WJEC
CBAC

GCSE MARKING SCHEME

MATHEMATICS - TWO TIER LEGACY

NOVEMBER 2011

INTRODUCTION

The marking schemes which follow were those used by WJEC for the November 2011 examination in GCSE MATHEMATICS - TWO TIER LEGACY. 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.

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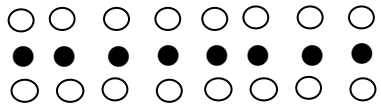
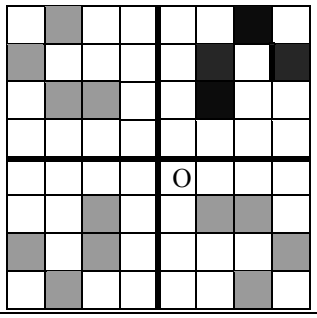
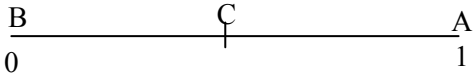
PAPER 1 – FOUNDATION TIER

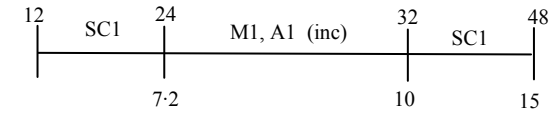
2011 Autumn Paper 1 (Non calculator) Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (14/11/2011) (Page 1)
1. (a) (i) 23062	B1	C.A.O.
(ii) eighty five thousand (one) hundred (and) five	B1	C.A.O.
(b) (i) 23, 47	B1	C.A.O.
(ii) 88, 46	B1	C.A.O.
(iii) 49	B1	Accept 7×7 OR 7^2
(c) (i) 5630	B1	C.A.O.
(ii) 5600	B1	C.A.O.
(d) 1, 3, 5, 15	B2	B1 for any 2 or 3 factors and no incorrect numbers. OR the 4 correct factors and 1 incorrect number.
(e) (i) 9832	B1	C.A.O.
(ii) 2398	B1	C.A.O.
	11	
2. (a) 9 12 11 7 1	B2	B1 for any three correct (tallies and) frequencies. **Frequencies take precedence over tallies If freq. score 0 then all correct tallies score B1**
(Total =) 40	B1	F.T. their frequencies. If frequencies get 0
(b) E	B1	F.T. their table of frequencies B0 for 12, but E and 12 is B1
(c) A, E, N, S, T along one axis	B1	OR indicated on the bars themselves
Uniform scale for the frequency axis starting at 0 (No numbers interpreted as 1-12 in ones)	B1	F.T. their table of frequencies. Use of any other scale must be clearly indicated on graph
Five bars at correct heights	B2	B1 for at least 3 correct bars on F.T. Bars can be of varying width
	8	**B1 for 5 correct bars with frequency polygon**
3. (a)		
cuboid	B1	C.A.O.
trapezium	B1	**Line to parallelogram gets B0**
pentagon	B1	C.A.O.
equilateral triangle	B1	C.A.O.
(b) parallel line	B1	Clear intent to be parallel.
	B1	
(c) Lines	B1	F.T. the ends of their lines
Curve	7	
4. (a) (i) 40	B1	C.A.O.
(ii) 58	B1	C.A.O.
(b) ·75	B1	C.A.O.
·76	B1	C.A.O.
·72 $\frac{3}{4}$ 76%	B1	Or equivalent. Correct answer OR F.T. their values.
	5	
5. (a) 11×5	M1	
$= 55$	A1	C.A.O. Candidates who get 55 then multiply by 2 etc get M0, A0.
cm^2	U1	Independent of other marks
(b) 32 (cm)	B1	C.A.O.
	4	

