graph (….) (ii) Attempt, (using the reading on the horizontal) UQ - LQ ……	B1 B1 E1 B1 B1 M1 A1 B1 M1 A1 10	 CAO. Now only FT their <u>cumulative table</u> to (d) Ignore bars only if intention clear that line or curve is being used in (e) FT from their cumulative graph in (e) *If (c) is not cumulative then do not FT to (d) and (e)*
11. Idea that 5s+3b=100 or s+b=22, which maybe via calculations shown or equations Equal coeffs. for simultaneous equations, or trial pairs of values total 22 aiming to make 100 Sara 17 and brother 5	S1 M1 A2 4	Working that meets just one of the two criteria, e.g. any 2 ages with total of 22 A1 for either correct *Answers only credit all 4 marks*
12. Implied or sight of 2^2, 4, 3^2 or 9 Considers 2.5^2 Evaluates 2.5^2 to 6.25 Answer 3 given having <u>considered</u> 2.5^2	B1 M1 A1 A1 4	Or 2.5^2 2.5^2 may not have been evaluated correctly *SC1 for answer of 3 with spurious or no working*
13.(a) All 6 correct entries (b) 0.4 x 0.3 = 0.12	B3 M1 A1 5	B2 for any 2 correct pairs OR B1 for any 2 correct entries FT their unambiguous entries Or equivalent
14.(a) Alan **AND** reason given (b) Clive **AND** reason given (c) 58.9 **AND** 2.6	B1 B1 B1 3	e.g. "smaller value for SD" E.g. "greater mean" ignore mention of SD. Accept Alan with full explanation mentioning SD & mean
15. (a) 23^0 Alternate segment theorem (b) 67^0 (Isosceles triangle,) angle at centre twice angle at circumference or alternative	B1 E1 B1 E1 4	Accept equal to $A\widehat{C}B = A\widehat{B}R$ FT if possible Do not accept calculation shown. Accept abbreviations
16.Area scale factor 3^2 or 9 90 / 9 10 (cm^2)	B1 M1 A1 3	 FT for M1 only incorrect evaluation of 3^2 as 6 CAO
17. (a) (2w +3) (7w + 1) -3/2 and -1/7 (b) (3e - 7) (3e + 7)	B2 B1 B2 5	B1 for (7w …1) (2w … 3) or split mid term and 1st step factor F.T. for pair of brackets B1 for (3e … 7)(3e … 7)
18.(a) Reflection (b) Translation to the right Clearly crosses (5 , 0) (c) Vertical translation downwards -6	B1 B1 B1 B1 B1 5	 Allow SC1 for left shift with 1 indicated. FT from their vertical translation to -4 only. Accept indication on the diagram
19.(x+3)(x-3) + 3(x+1) = 2(x+1)(x-3) x^2-9+3x+3 = 2 (x^2+x-3x-3) $x^2 - 7x = 0$ x = 0 AND x = 7	M2 A2 M1 A1 6	M2 for correct numerator/denominator = 2, OR M1 for 2 terms correct, or 1 slip, A1 LHS or numerator, A1 RHS expansion FT for equivalent level of difficulty CAO

Mathematics Paper 2 - Foundation Tier

Paper 2 Foundation Tier (Calculator allowed) Summer 2010	✓	Marks	Comments
Parts (a) & (b) marked at the same time			
1. (a) (56.94)			
13.96 (files)		B1	C.A.O.
22.08 (post-it)		B1	C.A.O.
19.02 (paper)		B1	C.A.O.
112(.00)		B1	F.T. their figures for 1 error Unsupported 112(.00) gets B4.
(b) (£) 11.2(0)		B1	F.T. their total (£)100.8(0) gets the B1.
		5	
2. kg	✓	B1	kilos gets B0
cm or mm	✓	B1	C.A.O.
kilometres or km	✓	B1	kilos gets B0
ml or cm^3 or l(itres)	✓	B1	C.A.O.
		4	Ignore quantities, e.g. 56kg OR 20cm etc, each get B1
3. (a) radius	✓	B1	C.A.O.
tangent	✓	B1	C.A.O.
chord	✓	B1	C.A.O.
3. (b) cuboid	✓	B1	C.A.O.
rhombus	✓	B1	C.A.O.
trapezium	✓	B1	C.A.O.
3. (c) Both lines of symmetry	✓	B2	B1 for either one of them and no incorrect lines. OR for both correct lines and 1 incorrect line.
