



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.

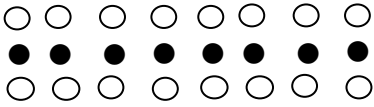
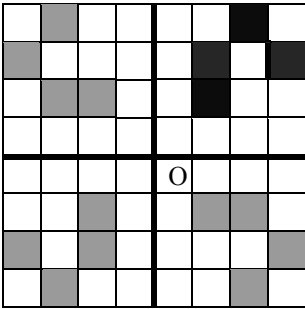
It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

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

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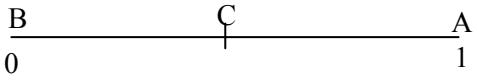
PAPER 1 – FOUNDATION TIER

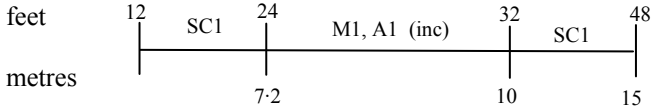
2011 Autumn Paper 1 (Non calculator) Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (14/11/2011) (Page 1)
1. (a) (i) 23062 (ii) eighty five thousand (one) hundred (and) five (b) (i) 23, 47 (ii) 88, 46 (iii) 49 (c) (i) 5630 (ii) 5600 (d) 1, 3, 5, 15 (e) (i) 9832 (ii) 2398	B1 B1 B1 B1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