2011 Autumn Paper 1 (Non calculator) Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (14/11/2011) (Page 2)
6. (a) 	B1	C.A.O.
(b) 8 10 16 20	B1 B1	C.A.O. C.A.O.
(c) (i) 90 (ii) 100	B1 B1 5	C.A.O. C.A.O.
7. All 3 quadrants correct. 	B3 3	B1 for each correct quadrant.
8. (a) 36 × 48 288 1440 1728 = 1728 (bottles)	M1 A1 A1	Any correct complete method for the multiplication of 36 by 48 For either 288 or 1440 C.A.O. Place value errors get M0, A0, A0
(b) e.g. 1% = 3 AND 8% = 3 × 8 24	M1 A1 5	Any valid method M1 for $\frac{8}{100} \times 300$ OR $\frac{2400}{100}$ SC1 for (un)supported 24**% OR (0).24** **M1, A0 if they go on to 300±24** **£24 gets M1, A1**
9. Procedure for marking Q9 (5, 1) (5, 5) (−3, 1) (−3, 5) 1. Mark any writen coords. up to 8 independent ones as B1 if correct, −1 if incorrect down to 0. 2. If the mark is 4 or 3 then STOP at that point. 3. If the mark is 2 award an extra B1 if all 4 correct points are plotted unambiguously. 4. If the mark is 1 or 0 then use the SCs in the right hand column of this Mark Scheme.	B1 B1 B1 B1 4	Reversed coordinates get 0 each time. **Penalise -1 once only for incorrect coordinate notation e.g. (x5,y1).** **SC2 for ONLY all the 4 correct points on the diagram OR SC1 for any 2 correct points (out of a maximum of 4 points) on diagram.**
10. (a) x – 8 (p) I.S.W. (b) 70b (g) I.S.W. (c) 14 (d) 7c – 3d (e) 2x + 6 **I.S.W**	 B1 B1 B2 B2 B1 7	Ignore x= OR =x OR y= etc . Ignore use of capital letter but use of a different letter is penalised −1 once only. C.A.O. Allow 70 × b OR b × 70 OR b70. **70+b=70b gets B0** B1 for either –6 OR 20 B1 for either 7c OR – 3d in an expression of the form ac±bd B1 for 7c + – 3d C.A.O.

2011 Autumn Paper 1 (Non calculator) Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (14/11/2011) (Page 3)
11. (a) (180 – 52) / 2 = 64 (º) (x=) 116 (º) (b) Internal angle = 95 (y =) 360 – 100 – 68 – 95 = 97 (º)	 M1 A1 B1 B1 M1 A1 6	Look at their diagram also C.A.O. F.T. 180 – 'their 64', **but F.T. 52 only if it is shown to be the right hand 'base' angle in the triangle.** C.A.O. F.T. 'their 95' **Watch for 180+85−100−68 which is correct for the M1 B1M0A0 for y = 95 only seen**
12. (a) AB = 11·5 cm AB (in km) = 11·5 × 5 = 57·5 (km) (b) Bearing Distance	B1 M1 A1 B1 B1 5	Allow ±2mm. **That is, allow 11·3 to 11·7.** F.T. their AB Use overlay Allow ±2º Allow ±2mm
13. (a) False (indicated or implied) AND a counter-example, e.g. halving 16 ends up as 8 (b) False (indicated or implied) AND a counter-example, e.g. 33 is not prime	B2 B2 4	B1 for an explanation that is on the correct lines, but has an error, e,g**. '36 divides into 2 to make 18' or '36 ÷ 2 = 17'** B1 for an explanation that is on the correct lines, but has an error.
14.(a) Strategy, e.g. knowing that the probabilities add to 1, or that RED with BLUE is 0.5, or Green the same as Red RED 0.18 BLUE 0.32 (b) 0.12 + 0.18 0.3(0) or 30% **H1**	M1 A1 A1 M1 A1 5	Also for their P(Red) + their P(Blue) = 0.5 Either correct response implies M1 also. **C.A.O.** **C.A.O.**
15.(a) 90 (kg), 172 (cm) (b) Positive (c) Suitable line, with some points above and below (d) Answers in the range >60 (kg) but ≤ 70 (kg) (e) No, with a suitable reason e.g. No as there is no data around 210cm, or "graph doesn't go that high" **H2**	B2 B1 B1 B1 B1 6	B1 for either or if reversed Do not accept a description No requirement to pass through the means OR Suitable answer from their line of best fit No maybe implied in their statement **Allow descriptions of the scale to go up to 200.**
16.(a) 60/80 × 100 75(%) (b) 300/12 × 5 OR 300/12 × 7 (£)125 (£) 175 (c) 75/100 × 562.80 OR ¾ × 562.80 OR 281.4(0) + 140.7(0) (£)422.1(0) **H5**	M1 A1 M1 A1 A1 M1 A1 7	 Allow SC1 for 75/100 **Allow for 300/'their 5+7' × 5 OR × 7** **C.A.O.** **C.A.O.** OR equivalent
17.(a) $4n + 2$ (b) $3x + 7x = 8 - 4$ $x = 4/10$ (or equivalent) **ISW.** **H6**	B2 B1 B1 4	B1 for 4n **4+n = 4n gets B0** FT until 2nd error Accept x = -4/-10
18.(a) E.g. $2^3 \times 3$ not even powers **OR 'No WHOLE number multiplied by itself gives 24 OR $2\sqrt{6}$ is not a whole number.** (b) Method that produces at least 2 correct prime factors Sight of correct factors (2, 2, 2, 2, 7) $2^4 \times 7$ **H7**	E1 M1 A1 B1 4	**Accept 'no number times itself gives 24' only with 4×4 and 5×5 given. Accept 4×4=16 and 5×5=25.** **Do not accept '16, 25' only.** Do not accept "not even powers" without $2^3 \times 3$ Before 2nd error Ignore 1s seen FT their factors (with at least one index >1 used). Do not ignore 1s.