All parts (a) – (c) marked at the same time			
4. (a) 5, 14, 12, 6, 3		B2	B1 for any three/four correct frequencies If frequencies score 0, then give B1 for all 5 correct tallies.
(b) 1		B1	F.T. their table of frequencies Accept 1 and 14 but not 14 alone.
(c) 0, 1, 2, 3, M along one axis OR 0,1,2,3,4		B1	Anywhere within the base (inc.) of the corresponding bar.
Uniform scale for the frequency axis starting at 0		B1	If no scale then B0, but allow one square to represent 1. If frequency scale starts with 1 at the top of the first square the starting at 0 will be implied for B1.
Five bars at correct heights (ignore widths of bars)		B2	F.T. their table of frequencies B1 for any 3 or 4 correct bars on F.T.
		7	
5. (a) Printing Cost = 300 × 9 + 2000		M1	
= (£) 4700		A1	C.A.O.
5. (b) Cost per book = (5000 – 2000) /600		M1	
= (£) 5		A1	C.A.O. Accept embedded answers.
6. (a) Sum of the numbers (511)	✓	M1	For attempt to add the numbers (totals of 421 – 601)
Sum / 7	✓	m1	If seen.
73	✓	A1	C.A.O.
6. (b) 51 53 75 78 81 83 90		M1	For attempting to order the numbers
Median = 78		A1	C.A.O.
6. (c) 39		B1	

Paper 2 - Foundation Tier (Calculator allowed) Summer 2010	✓	Marks	Comments
7. Man 5 to 7 ft OR 1·5 to 2·5 metres (Man 1cm Dinosaur = 8cm) Multiplying factor = 8 Estimate height of dinosaur = estimate × factor F.T. their estimates × their SF (5 − 11 inc.) = *correct answer for their figures* SC1 for answers which: (a) only give man's height as 1cm and dinosaur's as 8cm ± 2mm OR (b) a proper attempt at 'dividing' the dinosaur's height into equal parts	✓ ✓ ✓ ✓	B1 B1 M1 A1 4	**Unsupported answers marked as follows**:  F.T. their man's height estimate AND scale factors 5–11 inc. Correct units must be seen at least once to get the final A1
8. (a) 7/100		B1	C.A.O.
8. (b) 20/·84 OR 2000/84 OR 23.8(095..) OR 20/84 = 23 Change = 68p	✓ ✓ ✓	M1 A1 A1	Sight of (£)19.32 gets this M1 C.A.O. Allow A1 for an embedded 23 in their working. F.T. their 23
9. (a) (i) 5 (ii) 22		B1 B2	C.A.O. Watch out for 20÷5 = 4 which gets B0. B1 for sight of 28 OR 'their 28' – 6
9. (b) Add 7 (to the previous term) Multiply (previous term) by 3		B1 B1	Accept +7 Accept ×3
10. (a) 12 (º C)		B1	C.A.O.
10. (b) −4 (º C)		B1	C.A.O.
10. (c) (+) 7 (º C)		B1	B0 for −7
11. (a) euros = 1200 × 1.27 = (€) 1524		M1 A1	C.A.O. Ignore units
11. (b) Pounds = 486/1.35 = (£) 360		M1 A1	C.A.O. Ignore units. Allow embedded answers
12. (a) 1 − 8		B1 B1	C.A.O. F.T. 'their 1' – 9 if answer is negative.
12. (b) $x = 10/4$ I.S.W. (OR 2½ OR 2·5)		B2	Accept embedded answers such as $4 \times 2½ - 7 = 3$ F.T. $ax = b$ provided $a \neq 1$ B1 for $4x = 10$
12. (c) $4x + 2y$		B2	B1 for either $4x$ OR $2y$ in an expression of the form $ax \pm by$
13. 23×2 + 24×13 + 25×14 + 26×10 + 27(×1) OR 46 + 312 + 350 + 260 + 27 = 995		M1 A1	Not all required, allow 1 error in working shown. C.A.O.
14. (a) $\frac{46}{100} \times 54$ = 24·8(4) OR 25 ISW		M1 A1	 C.A.O. Ignore %.
14. (b) $\frac{77}{140} \times 100$ = 55 (%)		M1 A1	 C.A.O.

