



GCSE MARKING SCHEME

MATHEMATICS

NOVEMBER 2009

INTRODUCTION

The marking schemes which follow were those used by WJEC for the November 2009 examination in GCSE MATHEMATICS. 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.

PAPER 1 - FOUNDATION TIER

2009 Autumn Paper 1 (Non calculator) Foundation Tier	Marks	Comments
1. (a) (i) 43074 (ii) seven million nine hundred thousand OR seven point nine million (b) (i) 36, 44 (ii) 47 (iii) 48 (c) (i) 97600 (ii) 98000 (d) 1, 21, 3, 7 (e) $40/5.99$ OR $40/6$ = 6	B1 B1 B1 B1 B1 B1 B1 B2 M1 A1 11	C.A.O. C.A.O. C.A.O. C.A.O. C.A.O. 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. Using a repeated addition method (or multiplication) only gets M1 if it shows trying to get the most for £40. Award SC1 for unsupported 6·6(77..)
2. (a) <div style="display: flex; flex-direction: column; align-items: flex-start;"> <div>W </div> <div>E </div> <div>S </div> <div>I </div> </div> (b) W(ales), E(ngland), S, I along one axis Uniform scale for the frequency axis starting at 0 Four bars at correct heights	B1 B1 B1 B1 B1 B1 B2 8	Penalise –1 once only for contiguous or fragmented symbols C.A.O. C.A.O. Accept other configurations of the 2 squares C.A.O. Accept other configurations of the 3 squares C.A.O. B1 B1 B2 8 If no scale then B0 and allow one 2 cm square to represent 10 B1 for any 2 or 3 correct bars.
3. (a) (i) 22 (ii) 64 (b) 700 (c) ·25 ·27 ·23 $\frac{1}{4}$ 27%	B1 B1 B1 B1 B1 B1 6	C.A.O. C.A.O. C.A.O. <u>'hundred(s)' is B0</u> C.A.O. C.A.O. Or equivalent. Correct answer OR F.T. their values.
4. (a) 3 (b) <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">A</div> <div style="margin-right: 10px;">C</div> <div style="flex-grow: 1; border-bottom: 1px solid black; position: relative;"> <div style="position: absolute; left: 0; bottom: -5px;">0</div> <div style="position: absolute; right: 0; bottom: -5px;">1</div> <div style="position: absolute; left: 25%; bottom: -5px;"> </div> <div style="position: absolute; left: 75%; bottom: -5px;"> </div> </div> </div> <div style="margin-top: 5px;"> B </div> <div style="margin-top: 5px;"> C should be between 0 and $\frac{1}{4}$ exclusive </div>	B1 B1 B1 B1 4	C.A.O. <u>A (accept 5 for A) marked at O.</u> <u>B (or 3) marked at centre of the line.</u> <u>C (or 4) should be < 2.5cm from O using your ruler</u>
5. (a) 8×5 = 40 cm ² (b) 26 (cm)	M1 A1 U1 B1 4	C.A.O. Candidates who get 40 then multiply by 2 etc get M0, A0. Independent of other marks C.A.O.

2009 Autumn Paper 1 (Non calculator) Foundation Tier	Marks	Comments
6. (a) <div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; gap: 10px;">○ ○ ○ ○</div> <div style="display: flex; gap: 10px;">○ ● ● ● ● ○</div> <div style="display: flex; gap: 10px;">○ ○ ○ ○</div> </div> (b) 10 12 (c) (i) 50 (ii) 102	B1 B1 B1 B1 B1 5	C.A.O. C.A.O. C.A.O. C.A.O. C.A.O.
7. (a) <div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="margin-bottom: 10px;"> $\begin{array}{r} 26 \\ 48 \overline{) 1248} \\ \underline{96} \\ 288 \\ \underline{288} \end{array}$ </div> <div style="margin-bottom: 10px;">(b) 18</div> <div>(c) 24</div> </div>	M1 <u>m1</u> A1 B2 <u>M1</u> <u>A1</u> 7	<u>For showing that the solution to the problem is finding how many 48s in 1248.</u> Any valid complete division algorithm C.A.O. B1 for $\frac{2}{5} \times 45$ OR $\frac{90}{5}$ OR sight of 9 <u>OR 18/45</u> <u>M1</u> for $\frac{6}{100} \times 400$ OR $\frac{2400}{100}$ <u>OR 4 × 6</u> <u>SC1 for unsupported 24%</u>
8. A at (4, 2) B at (-2, 0) C at (-3, -4)	B1 B1 B1 3	C.A.O. Reversed coordinates get 0 each time. C.A.O. Letters not required. <u>If there are more than 3 unlettered points give +1 for every correct point and -1 for each incorrect one down to 0.</u>
9. <div style="margin-top: 10px;"> (a) $x + 10$ (p) <u>I.S.W.</u> (b) $8y$ <u>I.S.W.</u> (c) $r - 6$ (cm) <u>I.S.W.</u> (d) $(y =) -7$ (e) $8a - 3t$ </div>	B1 B1 B1 B1 B2 6	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. Ignore pence or p Allow $8 \times y$ OR $y \times 8$ <u>OR y8</u> C.A.O. C.A.O. <u>Accept embedded answers such as $-7 + 10 = 3$</u> B1 for either $8a$ or $-3t$ in an expression, e.g $8a + 3t$. If B2 then penalise -1 for any extra incorrect algebra.
10. <div style="margin-top: 10px;"> (a) 58 $180 - 58 - 58 = 64 (^{\circ})$ (b) $360 - 105 - 110 - 78 = 67 (^{\circ})$ $(y =) 113 (^{\circ})$ </div>	B1 M1 A1 M1 A1 A1 6	<u>Look at their diagram also</u> C.A.O. F.T. ‘their 58’ C.A.O. Even $y = 67$ gets M1, A1 F.T. ‘their 67’
11. (a) <u>(1,red)</u> 1, blue <u>(2,red)</u> 2, blue 3,red 3, blue 4,red 4, blue 5,red 5, blue 6,red 6, blue (b) $1/12$ (c) $4/12$ ISW	B2 B2 B2 6	<u>B1 for any 6 correct pairs not including the given 2 pairs</u> <u>B1 for all 10 correct pairs and some pairs repeated</u> <u>B1 for all 10 correct pairs and extra pairs</u> <u>In parts (b) and (c), accept correct answers OR F.T. their sample space in (a) if at least B1 awarded</u> <u>Accept decimals or percentages, but must be exact values</u> B1 for the 1 in a fraction (<1), B1 for the 12 in a fraction (<1) <u>Penalise -1, once only, in (b) and (c) for incorrect notation, eg 1 in 12 OR 1:12 OR 4 out of 12.</u> Or equivalents. <u>B1 for ‘their 4’/‘their 12 if consistently used in b’</u>