PAPER 2 – FOUNDATION TIER

2011 Autumn Paper 2 (Calculator allowed) Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (21/11/2011) (Page 1)
1. (a) (£120.38) 11.04 25.38 3.8(0) (£) 160.6(0) **I.S.W.** (b) e.g. 10% = 16.06 5% = 16.06/2 = (£) 8.03	 B1 B1 B1 B1 M1 A1 6	 C.A.O. C.A.O. C.A.O. F.T. their figures for one error F.T. 'their 160.6' **Award M1, A1 for (£)152.57 OR 'their (£)152.57' on F.T.**
2. km kg ℓ m	B1 B1 B1 B1 4	C.A.O. C.A.O. Accept cm^3 OR cc OR ml C.A.O.
3. 430 (g) 190 (g) (430 – 190)/40 = 6 (g)	B1 B1 M1 A1 4	C.A.O. C.A.O. F.T. 'their 430 – 'their 190'
4. (a) Wage = 7 × 15 + 150 = (£) 255 ISW (b) Number of hours = (270 − 180) / 15 = 6	M1 A1 M1 A1 4	 C.A.O. Correctly substitution including the division C.A.O. Accept embedded answers such as 270 = 6×15 + 180
5. (a) Counting squares 42 – 48 210 – 240 (b) d c b a	M1 A1 B1 B4 7	 F.T. 'their 42–48'×5 **correctly calculated** B1 for each
6. (a)  (b) No – number of pupils is odd, (so not equal number of girls and boys.) OR depends on how many tickets the girls and boys bought.	B1 B1 B1 E1 4	A marked at 1. B should be almost at 0 **(0 to under the p in probabilty)** C marked at centre of the line. Along these lines **No may be implied in their explanation** **Reason overides the 'Yes' or 'No'' in the comments column**
7. Units used = 246 **OR 7792×12 − 7546×12** Cost of units = (£) 29.52 **OR 2952(p)** Total cost = (£) 51.77 **OR 5177(p)**	B1 B2 B1 4	 F.T. 'their units'. **B1 for £2952** F.T. for 'their cost of units + £22.25
8. (a) angle at A = 54º AC = 12·6 Complete triangle (b) Angle	B1 B1 B1 B1 4	± 2º ± 2mm Only if at least one B1 already awarded F.T. if completed triangle **joining BC.** **(Allow 46 – 50 in a 'good' triangle)** **Complete 'correct' triangle but reflected gets B2.**
9. (a) Sum = 1176 Mean = 1176/8 = 147 (cm) (b) 118 120 137 141 151 153 175 181 146 (c) 63 (cm)	M1 m1 A1 M1 A1 B1 6	For attempt to add the numbers **(1000 – 1350 will imply M1)** For dividing a number by 8 **(dependent on the M1)** **C.A.O.** Arranging the numbers in order **(ascending or descending)** **(Award the M1 for 7 of the numbers in correct order)** C.A.O. C.A.O.