Paper 2 Foundation Tier (Calculator allowed) Summer 2010	✓	Marks	Comments
15. (a) Reason, e.g. outside the fish & chip shop **H1a**		E1	Accept reference to question 2 *Ignore additional information given by the candidate once a correct response has been given credit.*
15. (b) Any 2 of: No under 15s, 30 appears in two boxes, may object to giving their age **H1b**		E2	E1 for each response. Do not accept: Over 40s in one group, gaps between ages different *Ignore additional information given by the candidate once a correct response has been given credit.*
15. (c) (i) Explanation, e.g. vague, no options, asks 2 questions, same question twice, open questions, can't display answers easily, can't answer if answer to Q2 is NO, many payment methods, not same pattern as Q1 & Q2 (ii) States to give options OR give some options, e.g. card/cash OR deletes 1 question **H1c**		E1 B1	Do not accept: could be more than one answer *Ignore additional information given by the candidate once a correct response has been given credit.*
16. (a) Volume = $6 \times 4 \times 5$ $= 120$ cm^3		M1 A1 U1	 Independent of the other marks
16. (b) $(6\times4 + 4\times5 + 6\times5)$ Area = 2×74 OR $2 \times (6\times4 + 4\times5 + 6\times5)$ $= 148$ (cm^2)	✓ ✓ ✓	M1 m1 A1	 Dependent on the M1 C.A.O.
17. (a) Strategy, × 2.5 OR /4 then × 10 or equivalent Any 4 correct values seen All values correct *Accept 1000g and 2000g written as 1kg and 2kg – units need to be correct* **H2a**	✓ ✓ ✓	M1 A1 A1	**Ingredients to serve 10 people** **For the spaghetti**: **1000g/ 35oz** Flour; **10** eggs **For the sauce**: **10** tbsp olive oil; **5** onions; **2000g/ 70oz** fresh chopped toms.; **50** leaves of fresh basil
17. (b) 3.5 (oz) **H2b**		B1	C.AO.
18. (a) $7x - 5x = 3 - 2$ $2x = 1$ $x = ½$ ISW **H3a**	✓ ✓ ✓	B1 B1 B1	F.T. until 2nd error F.T. $ax = b$ provided $a \neq 1$
18. (b) a^7 **H3c**		B1	C.A.O.
18. (c) $b^2 + 3b$ **H3d**		B2	B1 for either term correct. Accept b×b or bb as b^2, and b3 or 3×b or b×3 for 3b. If B2 penalise further incorrect working -1
18. (d) $4f = e + 3$ $f = (e + 3)/4$		B1 B1	Isolating the tem in *f*. Allow B1 for $f = e/4 + 3$
19. (a) Any correct 5% of a value used in workings 800 – 5% of 800 (= 800 – 40) 760 – 5% of 760 (= 760 – 38) (£)722 **H6a**	✓ ✓ ✓ ✓	B1 M1 M1 A1	 OR B1 and M2 for 800×0.95^2 (B1 and M1 for 800x0.95) FT their 760, but not 800 CAO. Penalise extra working -1 Appreciate: Possible B1 and SC1 for (£)882 Simple depreciate: Possible B1 and M1, answer 720 gets B1 M1
19. (b) 1 inch as 2.5(4… cm) or 25(.4 … mm) Realising the need to divide by (4×7) Value between 20 and 30 inclusive ÷ (4×7) correctly evaluated, rounded or truncated **H6b**	✓ ✓ ✓	B1 B1 B1	If units are given they must be correct *SC1 if for value between 20 to 30 inclusive divided by 30 or 31 correctly evaluated, it is also possible to award 1st B1 for 25.* *A correct answer only of 0.9(mm per day) gets all 3 marks, other values do not*
20. $3.6^2 + 7.3^2 = AC^2$ $AC^2 = 66.25$ 8 OR 8.1 OR 8.14 (cm) **H9**	✓ ✓ ✓ ✓	M1 A1 A2	Correct statement (or cosine rule),accept as implied through working FT their AC^2 rounded to whole, 1dp or 2dp if M1 awarded. A1 for AC = 8.13(9…)

Mathematics Paper 2 -Higher Tier

Paper 2 (Calculator allowed) - Higher Tier Summer 2010		Comments
1.(a) Reason, e.g. outside the fish & chip shop (b) Any 2 of: No under 15s, 30 appears in two boxes, may object to giving their age (c) (i) Explanation, e.g. vague, no options, asks 2 questions, same question twice, open questions, can't display answers easily, can't answer if answer to Q2 is NO, many payment methods, not same pattern as Q1 & Q2 (ii) States to give options OR give some options, e.g. card/cash OR deletes 1 question	E1 E2 E1 B1 5	Accept reference to question 2 E1 for each response. Do not accept: Over 40s in one group, gaps between ages different *Mark responses in the sections they appear, do not pick out responses in other sections.* *In all parts ignore additional information given by the candidate once a correct response has been given credit.*