2009 Autumn Paper 1 (Non calculator) Foundation Tier	Marks	Comments
12. (a) Some end in 0 OR a counter example. (b) For example, halving 14 ends up as 7 (c) One of 2 consecutive numbers is even so the product will be even.	B2 B2 B2 6	B1 for False unless their explanation gives an inappropriate argument. SC1 for explanations like '10 divides into 5 and it does not end in 5', that is, a reversal of the divisibility statement which should have been '5 divides into 10'. B1 for False unless their explanation gives an inappropriate argument. SC1 for explanations like '34 divides into 2 to make 17 rather than '34 divided by 2 makes 17' For a correct proof B1 for an example to illustrate that it is true B1 for 'even \times odd = even'.
13. (a) $\frac{1}{2}(6 \times 8)$ = 24 (b) $9+13+14+12+6+6 =$ 60 (cm) (c) $x = 70^0$ $180 - 110 - 30$ OR $70 - 30$ $y = 40^0$ H2	M1 A1 M1 A1 B1 M1 A1 7	Watch out for $6 + 8 + 10 = 24$ which gets M0, A0. Watch for $9+13+14+12+12$ which also gets M1. F.T. $y = x - 30$
14. Middle number 9 Mode of their numbers is 10 Their smallest = their largest - 5 (=5) Total of five numbers is 40 H3	B1 B1 B1 B1 4	 If B4 but numbers not in order then penalise -1 Numbers are 5 6 9 10 10
15. Angle bisector Arc 5cm from B Correct region indicated H5b	B1 B1 B1 3	Accept $\pm 2^0$ Accept $\pm 2\text{mm}$ F.T. for similar region (a line through B and an arc centre B).
16. (a) $y(y - 4)$ (b) $7x - 13 = 3x - 3$ $4x = 10$ $x = 10/4$ ISW (=2.5 OR $2\frac{1}{2}$)	B1 B1 B1 B1 4	C.A.O. F.T. until 2nd error Correct clearing of bracket (you make have to look in subsequent work to see their expansion of the bracket) Collecting terms F.T. if $ax = b$ ($a \neq 1$)
17. (a) Enlargement scale factor 3 Correct position (b) Correct rotation (2, 2) (1, 6) (-1, 3) H9	B2 B1 B2 5	B1 for 2 lines correctly enlarged Mark intention from any point <u>MR-1 if consistent incorrect scale factor</u> B1 about (3,1) but clockwise, (4, 0) (7, -1) (5, -4) OR about (1,3) anticlockwise, (2, 6) (-1, 7) (1, 10) OR B1 for 2 correct points in a triangle Allow near miss (within 2mm) on all points. B1 for 4 correct triangles made by 4 rotations of 90°
18. (a) $600/5 \times 2$ or $600/5 \times 3$ (£) 240 and (£) 360 (b) Method to find primes, with at least two correct 2, 3, 3, 7 $2 \times 3^2 \times 7$ H8	M1 A1 M1 A1 B1 5	 Correct FT with no 1s and at least one power >1

PAPER 2 - FOUNDATION TIER

2009 Autumn Paper 2 (Calculator allowed) Foundation Tier	Marks	Comments
1. (a) Biscuits (£) 4.05 OR 405 (p) Muesli 112 (p) OR (£) 1.12 Total = (£) 5.17 OR 517p (b) $93 (p) \times 3$ = 279 (p) OR (£) 2.79 Change = (£)2.21 OR 221 (p)	B1 B1 B1 M1 A1 B1 6	C.A.O. C.A.O. F.T. their figures for one error <u>Unsupported 517 gets B1, B1, B0.</u> C.A.O. F.T. 'their 2.79'
2. (a) $\frac{3}{30}$ $\frac{3}{6}$ (b) 2 sectors shaded (c) (i) $\frac{9}{14}$ ISW (ii) $\frac{5}{14}$ ISW	B2 B1 B1 B1 5	B1 if correct 2 circled and 1 incorrect circled OR B1 for 1 correct and up to 1 incorrect. <u>B2, MR-1 for clearly indicating 5/15, 4/12 and 2/6</u> C.A.O. C.A.O. F.T. 1 – 'their 9/14'
3. (i) 225 (g) (ii) $350 - 225$ = 125 (g)	B1 M1 A1 3	C.A.O. <u>F.T. 350 – 'their 225'</u>
4. (a) parallelogram pyramid cylinder pentagon (b) (i) parallel line (ii) Both lines of symmetry	B1 B1 B1 B1 B1 B2 7	Accept names spelt incorrectly if clearly identifiable C.A.O. C.A.O. C.A.O. C.A.O. Clear intent to be parallel. B1 for 1 correct line and no others B1 for both correct lines and 1 incorrect line
5. (a) Cost = $5 \times 25 + 50$ = (£) 175 ISW (b) Call out charge = $240 - 8 \times 25$ Charge = (£) 40	M1 A1 M1 A1 4	C.A.O. Correctly substitution including the subtraction C.A.O. <u>Accept embedded answers such as $240 = 8 \times (\pounds)25 + 40$</u>
6. (a) Subtract 5 (b) Multiply by 3	B1 B1 2	Accept -5. <u>B0 for n – 5</u> Accept $\times 3$. <u>B0 for n \times 3</u>
7. Units used = 132 Cost of units = (£)17.16 Total cost = (£) 39.41	B1 B2 B1 4	C.A.O. F.T. 'their units'. B1 for (£) 1716 (p) F.T. for 'their cost of units + £22.25'
8. (a) $45 \pm 2^\circ$ $\frac{45}{360}$ ISW OR equivalent $\frac{1}{8}$ (b) $\frac{120}{360}$ of 144 OR <u>$\frac{120}{2 \cdot 5}$</u> = 48	B1 B1 M1 A1 4	OR F.T. <u>their fraction</u> : <u>their angle $(40 - 50)$</u> <u>360</u> <u>Use $0 \cdot 11 - \cdot 139$ to check their fraction</u> <u>C.A.O.</u>
9. (a) angle at A angle at B Complete triangle (b) reflex	B1 B1 B1 B1 4	$\pm 2^\circ$ $\pm 2^\circ$ <u>Only if at least one B1 already awarded</u> C.A.O.