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) $\begin{array}{r} 36 \\ \times 48 \\ \hline 288 \\ 1440 \\ \hline 1728 \end{array}$ = 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) 1. Mark any written coords. up to 8 independent (5, 5) ones as B1 if correct, -1 if incorrect down to 0. (-3, 1) 2. If the mark is 4 or 3 then STOP at that point. (-3, 5) 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) <u>I.S.W.</u> (b) 70b (g) <u>I.S.W.</u> (c) 14 (d) $7c - 3d$ (e) $2x + 6$ <u>I.S.W.</u>		 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 $70 \times b$ OR $b \times 70$ OR $b70$. <u>70+b=70b gets B0</u> B1 for either -6 OR 20 B1 for either 7c OR -3d in an expression of the form $ac \pm bd$ 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 (°) (x=) 116 (°) (b) Internal angle = 95 (y =) $360 - 100 - 68 - 95$ = 97 (°)	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 ±2° 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 $P(\text{Red}) + P(\text{Blue}) = 0.5$ 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) $60/80 \times 100$ 75(%) (b) $300/12 \times 5$ OR $300/12 \times 7$ (£)125 (£) 175 (c) $75/100 \times 562.80$ OR $\frac{3}{4} \times 562.80$ 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 2 nd 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 $4 \times 4 = 16$ and $5 \times 5 = 25$. Do not accept ‘16, 25’ only. Do not accept “not even powers” without $2^3 \times 3$ Before 2 nd 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) <u>I.S.W.</u> (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' <u>Award M1, A1 for (£)152.57 OR 'their (£)152.57' on F.T.</u>
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 = $7 \times 15 + 150$ = (£) 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 $270 = 6 \times 15 + 180$
5. (a) Counting squares 42 – 48 210 – 240 (b) d c b a	M1 A1 B1 B4 7	F.T. 'their 42–48'×5 <u>correctly calculated</u> 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 (<u>0 to under the p in probability</u>) C marked at centre of the line. Along these lines <u>No may be implied in their explanation</u> <u>Reason overrides the 'Yes' or 'No' in the comments column</u>
7. Units used = 246 <u>OR 7792×12 – 7546×12</u> Cost of units = (£) 29.52 <u>OR 2952(p)</u> Total cost = (£) 51.77 <u>OR 5177(p)</u>	B1 B2 B1 4	F.T. 'their units'. <u>B1 for £2952</u> F.T. for 'their cost of units + £22.25
8. (a) angle at A = 54° AC = 12.6 Complete triangle (b) Angle	B1 B1 B1 B1 4	± 2° ± 2mm Only if at least one B1 already awarded F.T. if completed triangle <u>joining BC.</u> <u>(Allow 46 – 50 in a 'good' triangle)</u> <u>Complete 'correct' triangle but reflected gets B2.</u>
9. (a) Sum = 1176 Mean = 1176/8 = 147 (cm) (b) 118 120 137 <u>141 151</u> 153 175 181 146 (c) 63 (cm)	M1 m1 A1 M1 A1 B1 6	For attempt to add the numbers (<u>1000 – 1350 will imply M1</u>) For dividing a number by 8 (<u>dependent on the M1</u>) <u>C.A.O.</u> Arranging the numbers in order (<u>ascending or descending</u>) <u>(Award the M1 for 7 of the numbers in correct order)</u> 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 \times their SF (2-6) = SC1 for answers which: (a) <u>give only door's height as 2.5cm and building height as 10cm</u> OR (b) <u>a proper attempt at 'dividing' the building's height into equal 'door' heights</u>	B1 B1 M1 A1 4	<p><u>Unsupported answers marked as follows:</u></p>  <p>F.T. their door's height estimate AND scale factors 2 – 6 inc <u>Correct units for their numerical answer must be shown somewhere in their working for this A1</u></p>	
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 . <u>but not $\frac{1}{2}$.</u>	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) $35 = 2 \times 4 + 3M$ $3M = 27$ $M = 27/3$ ISW ($=9$)	B1 B1 B1 B1 B1 B1 B1 B1 8	Accept embedded answers such as $75/5 = 15$ Accept embedded answers such as $3 \times 2 + 11 = 17$ F.T. until 2 nd error. <u>Final B0 for 6+3</u> F.T. until 2 nd error. <u>F.T. aM=b (a\neq1)</u> <u>Accept embedded answers such as $35 = 2 \times 4 + 3 \times 9$</u>	
14. Cost of all adult tickets = $\pounds 488.8(0) - 25 \times (\pounds) 7.6(0)$ = $(\pounds) 298.8(0)$ Cost per ticket = $298.8(0)/24$ = $(\pounds) 12.45$	M1 A1 M1 A1 4	C.A.O. F.T. 'their 298.80' but NOT $(\pounds) 488.80$ <u>Note: Pupils who interchange the 25 and 24 should be marked as if correct then MR-1.</u>	
15. (a) 11/40 ISW (b) $(0 \times 10) + 1 \times 19 + 2 \times 6 + 3 \times 4 + 4 \times 1$ = 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) $\frac{17}{100} \times (£) 269$ $= (£) 45.73$ Internet price = (£)223.27 OR $\frac{83}{100} \times (£) 269$ Internet price = (£)223.27 (b) $1/3 \times 2 \times 2 \times 5$ $= 20/3$ 7 tins	M1 B1 A1 M1 A1 B1 6	For a correct method of finding 17% and subtracting from 269 C.A.O. F.T. 'their 45.73' if M awarded <u>OR</u> M1 for a correct method of finding 83% B1 for sight of 83 A1 C.A.O. <u>F.T. 'their 20/3' rounded up.</u>
17. (a)(i) Their readings at 14:30 & 13:00 and intention to subtract $= 52 \text{ (km)}$ (ii) $52 / 1.5$ $34.666(\text{km} / \text{h})$ (b) Explanation, e.g. "first half journey in just over an hour", "steeper to start" H1	M1 A1 M1 A1 E1 5	116 – 64. Allow for 'their readings' with intention to subtract CAO FT their (i) <u>Watch for 144/4 (= 35) which gets M0, A0</u> Accept rounded or truncated. <i>However, do not accept an answer of 35 without working or from incorrect working SC1 for an answer of 40</i> <u>Accept, e.g. "more vertical", "line increases means it is quicker"</u>
18.(a) 0.72 (b) Any correct 8% of a value used in workings $1600 - 8\% \text{ of } 1600 (= 1600 - 128)$ $1472 - 8\% \text{ of } 1472 (= 1472 - 117.76)$ $(£) 1354.24$ H3ac	B2 B1 M1 m1 A1 6	B1 for 0.7(17694....) <u>Could be (£)128 OR (£)256 OR 'their 117.76'</u> OR M2 for 1600×0.92^2 (M1 for 1600×0.92) FT their 128 CAO. Penalise extra working -1 <i>Appreciate: Possible B1 and SC1 for (£)1866.24</i> <i>Simple depreciate: Possible B1 and M1 (1344)</i>
19. 700×1.64 $= (\$)1148 \text{ (Canadian dollars)}$ Conclusion, has to buy 1100 (Canadian dollars) $1100 \div 1.64$ $= 670.73(17..)$ $£670.73$ H4	M1 A1 A1 M1 A1 A1 6	FT their rounding down to nearest 50 provided M1 FT their amount of Canadian <u>dollars 'if changed to a \$50 amount'. Do NOT F.T. 1148 OR 'their 1148'</u> <u>£ must be given. Accept £670.73p</u> <u>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.</u> <i>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</i>
20.(a) $\frac{1}{2} (8.2 + 12.8) \times 7.6$ $79.8 \text{ (cm}^2\text{)}$ (b) $\frac{1}{2} \pi \times 22.4^2$ $= 787.7(6...) \text{ to } \underline{\underline{788.2(6496)}}$ H6bc	M1 A1 M2 A1 5	Accept 80 from working, <u>but unsupported 80 gets M0, A0.</u> Allow M1 $\pi \times 22.4^2$ A1 1575.5.. to <u>1576.5...</u> SC1 for answer 3151 to <u>3153.05...</u>