2011 Autumn Paper 2 (Calculator allowed) Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (21/11/2011) (Page 2)
10. Door 6 to 8 ft OR 1·8 to 2·5 metres Door 2·5cm Building = 10cm Multiplying factor = 4 Height = door's estimate × their SF (2-6) = SC1 for answers which: (a) **give only door's height as 2.5cm and building height as 10cm** OR (b) **a proper attempt at 'dividing' the building's height into equal 'door' heights**	B1 B1 M1 A1 4	**Unsupported answers marked as follows**:  F.T. their door's height estimate AND scale factors 2 – 6 inc **Correct units for their numerical answer must be shown somewhere in their working for this A1**
11. (a) D (b) C (c) Ran a little then turned back to the start	**B1** **B1** E1 3	Along these lines
12. (a) 12 14 20 22 11 13 19 21 (b) 3/16 ISW (c) $\frac{3}{16} \times 80$ = 15	B2 B2 M1 A1 6	C.A.O. B1 for any 4 F.T. their table in (b) and (c) B1 for a numerator of 3 in a fraction less than 1. B1 for the 16 in a fraction <1. Do not penalise incorrect reduction of fractions. F.T. 'their 3/16' if a fraction <1. **but not ½.** **If they have incorrectly reduced their answer in part (b) and use it in part (c), then it is M1, A0 in part (c).** **15/80 gets M1, A0** NOTES Penalise –1 for use of words such as "3 out of 16", "3 in 16" OR "3:16" **OR 3 over 16.** When fraction and wrong notation seen, DO NOT penalise wrong notation.
13. (a) 2p (b) (i) (x =) 75 (ii) 3y = 6 (y =) 6/3 ISW (=2) (c) 2 (d) 35 = 2×4 + 3M 3M = 27 M = 27/3 ISW (=9)	B1 B1 B1 B1 B1 B1 B1 B1 8	Accept embedded answers such as 75/5 = 15 Accept embedded answers such as 3×2 + 11 = 17 F.T. until 2nd error. **Final B0 for 6÷3** F.T. until 2nd error. **F.T. aM=b (a≠1)** **Accept embedded answers such as 35 = 2×4 + 3×9**
14. Cost of all adult tickets = £488.8(0) – 25 × (£)7.6(0) = (£) 298.8(0) Cost per ticket = 298.8(0)/24 = (£) 12.45	M1 A1 M1 A1 4	C.A.O. F.T. 'their 298.80' but NOT (£)488.80 **Note: Pupils who interchange the 25 and 24 should be marked as if correct then MR-1.**
15. (a) 11/40 ISW (b) (0×10) + 1×19 + 2×6 + 3×4 + 4×1 = 47	B2 M1 A1 4	C.A.O. B1 for 11/m in a fraction < 1, B1 for n/40 (if < 1) Penalise –1 for incorrect notation such as 11:40 OR 11 out of 40 etc Allow one term to be incorrect or missing. Allow M1, A0 for 47/40

2011 Autumn Paper 2 (Calculator allowed) Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (21/11/2011) (Page 3)
16. (a) $\frac{17}{100} \times$ (£) 269	M1	For a correct method of finding 17% and subtracting from 269
= (£) 45.73	B1	C.A.O.
Internet price = (£)223.27	A1	F.T. 'their 45.73' if M awarded
		OR
OR $\frac{83}{100} \times$ (£) 269		M1 for a correct method of finding 83%
		B1 for sight of 83
Internet price = (£)223.27		A1 C.A.O.
(b) 1/3 × 2 × 2 × 5	M1	
= 20/3	A1	
7 tins	B1	**F.T. 'their 20/3' rounded up.**
	6	
17. (a)(i) Their readings at 14:30 & 13:00 and intention to subtract	M1	116 – 64. Allow for 'their readings' with intention to subtract
= 52 (km)	A1	CAO
(ii) 52/ 1.5	M1	FT their (i) **Watch for 144/4 (= 35) which gets M0, A0**
34.666(km / h)	A1	Accept rounded or truncated. *However, do not accept an answer of 35 without working or from incorrect working SC1 for an answer of 40*
(b) Explanation, e.g. "first half journey in just over an hour", "steeper to start"	E1	**Accept, e.g. "more vertical", "line increases means it is quicker"**
H1	5	
18.(a) 0.72	B2	B1 for 0.7(17694….)
(b) Any correct 8% of a value used in workings	B1	**Could be (£)128 OR (£)256 OR 'their 117.76'**
1600 – 8% of 1600 (= 1600 – 128)	M1	OR M2 for 1600×0.92^2 (M1 for 1600×0.92)
1472 – 8% of 1472 (= 1472 – 117.76)	m1	FT their 128
(£) 1354.24	A1	CAO. Penalise extra working -1
		Appreciate: Possible B1 and SC1 for (£)1866.24
H3ac	6	*Simple depreciate: Possible B1 and M1 (1344)*
19. 700× 1.64	M1	
= ($)1148 (Canadian dollars)	A1	
Conclusion, has to buy 1100 (Canadian dollars)	A1	FT their rounding down to nearest 50 provided M1
1100 ÷1.64	M1	FT their amount of Canadian **dollars 'if changed to a $50 amount'. Do NOT F.T. 1148 OR 'their 1148'**
= 670.73(17..)	A1	**£ must be given. Accept £670.73p**
£670.73	A1	**For example, 1148 changed to 1150 (incorrect) gets M1, A1, A0, but on F.T. 1150/1.64 gets M1, 701.21(9) gets A1 and finally £701.22 gets A1 giving 5 marks in total.**
		Accept an answer of '29.27 in credit' or similar, but an answer of 29.27 would not get the final A mark, but do award the previous M1 A1 as alternative method
H4	6	
20.(a) ½ (8.2 + 12.8) × 7.6	M1	
79.8 (cm^2)	A1	Accept 80 from working, **but unsupported 80 gets M0, A0.**
(b) ½ π ×22.4^2	M2	Allow M1 π ×22.4^2
= 787.7(6…) to **788.2(6496)**	A1	A1 1575.5.. to **1576.5…**
		SC1 for answer 3151 to **3153.05...**
H6bc	5	