2009 Autumn Paper 2 (Calculator allowed) Foundation Tier	Marks	Comments
10.(a) (i) Point X between 1–3cm (inc) above sea level (ii) Point Y between 0.5–1.5cm (inc) below sea level (b) 300 (m) ISW (c) –220 (m) ISW	B1 B1 B1 B1 4	C.A.O. C.A.O. C.A.O. C.A.O.
11. Man 5 to 7 ft OR 1.5 to 2.5 metres Man 1cm Distance = 14cm Multiplying factor = 14 Distance = man's estimate \times their SF (10-18) = SC1 for answers which: (a) only give man's height as 1cm and distance between buildings as 14cm OR (b) a proper attempt at 'dividing' the distance between buildings into equal parts	B1 B1 M1 A1 4	Unsupported answers marked as follows: feet 50 SC1 70 M1, A1 (inc) 98 SC1 126 metres 15 35 45 F.T. their man's height estimate AND scale factors 10 – 18 inc Candidates who try to find the height of the building : Mark as for distance then MR–1. Multiplying factor = 9. Allow 6 – 12 instead of 10 – 18 Unsupported answers marked as follows: 30 SC1 45 M1, A1 (inc) 63 SC1 84 9 13.5 22.5 30 SC1s awarded as for distance (but use 1cm and 9cm)
12. (a) 9c (b) (i) (x =) 5 (ii) (y =) 6 (c) $40 = 3V + 2 \times 5$ $3V = 30$ $V = 10$	B1 B1 B1 B1 B1 B1 6	Accept embedded answers such as $3 \times 5 = 15$ Accept embedded answers such as $6 + 7 = 13$ F.T. until 2nd error. SC1 for an answer of 130. (Misread of R for V)
13. (a) (£) 7.49 \times 8 = (£) 59.92 (b) (£) 4.95 – 4.49 OR 46 (p) OR 24.75 – 22.45 = (£) 2.3(0)	M1 A1 B1 B1 4	C.A.O. For sight of correctly using the correct 2 prices C.A.O.
14. (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, once only, 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
15. (a) $\frac{84}{125} \times 100$ = 67.2 (%) (b) 24.09 (c) Cost of grapes = £3.99 – 1.5×1.24 = (£) 2.13 Cost per kg = $2.13 / 0.6$ = (£) 3.55	M1 A1 B1 M1 A1 M1 A1 7	C.A.O. Allow M1, A0 for unsupported 67(%) C.A.O. C.A.O. F.T. 'their 2.13' but NOT (£) 3.99
16. (a) AB = 6.8 (cm) = 6.8×0.25 = 1.7 (km) (b) Bearing of 048° Line AC = 10 cm	B1 M1 A1 B1 B1 5	Allow 6.6 – 7.0 (cm) F.T. 'their 6.8' \times 0.25 All 3 marks for unsupported answers in the range 1.65 – 1.75 Allow $\pm 2^\circ$ Allow ± 2 mm