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 RED 0.18 BLUE 0.32 (b) $0.12 + 0.18$ $0.3(0)$ or 30% or equivalent	M1 A1 A1 M1 A1 5	Also for their $P(\text{Red}) + \text{their } P(\text{Blue}) = 0.5$ Either correct response implies M1 also
2.(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”	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
3.(a) $a = 70^\circ$, $b = 110^\circ$, $c = 70^\circ$ (b) $360/10$ $180 - 360/10$ $144^{(0)}$ (c)(i) Bearing $326 \pm 2^\circ$ (ii) $038^\circ \pm 2^\circ$ from C $305^\circ \pm 2^\circ$ from A D indicated or implied by point	B3 B1 M1 A1 B1 M1 M1 A1 10	B1 for each. FT $b = 180 - a$ and $c = a$ or $c = 180 - b$ OR alternatively: 8 triangles at 180 or 1440 B1 $(8 \times 180) \div 10$ M1 144 A1 Depends on at least 1 M mark
4. (a) Correct reflection in the line $x = -1$ (b) Correct translation (c) Enlargement $\frac{1}{2}$ Correct position (d) Bisector of angle CAB Arc radius 5cm centre A Correct region shaded	B2 B1 M1 A1 B1 B1 B1 8	B1 for a reflection in any line indicated or either axis, OR B1 for drawing $x = -1$ Note: Scale factor 2 is NOT MR, M0 A0 $\pm 2^0$ ± 1 mm FT for intention of bisector & arc
5.(a) $60/80 \times 100$ $75(\%)$ (b) $300/12 \times 5$ OR $300/12 \times 7$ (£)125 (£)175 (c) $75/100 \times 562.80$ OR $\frac{3}{4} \times 562.80$ OR $281.4(0) + 140.7(0)$ (£)422.1(0)	M1 A1 M1 A1 A1 A1 M1 A1 7	Allow SC1 for 75/100 Intention $300/(5+7)$ then $\times 5$ or $\times 7$ CAO CAO OR equivalent e.g. attempting to find 7 lots of 10% and adding 5%
6.(a) $4n + 2$ (b) $3x + 7x = 8 - 4$ $x = 4/10$ (or equivalent)	B2 B1 B1 4	B1 for $4n$. B0 for $n + 4 = 4n$ FT until 2 nd error ISW. Accept $x = -4/-10$
7.(a) E.g. ‘ $2^3 \times 3$ not even powers’, (b) Method that produces at least 2 correct prime factors Sight of correct factors (2, 2, 2, 2, 7) $2^4 \times 7$ (c) $3/5$ or 0.6 (d) $7/3 \times 24/7$ $= 8$	E1 M1 A1 B1 B1 M1 A1 7	Accept ‘no number times itself gives 24’ only with 4×4 and 5×5 given. Accept $4 \times 4 = 16$ and $5 \times 5 = 25$. Do not accept ‘16, 25’ Do not accept “not even powers” without $2^3 \times 3$ Accept ‘ $2\sqrt{6}$ not a whole number’ Before 2 nd error Ignore 1s seen FT their factors (with at least on index >1 used). Do not ignore 1s. CAO Unsimplified answer award M1 only
8.(a) 2045 and 2055 (b) Sight of least width 1035 (mm) $2045+1035+2045+1035$ 6160 (mm)	B2 B1 M1 A1 5	B1 for each. Accept 2044.999(9999...) not 2044.9 FT their least length, not 2050 AND their least width, not 1040 CAO