PAPER 1 – HIGHER TIER

Higher Tier November 2011 Paper 1	Mark	Comments (Final Post-conference version 13.11.11)
1.(a) Strategy, e.g. knowing that the probabilities add to 1, or that RED with BLUE is 0.5, or Green the same as Red	M1	Also for their P(Red) + their P(Blue) = 0.5 Either correct response implies M1 also
RED 0.18	A1	
BLUE 0.32	A1	
(b) 0.12 + 0.18	M1	
0.3(0) or 30% or equivalent	A1	
	5	
2.(a) 90 (kg), 172 (cm)	B2	B1 for either or if reversed
(b) Positive	B1	Do not accept a description
(c) Suitable line, with some points above and below	B1	No requirement to pass through the means
(d) Answers in the range >60 (kg) but $\leq$ 70 (kg)	B1	OR Suitable answer from their line of best fit
(e) No, with a suitable reason	B1	No maybe implied in their statement
e.g. No as there is no data around 210cm, or "graph doesn't go that high"	6	
3.(a) a = 70°, b = 110°, c = 70°	B3	B1 for each. FT b = 180 – a and c = a or c = 180 - b
(b) 360/10	B1	OR alternatively: 8 triangles at 180 or 1440 B1
180 – 360/10	M1	(8 × 180)÷ 10 M1
$144^{(0)}$	A1	144 A1
(c)(i) Bearing 326 $\pm$2°	B1	
(ii) 038° $\pm$2° from C	M1	
305° $\pm$2° from A	M1	
D indicated or implied by point	A1	Depends on at least 1 M mark
	10	
4. (a) Correct reflection in the line x = -1	B2	B1 for a reflection in any line indicated or either axis, OR B1 for drawing x =-1
(b) Correct translation	B1	
(c) Enlargement ½	M1	Note: Scale factor 2 is NOT MR, M0 A0
Correct position	A1	
(d) Bisector of angle CAB	B1	$\pm 2^0$
Arc radius 5cm centre A	B1	$\pm$ 1 mm
Correct region shaded	B1	FT for intention of bisector & arc
	8	
5.(a) 60/80 × 100	M1	
75(%)	A1	Allow SC1 for 75/100
(b) 300/12 × 5 OR 300/12 × 7	M1	Intention 300/(5+7) then ×5 or ×7
(£)125	A1	CAO
(£) 175	A1	CAO
(c) 75/100 × 562.80 OR ¾ × 562.80 OR 281.4(0) + 140.7(0)	M1	OR equivalent e.g. attempting to find 7 lots of 10% and adding 5%
(£)422.1(0)	A1	
	7	
6.(a) $4n + 2$	B2	B1 for 4n. B0 for n + 4 = 4n
(b) $3x + 7x = 8 - 4$	B1	FT until 2nd error
$x = 4/10$ (or equivalent)	B1	ISW. Accept x = -4/-10
	4	
7.(a) E.g. '$2^3 \times 3$ not even powers',	E1	Accept 'no number times itself gives 24' only **with** 4×4 **and** 5×5 given. Accept 4×4 = 16 **and** 5×5 = 25. Do not accept '16, 25' Do not accept "not even powers" without $2^3 \times 3$ Accept '$2\sqrt{6}$ not a whole number'
(b) Method that produces at least 2 correct prime factors	M1	Before 2nd error
Sight of correct factors (2, 2, 2, 2, 7)	A1	Ignore 1s seen
$2^4 \times 7$	B1	FT their factors (with at least on index >1 used). Do not ignore 1s.
(c) 3/5 or 0.6	B1	CAO
(d) 7/3 × 24/7	M1	Unsimplified answer award M1 only
= 8	A1	
	7	
8.(a) 2045 and 2055	B2	B1 for each. Accept 2044.999(9999...) not 2044.9
(b) Sight of least width 1035 (mm)	B1	
2045+1035+2045+1035	M1	FT their least length, **not** 2050 AND their least width, **not** 1040
6160 (mm)	A1	CAO
	5	