2009 Autumn Paper 2 (Calculator allowed) Foundation Tier	Marks	Comments
17. Use of a 90 angle from the rectangle angle BFC = 70 angle AGD = 70 Triangle EFG is isosceles because 2 angles are equal	B1 B1 B1 E1 4	
18. (a) $x + x+2 + x+3 + x+7$ (OR $4x + 12$) (b) (i) $x+x+2+x+3+x+7=40$ OR $4x + 12 = 40$ (ii) $x = 7$ (c) 7, 9, 10, 14 (cm) H2	B1 B1 B1 B1 4	Allow “=p”, “=perimeter”, “=40” etc. FT their (a) (=40). Similar form $ax + b = 40$, (a,b not zero) FT solution to $ax+b=c$ where a, b, c non zero <u>F.T. their x</u>
19. (a) All points plotted correctly (b) (i) $(8+30+4+24+14)/5$ (80/5) = 16 (ii) Line of best fit through means (c) Positive (d) From their line of best fit H3	B2 M1 A1 B2 B1 B1 8	B1 for 3 correct, or reverse correct for 4 points <u>F.T. their mean for y.</u> B1 line by eye <u>Penalise -1 if their plotted points are joined</u>
20. (a) $2(2x - 3)$ (b) $9r = m - 4$ OR $m - 4 = 9r$ $r = \frac{m-4}{9}$ (c) $4x > 9$ OR $9 < 4x$ $x > \frac{9}{4}$	B1 B1 B1 B1 B1 5	C.A.O. Isolating the term in r. B1 for $-9r = -m+4$ F.T. B1 for $r = \frac{-m+4}{-9}$ Isolating the term in x F.T. division by their 4 ($\neq 1$) <u>Use of = instead of > gets 0 until the > is reinstated</u>
21. $\frac{1}{3} \times \frac{1}{4}$ $\frac{1}{12}$ OR <u>Sample space method</u> 1-1 1-2 1-3 1-4 2-1 2-2 2-3 2-4 3-1 3-2 3-3 3-4 1/12 F.T. their sample space (up to this B2) ONLY IF their sample space has EITHER (1) at least 8 correct pairs OR (2) 12 correct pairs and some pairs repeated OR (3) 12 correct pairs and extra (incorrect) pairs	B1 M1 A1 B1 B2 3	For either $\frac{1}{3}$ or $\frac{1}{4}$ For multiplying their 2 probabilities as long as at least one of them is correct. C.A.O. C.A.O. B1 for 1/m in a fraction (<1) OR B1 for n/12 in a fraction (<1) m, n positive integers
22. $7.3^2 - 4.8^2 = \textbf{(XZ^2)}$ $XZ^2 = 30.25$ $XZ = 5.5(m)$ H8a	M1 A1 A1 3	Correctly substituted Pythagoras. <u>C.A.O.</u> <i>OR $\cos y = 4.8/7.3$ leading to 48.89°</i> <i>with attempt at tan or sin to find XZ</i> M1 <i>$\tan 48.89 = XZ/4.8$ or $\sin 48.89 = XZ/7.3$</i> A1 <i>$XZ = 5.5(m)$</i> A1

PAPER 1 - HIGHER TIER

Paper 1 November 2009 Higher Tier		Comments
1. (a) Correct translation (b) Correct reflection	B1 B2 3	B1 Reflect in any horizontal line, OR y=5 seen
2.(a) $\frac{1}{2} (6 \times 8)$ = 24 cm ² (b) $9+13+14+12+6+6 =$ 60 (cm) (c) $x = 70^0$ $180 - 110 - 30$ OR $70 - 30$ $y = 40^0$	M1 A1 U1 M1 A1 B1 M1 A1 8	CAO CAO FT x - 30
3. Middle number 9 Mode of their numbers is 10 Their smallest = their largest - 5 (=5) Total of five numbers is 40	B1 B1 B1 B1 4	If B4 but numbers not in order then penalise -1 Numbers are 5 6 9 10 10
4.(a) $x = 4 \times 20$ ISW (=80) (b) $y (y - 4)$ (c) $5x + 3x = 6 - 2$ $8x = 4$ $x = \frac{1}{2}$ (d) $5x^3 + 6x$ ISW	B1 B1 B1 B1 B1 B2 7	CAO FT from one error for collection of terms Accept $x = 4/8$. FT from collection of terms B1 for each correct term
5.(a)(i) Bearing 328 ± 2^0 (ii) R in correct position (b) Angle bisector Arc 5cm from B Correct region indicated	B1 B2 B1 B1 B1 6	B1 for 270^0 from Q or 180^0 from P Accept $\pm 2^0$ Accept ± 2 mm FT for similar region
6.(a) 30 (b) 81 or 9^2 or 9×9 (c) Sight of any two of 40, 400 and 80 200 (d) $1/8$ or 0.125	B1 B1 B1 B1 B1 5	Do not accept 9
7.(a) $x + 5 = 3 \times 14$ $x = 37$ (b) $10y + 15 - 8y + 14$ $= 2y + 29$ (c) $t + 8 = 5g$ $g = (t + 8) / 5$	M1 A1 B1 B1 B1 B1 6	FT from 1 error, then correct collection of terms Must be clearly all divided by 5. FT 1 slip due to change of sign
8.(a) $600/5 \times 2$ or $600/5 \times 3$ (£) 360 and (£) 240 (b) Method to find primes, with at least two correct 2, 3, 3, 7 $2 \times 3^2 \times 7$	M1 A1 M1 A1 B1 5	Correct FT with no 1s and at least one power >1
9.(a) Correct rotation (b) Enlargement scale factor 3 Correct position	B2 B2 B1 5	B1 about (3,1) but clockwise, or about (1,3) anticlockwise, or near miss, or 2 points correct with completed triangle, or 4 correct triangles drawn repeated rotation B1 for 2 lines correctly enlarged Mark position intention from any point MR-1 if consistent incorrect scale factor
10. (a) $17 \text{ (seconds)} \pm 0.2$ (b) Intention to find difference as required 14.5 (seconds) (c) 130	B1 M1 A1 B2 5	22.5 - 8 B1 for 30, or 160 – their reading for 7 seconds