2.(a) Strategy, ×2.5 OR /4 then ×10 or equivalent Any **4** correct values seen All values correct *Accept 1000g and 2000g written as 1kg and 2kg – units need to be correct* (b) 3.5 (oz) CAO	M1 A1 A1 B1 4	**Ingredients to serve 10 people** **For the spaghetti** 1000g/35oz plain flour 10 eggs **For the sauce** 10 tbsp olive oil 5 onions 2000g/70oz fresh chopped tomatoes 50 leaves of fresh basil
3.(a) $7x - 5x = 3 - 2$ $2x = 1$ $x = ½$ ISW (b) $8(x + 2)$ (c) a^7 (d) $b^2 + 3b$	B1 B1 B1 B2 B1 B2 8	FT until 2nd error FT ax = b provided a ≠ 1 B1 for 4 (2x + 4) or 2 (4x +8) B1 for either term correct. Accept b×b or bb as b^2, and b3 or 3×b for 3b. If B2 penalise further incorrect working -1
4.(a) Uniform scale shown on y axis Any 2 correct points plotted Correct straight line drawn (b) (3+8)/2 or (-1+5)/2 or diagram showing strategy to find mid-point (5.5 , 2)	B1 B2 B1 M1 A2 7	Must be shown, but then FT an correct implied scale *Does not have to start at 0, in which case start value must be seen* B1 for any 1 correct plot *Previous B2 maybe implied by sight of a correct line* The diagram may show horizontal/vertical lines to the axes from points in a sketch. A1 for either. Accept other notation, e.g. missing brackets, x = 5.5, y = 2. *If either coordinate correct do not assume method – check! (5.5, …) implies M1 A1 BUT (… , 2) does not imply M1 A1. Check*
5.(a) All points correctly plotted (b) Line of best fit through Index 73, Arm 66 (c) Positive (d) (If no line) answer between 58 and 65 (cm)	B3 B2 B1 B1 7	B2 for 5 or 6 points correctly plotted, OR B1 for 3 or 4 points correctly plotted *SC1 all correctly plotted but joined. Reverse of axes is MR-1* B1 through means but not reasonable, OR B1 reasonable line not through means Do not accept description **FT their line if drawn**
6. (a) Any correct 5% of a value used in workings 800 – 5% of 800 (= 800 – 40) 760 – 5% of 760 (= 760 – 38) (£)722 (b) 1 inch as 2.5(4… cm) **or** 25(.4 … mm) Realising the need to divide by (4×7) Value between 20 and 30 inclusive ÷ (4×7) correctly evaluated, rounded or truncated	B1 M1 M1 A1 B1 B1 B1 7	 OR B1 and M2 for 800 x 0.95^2 (B1 and M1 for 800x0.95) FT their 760, but not 800 CAO. Penalise extra working -1 *Appreciate: Possible B1 and SC1 for (£)882* *Simple depreciate: Possible B1 and M1, answer 720 gets B1 M1* If units are given they must be correct *SC1 for value between 20 to 30 inclusive divided by 30 or 31 correctly evaluated, it is also possible to award 1st B1 for 25.* *A correct answer only of 0.9(mm per day) gets all 3 marks, other values do not*
7. (a) Mid points 155, 160, 165 155 x 10 + 160 x 23 + 165 x 27 (∑*fx* =) 9685 161.4(1666…) (b) **Polygon** with at least 3 vertices correctly plotted (vertical & horizontal) All 5 vertices of the **polygon** correct	B1 M1 A1 A1 M1 A1 6	 FT for their mid points from within group including bounds FT for correct sum of their *fx* terms FT their ∑*fx* / 60 correct evaluated. Accept 161 from working *Unsupported 161.4(1666…) awarded 4 marks. FT answer for bounds:(lower 159.4(1666…) , upper 163.4(1666…))* No polygon M0. Ignore bars if polygon drawn Mid points - allow intention to be on lines *SC1* for a correct polygon translated horizontally or all correct plots with no polygon (or curved polygon!)