Higher Tier November 2011 Paper 1	Mark	Comments (Final Post-conference version 13.11.11)
9. (a) $(x-4)(x+2)$	B2	B1 for $(x \quad 4)(x \quad 2)$ with no or incorrect signs
(b) $2x^2 - 9x - 5$	B2	B1 for $2x^2$ -5 or $-9x$ as part of a trinomial. ISW 'solving'
(c) $21 - 2x = 20 - 5x$	B1	FT until second error
$3x = -1$	B1	
$x = -1/3$ (= -0.33….) ISW	B1	Do not accept -0.3 unless -1/3 seen. FT: 21 – 2x = 20 – x B0, -x = -1 B1, x = 1 B1 FT: 21 – 2x = 4 – 5x B0, 3x = -17 B1, x = -17/3 B1 125 – 10x = 4 – x is 2 errors so no FT
(d) $24x^{10}y^7$	B2	B1 for any two factors number, x & y correct, or correct but with "times" left in expression
(e) a^3	B1	CAO
	10	
10.(a) 40, 50, 56, 60	B1	FT to (b) only if cumulative in (a).
(b) At least 5 plots correct horizontally	B1	B0 for bars, B1 for vertical lines. Accept plots, e.g 89 to 90 for <90
At least 5 plots correct vertically	B1	B1 for bars or vertical lines
All **7** points plotted correctly **and** joined	B1	Joined with a curve or a straight line
(c) (i) Median from their cum. freq. diagram	B1	FT their cumulative frequency or other **cumulative** diagram in (c)
Difference of heart rate reading for 45 & 15	M1	Allow consistent misread of the scale.
Interquartile range	A1	Correct for their cumulative freq. diagram
	7	
11.(a) $(3x+2)(2x-5)$	B2	B1 for $(3x\ldots2)(2x-\ldots)$
$x = -2/3$ and $x = 5/2$	B1	FT their pair of brackets
(b) $(2y+9)(2y-9)$	B2	B1 for $(2y\ldots9)(2y\ldots9)$
	5	
12.(a) 0.3, 0.2, 0.8, 0.2, 0.8	B2	B1 0.3 with one other correct, or 0.2 & 0.8 as a pair
(b) 0.7×0.2	M1	
$= 0.14$	A1	FT from their tree, not 0.5s and must be <1
	4	
13.(a) Method for either (i) or (ii)	M1	(Accept missing brackets if no other marks in (a))
(i) $3\mathbf{a} + 2\mathbf{b}$	A1	Simplifying $-(2\mathbf{a} + \mathbf{b}) + 5\mathbf{a} + 3\mathbf{b}$ correctly
(ii) $9\mathbf{a} + 6\mathbf{b}$	A1	Simplifying $-(5\mathbf{a} + 3\mathbf{b}) + 14\mathbf{a} + 9\mathbf{b}$ correctly
(b) **KM** = $12\mathbf{a}+8\mathbf{b}$ seen or implied	M1	FT (i) + (ii)
Showing p = 4	A1	CAO
(c) Collinear (or parallel)and 4 times length,	E2	E1 for parallel OR collinear OR 4 times length
OR Collinear with ratio KL:LM as 1:3, OR equivalent	7	Accept 'all on straight line' for collinear
14.(a) $x = -3, 1, 5$	B1	All three required
(b) Tangent at $x = 4$	B1	
Gradient = change y / change x	M1	Independent of tangent drawn or not, no values required
11 from a tangent or ft reasonable **tangent**	A1	
(c) Line $y = 10$ stated or shown	B1	Maybe implied
Solution ~ -2.6, ~0.4, ~5.3	B2	FT from incorrect line B1 for 2 solutions, or 3 solutions from consistent MR
(d) Using trapezium rule or evidence of summation of areas.	M1	Must be for required area
At least 2 correct non zero y values.	M1	Equal strips gives (-3,0),(-2,21),(-1,24),(0,15),(1,0)
Correct expression for total area.	A1	Allow 1 error in y value. 10.5+22.5+19.5+7.5
Answer 60	A1	CAO
	11	An answer of '260' gets M0, M1, A0, A0 but then SC1
15. (a) (x=) 0.6525252… & (100x=) 65.252525… with attempt to find the difference	M1	Or equivalent
646 / 990	A1	A final answer of 64.6/99 is M1 only
(b) $65\sqrt{5}$	B2	B1 for $325=5\times5\times13$ or $\sqrt{325} = 5\sqrt{13}$ or partial simplification or shown by division
	4	