PAPER 2 - HIGHER TIER

Paper 2 November 2009 Higher Tier		Comments
1.(a) $22/100 \times 35$ OR $0.22 \times 35 (=7.7)$ (1- 0.22) $\times 35$ OR $35 - (0.22 \times 35)$ (£) 27.3(0) (b) $25/40 \times 100$ 62.5(%) (c) (i) $345 / 1.15$ = (£) 300 (ii) 24×1.15 = 27.6(0 euros)	B1 M1 A1 M1 A1 M1 A1 M1 A1 9	OR sight of 78(%) or 0.78 Accept 62 or 63
2.(a) $x + x+2 + x+3 + x+7$ (OR $4x + 12$) (b)(i) $x+x+2+x+3+x+7=40$ OR $4x + 12 =40$ (ii) $x = 7$ (c) 7, 9, 10, 14 (cm)	B1 B1 B1 B1 4	Allow “=p”, “=perimeter”, “=40” etc. FT their (a) similar form $ax + b =40$, where a and b are non zero FT solution to $ax+b=c$ where a, b, c non zero FT for their x
3.(a) All points plotted correctly (b)(i) $(8+30+4+24+14)/5$ (80/5) = 16 (ii) Line of best fit through means (c) Positive (d) From their line of best fit	B2 M1 A1 B2 B1 B1 8	B1 for 3 correct, or reverse correct for 4 points B1 line by eye
4.(a) Sight of any two different square numbers $4 + 16$ OR $16 + 36$ OR any example with even sum (b) Sight of 2 (as an even prime number) (c) Strategy, e.g $125/5$ or 5×25 or $25+25+25+25+25$ 23, 24, 25, 26, 27 (d) 7 and 11	B1 B1 B1 B1 B1 B1 6	 This implies strategy mark
5. (a) $8n + 1$ (b) (i) n or equivalent (ii) $n + 4$ or equivalent	B2 B1 B2 5	B1 for $8n (+ \dots)$ B0 for $n+ 8$ B1 for results 5, 6, 7, 8 seen. FT (i) +4 B1 for $n = n + 4$ <i>Do not penalise consistent letter other than n used</i>
6.(a) 60×108 OR 40×112 (6480 OR 4480) <u>$60 \times 108 + 40 \times 112$</u> 100 Mean 109.6 (g) (b) Royal Gala Explanation based on range	B1 M1 M1 A1 B1 E1 6	<i>Divide by 100 not required for this mark</i> Division by 100 CAO. 110(g) with no working, no marks
7.(a) $2\pi r = 2x \pi \times 26$ (cm) 1km = 100000cm used 100000/C 612.134..... to 612.44488.. 612 (b) Distance / time $28/1.75$ = 16 (mph)	M1 B1 m1 A1 A1 M1 A1 A1 8	FT their conversion / their C (not area) FT their conversion / their C CAO. Do not accept other answers from p.r. However time is expressed Time in hours maybe in stages CAO
8.(a) $7.3^2 - 4.8^2 = XZ^2$ $XZ^2 = 30.25$ $XZ = 5.5(m)$ (b) $BC = 23.4 \times \cos 62$ $BC = 10.985 \dots$ (cm)	M1 A1 A1 M2 A1 6	Correctly substituted Pythagoras. CAO. Do not accept 5 or 6 unless 5.5 seen <i>OR</i> $\cos y = 4.8/7.3$ leading to 48.89° with attempt at <i>tan</i> or <i>sin</i> to find XZ M1 $\tan 48.89 = XZ/4.8$ or $\sin 48.89 = XZ/7.3$ A1 $XZ = 5.5(m)$ A1 M1 for $\cos 62 = BC/23.4$ Rounded or truncated OR $BC/\sin 28 = 23.4/(\sin 90)$ or $BC/23.4 = \sin 28$ M1 $BC = \sin 28 \times 23.4/(\sin 90)$ M1 $BC = 10.985 \dots$ (cm) rounded or truncated A1

Paper 2 November 2009 Higher Tier		Comments
9. $x+y=24$ and $36x+21y=609$ Correctly setting up 2 eqns for eliminating 1 variable First variable's value Second variable's value	B2 M1 A1 A1 5	B1 for either equation Or alternate substitution method. Allow 1 slip Either $x=7$ or $y=17$ FT their first variable <i>Answers only B2</i>
10.(a) 0.6; 0.4, 0.6; 0.4, 0.6 (b) Sight of 0.4×0.4 $0.4 \times 0.4 + 0.6 \times 0.6$ 0.52	B2 B1 M1 A1 5	B1 any two correct entries FT their 0.6×0.6 FT $0.16 +$ their " 0.6^2 "
11.(a) $8w - 24y = 3w + 6y$ $5w = 30y$ $w = 6y$ (b) $(x-2)(x-5)$ (c) $48 < 6y$ or $-6y < -48$ $48/6 < y$ or $y > -48/-6$ $y > 8$	B1 B1 B1 B2 M1 M1 A1 8	Or equivalent FT until second error Accept $w = 30y/5$ B1 for $(x \dots 2)(x \dots 5)$ <u>Mark each step of working</u> FT from 1 error only. $y < -48/-6$ is M0 <i>A1 for $y > 8$ if at least M1 awarded.</i> <i>Use of equal signs in working penalise -1</i>
12. Total = 83100 Number of tickets $\{(Country) / 83100\} \times 5000$ 2587.24..., 1684.71..., 661.85..., 54.15..., 12.03... 2587, 1685, 662, 54, 12	B1 M1 A1 A1 4	FT their total Any 3 correct
13. $x = \{-8 \pm \sqrt{8^2 - 4 \cdot 3 \cdot 1}\} / 6$ $= [-8 \pm \sqrt{52}] / 6$ -0.13 and -2.54	M1 A1 A1 3	Allow one slip CAO. Must be correct to 2 decimal places
14.(a) 58^0 Alternate segment theorem (b) $y = k/x$ OR $y \propto 1/x$ $0.3 = k/10$ OR $k=3$ $y=3/x$	B1 E1 B1 M1 A1 5	Independent mark FT non linear Answer only B3
15.(a) $\frac{1}{2} \cdot 2.8 \times 3.9 \times \sin 41$ $= 3.58(\dots \text{cm}^2)$ or $3.6 (\text{cm}^2)$ (b) $(BC^2 =) 3.9^2 + 2.8^2 - 2 \times 3.9 \times 2.8 \times \cos 41$ $(BC^2 =) 6.567\dots$ $BC = 2.56(26\dots \text{cm})$ or $2.6 (\text{cm})$	M1 A1 M1 A1 A1 5	Do not accept 3.5 unless 3.58.. seen Do not accept 2.5. <i>SC1 if 3.5 in (a) & 2.5 in (b)</i>
16.(a) Cosine curve ± 1 , and $\pm 180^0$ shown or implied (b) Angles rounding to 101^0 and -101^0	M1 A1 B2 4	Must extend to both +ve and -ve x-axes No other angles given, or B1 for a correct angle <i>SC1 for 100 with -100 or 102 with -102</i>
17. $\frac{1}{2} (4/3 \times \pi \times r^3) = 48.5$ Correct rearrangement for $r^3 =$ OR $r^3 = 23.157\dots$ Radius = 2.85..... cm	M2 A1 A1 4	$4/3 \times \pi \times r^3 = 48.5$ without considering the $\frac{1}{2}$, M1 FT for sphere $r^3 = 48.5 \times 3 / 4 \pi$ <i>(full sphere $r=2.2623\dots$)</i> CAO
18.(a) x^2 horizontal plots at 1, 4, 9, 16, 25 Plot all 5 points correctly (b) $b = 70 \pm 5$ Use of gradient to find a $a = 8 \pm 2$.	B1 B1 B1 M1 A1 5	Allow one slip Horizontally & vertically correct Award for a correct answer, any method. Or alternative method FT their graph. Award both marks for a correct answer irrespective of method