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

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

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<p>8. (a) One correct evaluation, $3 \leq x \leq 4$</p> <p>2 correct evaluations, $3.55 \leq x \leq 3.7$, one either side of 0</p> <p>2 correct evaluations, $3.55 \leq x \leq 3.65$, one either side of 0</p> <p>OR correct evaluation of 3.65 if previous B1 awarded</p> <p>3.6</p> <p><i>No calculations shown: accept "too high", ">", etc.</i></p> <p>(b) Correctly setting up 2 equations for eliminating 1 variable</p> <p>First variable's value Correctly substituting their first variable Second variable's value</p>	<p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>8</p>	<p>x $2x^3 + x - 100$</p> <p>3 -43</p> <p>3.1 -37.318</p> <p>3.2 -31.264</p> <p>3.3 -24.826</p> <p>3.4 -17.992</p> <p>3.5 -10.75</p> <p>3.6 -3.088</p> <p>3.7 5.006</p> <p>3.8 13.544</p> <p>3.9 22.538</p> <p>4 32</p> <p>3.55 -6.97225</p> <p>3.65 0.90425</p> <p>Or alternate substitution method, allow one slip in multiplication in non-eliminate</p> <p>Either $x = 2$ or $y = -6$</p> <p>FT their first variable</p> <p>FT their first variable</p>									
<p>9.(a) $5.4/3 \times 2.5$ = 4.5 (cm)</p> <p>(b) $3.6 / 5.4/3$ = 2 (cm)</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>4</p>	<p>Or equivalent calculation that could lead to correct answer</p> <p>Or equivalent calculation that could lead to correct answer</p> <p>If no marks in (a) or (b) then award <i>SC1 for sight of scale factor 1.8</i></p>									
<p>10.(a) $(AD^2 =) 12.3^2 - 6.2^2$ $(AD^2 =) 112.85$ AD = 10.6(23... cm)</p> <p>(b) Strategy, idea to find BC and CD $\sin 41 = BC/12.3$ OR $\cos 41 = CD/12.3$ $BC = 12.3 \times \sin 41$ OR $CD = \cos 41 \times 12.3$ $BC = 8.0695...$ OR $CD = 9.28.....$ Use of correct method to find the other side Other side correct CD or BC Area BCD = $\frac{1}{2} BC \times CD$ Answers between 37.4 and 37.7 (cm²)</p>	<p>M1</p> <p>A1</p> <p>A1</p> <p>S1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>11</p>	<p>Or idea to find DC and use $\frac{1}{2} cbsinD$</p> <p>Implies previous M1</p> <p>Correct Pythagoras substitution, or trig Allow FT from rounding errors FT their CD and BC provided at least S1 FT</p>	<p>OR M2 $\frac{1}{2} absinD$ correctly substituted (M1 if 1 slip, not the wrong angle) A2 Correct answer</p>								
<p>11. (a) 30 (seconds)</p> <p>(b) Histogram drawn with at least 4 frequency densities correct Correct histogram drawn</p>	<p>B1</p> <p>M1</p> <p>A1</p> <p>3</p>	<p>Frequency density 1, 1.6, 2.4, 4.2 and 0.4</p>									
<p>12.(a) $y \propto x^2$ OR $y = kx^2$ $4 = k0.5^2$ $y = 16x^2$</p> <p>(b)</p> <table border="1"> <tr> <td>x</td><td>0.5</td><td>3</td><td>20</td></tr> <tr> <td>y</td><td>4</td><td>144</td><td>6400</td></tr> </table>	x	0.5	3	20	y	4	144	6400	<p>B1</p> <p>M1</p> <p>A1</p> <p>B2</p> <p>5</p>	<p>FT non linear only Maybe implied in part (b)</p> <p>B1 for each value. FT their non linear expression</p>	
x	0.5	3	20								
y	4	144	6400								
<p>13.(a) $2(x+5)(x+4) + 2(x+4) \times 6 + 2(x+5) \times 6$ $2x^2 + 42x - 57 = 0$</p> <p>(b) $\{-42 \pm \sqrt{(42^2 - 4 \times 2 \times -57)}\} / 4$ $(-42 \pm \sqrt{2220}) / 4$ 1.28 and -22.28</p> <p>(c) (6.) 5.28, 6.28</p>	<p>M2</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>B1</p> <p>7</p>	<p>M1 for area of any 2 of the 6 faces, or 1 of the 3 terms. <u>Must follow from working, convincing</u> Allow 1 slip. Incorrect formula is M0</p> <p>FT $x + 4$ and $x + 5$. (Accept 5.3 and 6.3). Allow FT from +ve only. B0 if +ve and -ve given</p>									
<p>14.(a) Mean 54.7 $\Sigma x^2 = 34257$ or $\Sigma(x - \bar{x})^2 = 4336.1$ SD = 20.8(233...)</p> <p>(b) New mean 56.7 SD = 20.8(233...)</p> <p>Explanation e.g. 'spread unchanged'</p>	<p>B1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>B1</p> <p>E1</p> <p>6</p>	<p>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'</p>									

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15. Overall strategy, cosine rule followed by sine rule $AC^2 = 52^2 + 37^2 - 2 \times 52 \times 37 \times \cos 19$ $AC^2 = 434.644\dots$ $AC = 20.8(481\dots)$ $\frac{\sin B}{AC} = \frac{\sin 47}{28}$ $\sin B = \sin 47 \times AC / 28$ $32.9(9\dots^\circ)$ to $33(26\dots^\circ)$	S1 M1 A1 A1 M1 M1 A1 7	Accept 21. FT candidate's AC Implies previous M1	



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