PAPER 2 – HIGHER TIER

Higher Tier November 2011 Paper 2	Mark	Comments Final 28/11/11
1.(a)(i) Their readings at 14:30 & 13:00 and intention to subtract	M1	116 – 64. Allow for 'their readings' with intention to subtract
= 52 (km)	A1	CAO
(ii) 52/ 1.5	M1	FT their (i)
34.666(km / h)	A1	Accept rounded or truncated. *However, do not accept an answer of 35 without working or from incorrect working* *SC1 for an answer of 40*
(b) Explanation, e.g. "first half journey in just over an hour", "steeper to start"	E1	Accept, e.g. "more vertical", "line increases means it is quicker"
	5	
2.(a) -5, -2, 3	B2	B1 for any two terms in correct position. Award B1 for -6, -5, -2
(b) $x(x - 5)$	B1	CAO
(c) $120(2y - 3)$	B2	B1 for correct partially factorised, or 120(2y …) or 120(… -3) B0 for 240(y – 1.5)
(d) $12x – 44 = 40$ OR $3x-11 = 40/4$	B1	FT until 2nd error in (d)
$12x = 40+44$ OR $3x = 10 + 11$	B1	
$x = 84/12$ (ISW) OR $x = 21/3$ (ISW) OR $x = 7$	B1	Accept embedded answer
(e) 9	B1	CAO
	9	
3.(a) 0.72	B2	B1 for 0.7(17694….)
(b) 18/100 × 45 (= 8.1(0))	M1	
45 + their tax	m1	Alternatively allow M2 for 1.18 × 45
(£)53.1(0)	A1	CAO
(c) Any correct 8% of a value used in workings	B1	
1600 – 8% of 1600 (= 1600 – 128)	M1	OR M2 for 1600×0.92^2 (M1 for 1600× 0.92)
1472 – 8% of 1472 (= 1472 – 117.76)	m1	FT their 128
(£) 1354.24	A1	CAO. Penalise extra working -1
	9	*Appreciate: Possible B1 and SC1 for (£)1866.24* *Simple depreciate: Possible B1 and M1 (1344)*
4. 700× 1.64	M1	
= ($)1148 (Canadian dollars)	A1	
Conclusion, has to buy 1100 (Canadian dollars)	A1	FT their rounding down to nearest 50 provided M1
1100 ÷1.64	M1	FT their amount of Canadian dollars but not 'their 1148', for M
= 670.73(17..)	A1	and 1st A only, however FT multiples of 50 for all marks
£670.73	A1	£ must be given. Accept £670.73p
	6	*Accept an answer of '£29.27 in credit' or similar, but an answer of 29.27 would not get the final A mark, but would do award the previous M1 A1 as alternative method*
5.(a) Mid points 4, 12 and 20	B1	Two shown is sufficient if no error
$\frac{(15\times4 + 67\times12 + 18\times20)}{100}$ (OR 60+804+360 = 1224)	M1	Attempt ∑fx for their mid-points that fall within the intervals including bounds
	m1	Attempt their∑ fx divided by 100
= 12.2(4)	A1	CAO. Accept 12 only if all working shown
(b)Polygon with at least 3 vertices correctly plotted (vertical & horizontal)	M1	No polygon M0. Ignore bars. Mid points - allow intention (e.g. from 10 to 12 inclusion)
All 5 vertices of the polygon correct	A1	*SC1* for a correct polygon translated horizontally or all correct plots with no polygon (or curved polygon!). Ignore joining to axis or to form a complete shape
	6	
6.(a) $2 \times \pi \times 7.2$	M1	
= 45.2(16…) to 45.3… (cm)	A1	
Degree of accuracy, whole or 1 d.p.	A1	FT rounding to whole or 1d.p. provided M1 A1 awarded
(b) $½ \pi \times 22.4^2$	M2	Allow M1 $\pi \times 22.4^2$
= 787.7(6…) to 788.2(…cm^2)	A1	A1 FT 1575.5.. to 1576.3… *SC1 for answer 3151 to 3152.65…*
(c) ½ (8.2 + 12.8) × 7.6	M1	
79.8 (cm^2)	A1	Accept 80 from working
	8	
7. (a) $18k – 6q = dk + 7$	B1	Expand *FT each stage for equivalent level of difficulty*
$18k – dk = 6q + 7$	B1	Collect *until 2nd error*
$k (18 – d) = 6q + 7$	B1	Factorise
$k = (6q+7)/ (18-d)$	B1	Divide
(b)(i) 7.6×10^7	B1	CAO
(ii) 8×10^8	B1	CAO *Penalise incorrect notation once only*
	6	