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GCSE MARKING SCHEME

MATHEMATICS (WALES PILOT)

NOVEMBER 2009

INTRODUCTION

The marking schemes which follow were those used by WJEC for the November 2009 examination in GCSE MATHEMATICS (WALES PILOT). 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.

PAPER 1 - FOUNDATION TIER (WALES PILOT)

2009 Autumn Paper 1 (Non calculator) Wales Pilot Foundation Tier	Marks	Comments
1. (a) (i) 24507 (ii) six thousand and fourteen (b) (i) 22 and 78 (ii) 59 (iii) 35 (iv) 81 (c) 1, 5, 11, 55 (d) $20/3.85$ OR $20/4$ $= 5$	B1 B1 B1 B1 B1 B1 B2 M1 A1 10	C.A.O. C.A.O. C.A.O. C.A.O. 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. Allow M1 for sight of $20/3.85$ OR $3.85 + 3.85 + 3.85 + 3.85 + 3.85 = 19.25$ OR $20 - 3.85 - 3.85 - 3.85 - 3.85 - 3.85 = .75$ C.A.O. SC1 for unsupported 5.19(48..)
2. (i) l(itre) (ii) m ² (iii) km (iv) g(rams)	B1 B1 B1 B1 4	C.A.O. C.A.O. C.A.O. C.A.O.
3. (a) Lines Curve (b) Line of symmetry on triangle 3 lines of symmetry	B1 B1 B1 B2 5	C.A.O. <u>An arc of correct curvature joining the ends of the 2 lines</u> <u>Must stay within the '6 squares'</u> C.A.O. <u>B0 if any extra line.</u> B1 for 1 line of symmetry <u>and no incorrect line.</u>
4. (a) 5 7 11 9 (b) P(arallelogram) (c) C, T, P, H along one axis Uniform scale starting at 0 Four bars at correct heights	B2 B1 B1 B1 B2 7	B1 for any three correct tallies and frequencies <u>B1 for parallelogram and 11, but B0 for 11 on its own.</u> F.T. their table of frequencies F.T. their table of frequencies If no scale then B0, and allow one square to represent 1 B1 for any 2 correct bars on F.T.
5. (a) Louise (<u>Lowri</u>) (b) 4:30 to 6:15 $= 1\text{h } 45\text{min}$ OR $1\frac{3}{4}$ (hours) (c) Nell (<u>Nia</u>) (d) 5:45 to 6:00	B1 B1 B1 B1 B1 5	C.A.O. Correct 2 times F.T. correct subtraction C.A.O. C.A.O.
6. (a) (i) 34 (ii) 36 (b) 8 (c) 7g (d) 20 (e) $y = x + 3$	B1 B1 B2 B1 B2 B2 9	C.A.O. C.A.O. B1 for 40 OR 'their 40' $\div 5$ <u>Accept '8' seen in their correct working.</u> C.A.O. B1 for either 12 or 8 B1 for words such as 'add 3' <u>which shows the connection between x and y</u>

2009 Autumn Paper 1 (Non calculator) Wales Pilot Foundation Tier	Marks	Comments	
7. (a) Plots Line (b) Any correct strategy, e.g. 20 times value at 10 acres 78 – 82	P1 L1 M1 A1 4	Allow ONE error within a small square. Any correct method using graph or table. F.T. their graph. Unsupported answers in the range 78 – 82 get M1, A1.	
8. Lunches 20×45 = 900 Water 52×18 52 $\times 18$ 416 <u>520</u> 936 Yes (there is enough water)	M1 A1 M1 m1 A1 E1 6	<u>For realising that 25×45 is needed</u> C.A.O. <u>For realising that 52×18 is needed</u> Any <u>complete correct</u> method for the multiplication of 52 by 18. C.A.O. F.T. conclusion on their figures <u>if at least M1 awarded</u> .	
9. (a) $\begin{array}{ccc} 6 & 9 & 12 \\ 6 & 9 & 10 \end{array}$ (b) $\frac{7}{16}$ (c) $\frac{7}{16}$ of 80 = 35 (d) $80 \times 50p - 35 \times (\pounds)1$ OR $\pounds 40 - 35$ = $\pounds 5.00$ OR 500p	B2 B2 M1 A1 M1 A1 8	C.A.O. B1 for any 1 correct row or any 2 correct columns F.T. their table B1 for a numerator of 7 in a fraction less than 1. B1 for a denominator of 16 in a fraction less than 1 F.T. 'their (b)' if a fraction less than 1 ($\neq \frac{1}{2}$) Full method F.T. 'their 35'	<u>NOTES</u> Penalise –1 for use of words such as “7 out of 16”, “7 in 16” OR “7:16”. When fraction and wrong notation seen, DO NOT penalise wrong notation.
10. (a) (i) 54.81 (ii) 548.1 (iii) .63 (b) For example, $\frac{7}{20} = 35\%$ 38% $.32 = 32\%$ Smallest = .32 Largest = 38% (c) 200	B1 B1 B1 B1 B1 B1 B2 8	C.A.O. C.A.O. C.A.O. MARKERS MUST MARK ALL THE WORKING SHOWN For CORRECTLY having two in a form suitable for comparing. For CORRECTLY having three in a form suitable for comparing. <u>Even in pairs, e.g. $\frac{7}{20} = 35\%$, $38\% = .38$ with .32 gets B1, B1</u> 35/100 is accepted as 35% Correct answers OR follow through of the correct conclusion from their working. B1 for the 8 or the 25	