Paper 2 (Calculator allowed) - Higher Tier Summer 2010		Comments
8. (a) 56.42 / 1.24 = (£) 45.5(0) (b) Idea 211.50 is 117.5% 211.50 / 117.5 x 100 = (£) 180 VAT (£) 31.5(0) "their 31.5(0)" x 1.24 = 39(.06) (Euros) OR correct FT	M1 A1 B1 M1 A1 A1 M1 A1 8	*Alternative (b):* *211.50 x 1.24* *M1* *262.26 (Euros)* *A1* *Idea "their 262.26" is 117.5%* *B1* *"their 262.26" /117.5 x 100* *M1* *= 223.2 (Euros)* *A1* *VAT 39(.06) (Euros)* *A1*
9. $3.6^2 + 7.3^2 = AC^2$ $AC^2 = 66.25$ 8 or 8.1 or 8.14 (cm)	M1 A1 A2 4	Correct statement (or cosine rule),accept as implied through working FT their AC^2 if M1 awarded, rounded to whole or 1dp or 2dp. A1 for AC = 8.13(9…) or FT unrounded or truncated answer
10. $V^2 = PR$ or $V/\sqrt{R} = \sqrt{P}$ $V^2/R = P$ or $(V/\sqrt{R})^2 = P$ or $V^2 \div R = P$	M1 A1 2	Penalise further incorrect working -1
11. (a) (i) 3.4×10^{-2} (ii) 6×10^6 (b) (i) $3.5(1) \times 10^7$ (ii) $1.7(2\ldots) \times 10^{14}$	B1 B1 B2 B2 6	 B1 for 35100000 or 35.1×10^6 B1 for $0.17(2) \times 10^{15}$ or correct not in standard form *Penalise incorrect notation once only -1*
12. (a) FG = 17.9 x sin 34^0 FG = 10.(0095…) (b) tan y = 13.2 / 18.7 = 35(.2…) (Accept answers in the range 34.9 to 35.4)	M2 A1 M1 A2 6	M1 for $\sin 34^0 = FG/17.9$ (or equivalent for sine rule) OR alternative complete method A1 for tan y = 0.7(0588…)
13.(a) 8**x** + 3**y** (b) -5**x** + 9**y**	B1 B1 2	Must be in simplest form (a) & (b), no ISW!
14. (a) y α 1/x OR y = k/x 12 = k/2 y = 24/x x | 0.1 | 2 | **3** y | **240** | 12 | 8	B1 M1 A1 B2 5	 FT non linear only Maybe implied in part (b) FT their non linear expression B1 for each value
15.(a) Sight of x + 5 (as height) Area = ½ (x+5)(x+3x+2) Convincing step leading to $2x^2+11x+5$ (b) **3**x^2 + 11x +5 = 15 or equivalent x = { -11 ± √(11^2 – 4 x 3 x -10)}/6 Allow 1 slip = {-11 ± √241}/6 0.75 (cm)	B1 M1 A1 B1 M1 A1 A1 7	 or equivalents FT $2x^2+11x+5=15$, x= { -11 ± √(11^2 – 4 x 2 x -10)}/4 Allow 1 slip = {-11 ± √201}/4 0.79 (cm) *Trial and improvement:* *M1 2 trials correct between 0.7 & 0.8* *A1 Trail 0.754 or 0.755 correct (OR for FT 0.794 or 0.795)* *A1 0.75 (cm) (OR for FT 0.79 cm)*
16. (a) $BC^2 = 8.6^2 + 6.7^2 - 2x8.6x6.7x\cos 140$ $BC^2 = 207.(12896\ldots)$ BC = 14(.3919… cm) (b) Area = ½ 8.6 x 6.7 x sin 140 = 18.5(187…cm^2) (c) Use of **their** Area = ½ base x height, 18.5187… = ½ 14.39… x ht Height 2.5(73… cm)	M1 A1 A1 M1 A1 M1 A1 7	 FT their values from (a) & (b)
17. (a) x^2 horizontal plots at 1, 4, 9, 16 and 25 Plot all points correctly (b) b= 200 ± 10 Use of gradient to find a a = -8 ± 2	B1 B1 B1 M1 A1 5	Allow 1 slip Horizontally & vertically correct Accept graphical or substitution method FT their graph. An answer of 8±2 implies M1
18. (a) Sin curve, through the origin ±1 shown, and ±180^0 shown or implied (b) -52^0 and -128^0 with no other angles	M1 A1 B2 4	 B1 for a correct angle. Accept unrounded values

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