Higher Tier November 2011 Paper 2	Mark	Comments Final 28/11/11
8. (a) One correct evaluation, $3 \le x \le 4$ 2 correct evaluations, $3.55 \le x \le 3.7$, one either side of 0 2 correct evaluations, $3.55 \le x \le 3.65$, one either side of 0 OR correct evaluation of 3.65 if previous B1 awarded 3.6 *No calculations shown: accept "too high",">", etc.* (b) Correctly setting up 2 equations for eliminating 1 variable First variable's value Correctly substituting their first variable Second variable's value	B1 B1 M1 A1 M1 A1 A1 M1 A1 8	x $2x^3 + x - 100$ 3 -43 3.1 -37.318 3.2 -31.264 3.3 -24.826 3.4 -17.992 3.5 -10.75 **3.55 -6.97225** 3.6 -3.088 **3.65 0.90425** 3.7 5.006 3.8 13.544 3.9 22.538 4 32 Or alternate substitution method, allow one slip in multiplication in non-eliminate Either $x = 2$ or $y = -6$ FT their first variable FT their first variable
9.(a) $5.4/3 \times 2.5$ $= 4.5$ (cm) (b) $3.6 / 5.4/3$ $= 2$ (cm)	M1 A1 M1 A1 4	Or equivalent calculation that could lead to correct answer Or equivalent calculation that could lead to correct answer If no marks in (a) or (b) then award *SC1 for sight of scale factor 1.8*
10.(a) $(AD^2 =) 12.3^2 - 6.2^2$ $(AD^2 =) 112.85$ $AD = 10.6(23\ldots$ cm) (b) Strategy, idea to find BC and CD sin41 = BC/12.3 OR cos41 = CD/12.3 BC = 12.3×sin41 OR CD = cos41×12.3 BC = 8.0695… OR CD = 9.28……. Use of correct method to find the other side Other side correct CD or BC Area BCD = ½ BC×CD Answers between 37.4 and 37.7 (cm^2)	M1 A1 A1 S1 M1 M1 A1 M1 A1 M1 A1 11	Or idea to find DC and use ½ cbsinD Implies previous M1 Correct Pythagoras substitution, or trig Allow FT from rounding errors FT their CD and BC provided at least S1 FT **OR** M2 ½ absinD correctly substituted (M1 if 1 slip, not the wrong angle) A2 Correct answer
11. (a) 30 (seconds) (b) Histogram drawn with at least 4 frequency densities correct Correct histogram drawn	B1 M1 A1 3	Frequency density 1, 1.6, 2.4, 4.2 and 0.4
12.(a) $y \propto x^2$ OR $y = kx^2$ $4 = k0.5^2$ $y = 16x^2$ (b) x 0.5 3 **20** y 4 **144** 6400	B1 M1 A1 B2 5	FT non linear only Maybe implied in part (b) B1 for each value. FT their non linear expression
13.(a) $2(x+5)(x+4) + 2(x+4)\times 6 + 2(x+5)\times 6$ $2x^2 + 42x - 57 = 0$ (b) $\{-42 \pm \sqrt{(42^2 - 4\times 2\times -57)}\}/4$ $(-42 \pm \sqrt{2220})/4$ 1.28 and -22.28 (c) (6,) 5.28, 6.28	M2 A1 M1 A1 A1 B1 7	M1 for area of any 2 of the 6 faces, or 1 of the 3 terms. Must follow from working, convincing Allow 1 slip. Incorrect formula is M0 FT $x + 4$ and $x + 5$. (Accept 5.3 and 6.3). Allow FT from +ve only. B0 if +ve and –ve given
14.(a) Mean 54.7 $\Sigma x^2 = 34257$ or $\Sigma(x - \bar{x})^2 = 4336.1$ SD = 20.8(233…) (b) New mean 56.7 SD = 20.8(233…) Explanation e.g. 'spread unchanged'	B1 M1 A1 B1 B1 E1 6	 FT mean + 2 FT 'their SD' unchanged Depends on B2 in (b). Understanding, not calculated. If no calculations accept simple statement 'all marks went up'

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15.Overall strategy, cosine rule followed by sine rule	S1	
$AC^2=52^2+37^2-2\times52\times37\times$ cos19	M1	
$AC^2 = 434.644\ldots$	A1	
AC = 20.8(481...)	A1	Accept 21.
$\frac{\sin B}{AC} = \frac{\sin 47}{28}$	M1	FT candidate's AC
sinB = sin47×AC/28	M1	Implies previous M1
32.9(9….°) to 33(.26…°)	A1	
	7	

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