2009 Autumn Paper 1 (Non calculator) Wales Pilot Foundation Tier	Marks	Comments
11. (a) 13 (miles)	B1	C.A.O.
(b) 36 (minutes)	B1	C.A.O.
(c) By the steepness (gradient) of the line(s) <u>Before because she took less time</u>	E1	
(d) 1336	B1 4	C.A.O.
12. (a) (i) $(x =) 18$	B1	C.A.O. <u>Accept embedded answers such as $18/6=3$</u>
(ii) $7x = 21$ $x = 21/7$ ISW (=3)	B1 B1	C.A.O. <u>Accept embedded answers such as $7 \times 3 = 21$</u> F.T. 'their 21'
(b) -3	B2 5	B1 for -15 OR 12
13. (a) Correct enlargement	B2	B1 for 2 points correct, or B1 for consistent but incorrect scale factor used.
Correct position	B1	FT their consistent scale factor (<u>$\neq 1$</u>)
(b) Correct rotation	B2	B1 for 90° anticlockwise rotation about (1,2) OR for 90° clockwise rotation about (2,1) <u>B1 for 4 correct triangles made by 4 rotations of 90°</u>
H5ac	5	
14. (a) Estimates, e.g 500, 20, 4 = 2500	M1 A1	<u>Accept correct calculations of their estimates within the range 2250 – 2750</u>
(b) $C = 2 \times 3.14 \times 20$ = 125.6 (cm)	M1 A1 4	C.A.O.
15. (a) 97, 99, 101, (103), 105. 98, 100, 102, 104, 106	B1	Correctly placed
(b) Strategy: must be odd numbered Strategy: $65/5$ or algebraic method 9, 11, 13, 15, 17	B1 B1 B1	<u>e.g $n + n + 2 + n + 4 + n + 6 + n + 8 = 65$; $5n = 45$; $n = 9$</u> B1 implies both strategy marks
(c) 9 and 10	B1 5	C.A.O.
H7ab		
16. Arc centre X , radius $DX \pm 2\text{mm}$ (<u>5cm</u>)	B1	Arc length shows intention. Allow series of dots as arc
Arc centre corner of building , correct radius $\pm 2\text{mm}$ (<u>3cm</u>)	B1	
Correct answer	B1 3	CAO. Intention not to go into the building
H8		
17. (a) (i) 6pm	B1	
(ii) Between 12 30pm & 2pm UK, AND 8 30pm & 10pm HK	B3	<u>Could be a shorter period within this.</u> B2 for either, or B1 for strategy timeline
(b) 4×80 OR 3×107 320 321 Hotel Bear and reason, e.g. 4 dinners for £1	M1 A1 A1 E1	<u>OR E1 for Hotel Gelton and acceptable reason.</u> <u>FT provided they compare 'their 4×80 with their 3×107'</u>
H6ab	8	

PAPER 2 - FOUNDATION TIER (WALES PILOT)

2009 Autumn Paper 2 Wales Pilot Foundation Tier	Marks	Comments
1. (a) (9.44) 11.22 16.02 10.36 47.04 (b) $10 - 3.56 - 0.85 - 1.45$ = (£) 4.14 (c) (i) 40 (%) (ii) 60 (%)	B1 B1 B1 B1 M1 A1 B1 B1 8	C.A.O. C.A.O. C.A.O. F.T. their figures for one error 47 04 is B0, but 47-04 OR 47,04 is B1 C.A.O. C.A.O. F.T. 100 – ‘their (i)’
2. (a) (i) 340 (g) (ii) Pointer at 340 (b) 60 (m.p.h.)	B1 B1 B1 3	C.A.O. F.T. ‘their 340’ C.A.O.
3. (a) Evidence of square counting 74 – 78 370 – 390 (b) chord diameter tangent (c) trapezium pentagon cylinder	M1 A1 B1 B1 B1 B1 B1 B1 B1 9	e.g. dots in the squares F.T. their area $\times 5$ C.A.O. C.A.O. C.A.O. C.A.O. C.A.O. C.A.O.
4. (a) (i) Cost = $3 \times 6.75 + 10$ = 3025 p OR (£) 30.25 (ii) Number of days $\times 6.75 = (61 - 7)$ Number of days = 8 (b) (i) 29.16 (ii) 4.6	M1 A1 M1 A1 B1 B1 6	For correct substitution C.A.O. For correct substitution and subtraction Allow embedded references to the correct answer. C.A.O. C.A.O.
5. (a) A (–3, 4) B (–3, –2) (b) C marked at (–3, 1) (c) E marked at (–3, –1)	B1, B1 B1 B1 4	C.A.O. Reversed coordinates get B0 May be on the graph, but answer space takes precedence C.A.O. Marking the points on the graph paper takes precedence in (b) and (c) C.A.O.
6. (a) 14 cm ³ (b) (i) 51 - 55° (ii) angle XYZ = 122 ° – 126 °	B1 U1 B1 B1 4	C.A.O. Independent of the ‘14’ C.A.O. C.A.O.
7. (a) (i) 26 (cm) (ii) 26/4 = 6.5 (cm) (b) (i) Area = 9×4 = 36 (cm ²) (ii) 6 (cm)	B1 M1 A1 M1 A1 B1 6	C.A.O. F.T. their perimeter/4 C.A.O. F.T. square root of their area

2009 Autumn Paper 2 Wales Pilot Foundation Tier	Marks	Comments
8. Door 6 to 8 ft OR 2 – 2.5 metres Door 2 cm Distance = 9cm Multiplying factor = 4.5 Distance = door's estimate \times 4.5 =	B1 B1 M1 A1 4	Unsupported answers marked as follows: <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">feet</div> <div style="display: flex; align-items: center;"> <div style="text-align: center; margin-right: 20px;">18 </div> <div style="text-align: center; margin-right: 20px;">27 </div> <div style="text-align: center; margin-right: 20px;">36 </div> <div style="text-align: center;">48 </div> </div> <div style="margin-left: 10px;">SC1 M1, A1 (inc) SC1</div> </div> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">metres</div> <div style="display: flex; align-items: center;"> <div style="text-align: center; margin-right: 20px;">6 </div> <div style="text-align: center; margin-right: 20px;">9 </div> <div style="text-align: center; margin-right: 20px;">11.25 </div> <div style="text-align: center;">15 </div> </div> </div> F.T. their door's height estimate AND scale factors 3 – 6 inc.
9. (a) (i) $x + 8$ (kg) (ii) 32g (p neu c) (b) (i) Subtract 6 from the previous term (ii) Multiply previous term by 4 (c) (i) $(x =) 8$ (ii) $(y =) 13$	B1 B1 B1 B1 B1 B1 6	Accept 'take away 6' Allow -6 Accept 'times by 4'. Allow $\times 4$ Accept embedded answers e.g. $6 \times 8 = 48$ Accept embedded answers e.g. $13 + 6 = 19$
10. Either $58 - 5$ OR $58 - 3 \times 7$ 53 37 then $53 - 3 \times 7$ OR $37 - 5$ Children cost (£) 32 Number of children = $32/4 (= 8)$ Total on trip = 11	M1 A1 M1 A1 B1 B1 6	C.A.O. F.T. 'their 53' OR F.T. 'their 37' Dependent on at least one M mark being awarded, F.T. 'their 32'/4 F.T. 'their 8' + 3 Accept 3 adults and 8 children
11. (a) 1200×1.15 = (€) 1380 (b) $150/1.18$ = (£) 127.11 OR 127.12	M1 A1 M1 A1 4	C.A.O. C.A.O. 127 or 127.1 get M1, A0
12. 3 or 4 angles correct and correctly labelled. 3 or 4 angles correct, labels not fully correct. 2 angles correct and correctly labelled. 2 angles correct, labels not fully correct. 1 angle correct and correctly labelled. OR <u>If 0 OR 1 for their diagram or no diagram,</u> 360/120 Angles are 114, 99, 63 and 84	B4 B3 B3 B2 B1 M1 A1 4	Use the overlay and allow $\pm 2^\circ$. Correct labels (Letter/word NOT the frequency OR angle). 3 correct labels is enough. Accept labels in the form of a key. If B0 scored for the diagram, check the angles and the method to see if the M1 and the A1 can be awarded. 1 is 3° gets the M1. If only B1 is scored for the diagram, and all the angles given correctly, then cancel the B1 and award M1, A1 for 2 marks. OR SC1 for all percentages: 31.7, 27.5, 17.5, 23.3 Or rounded OR truncated.
13. (a) Correct image (-1, 3) (-5, 1) (-3, -2) (b) Correct image (-2, 3) (1, 2) (0, 1)	B1 B1 2	C.A.O. C.A.O.
14. (a) 140 – 144 inclusive (b) Bearing from Wexford Bearing from Rosslare Point X	B1 M1 M1 A1 4	$\pm 2^\circ$ Use overlay (Allow the M marks for dots/crosses which are on the correct bearings, provided they are unambiguously offered). F.T. if at least M1 and 2 intersecting lines or correct pt. shown If the correct point X is unambiguously indicated even without the bearing lines then award M1, M1, A1.

2009 Autumn Paper 2 Wales Pilot Foundation Tier	Marks	Comments
15. (a) $14 + 24 \times 0.5$ $= 26 \text{ (cm)}$ (b) $(18.6 - 9) / 1.2 (=8)$ 9 (cups) (c) $9 + 20 \times 1.2 (= 33 \text{ cm})$ $(33 - 14) / 0.5$ 39 (cups) H2	M1 A1 B1 B1 B1 B1 B1 7	SC1 for 26.5(cm) An answer of 8 cups implies the first B1 FT for their “33”, e.g. $9 + \dots \times 1.2$ CAO. An answer of 38 cups implies the second B1 <i>Alternatively accept a trial & improvement method</i>
16. (a) (i) 53800 (ii) $\cdot 21$ (b) 18:29 (c) EITHER $\frac{28}{100} \times (\pounds)542$ AND subtracted from $\pounds 542$ $(\pounds) 151.76$ $(\pounds) 390.24$ OR $\frac{72 \times 542}{100}$ $= (\pounds) 390.24$	B1 B1 B1 M1 B1 A1 OR M1 B1 A1	C.A.O. C.A.O. C.A.O. Complete method. Need to show a correct process for finding 28% AND subtracting it from $(\pounds) 542$ For sight of $(\pounds) 151.76$ F.T. their 28% if M1 awarded. <u>Need to show a correct process for finding 72% of 542</u> For sight of the 72 OR $(0) \cdot 72$ C.A.O.
17. (a) Attempt to add to check total is/is not 1 No, showing total probability is 1 (b) (i) $0.06 + 0.4$ $= 0.46$ (ii) $1 - 0.15$ OR $0.25 + 0.14 + 0.06 + 0.4$ $= 0.85$ H4	M1 A1 M1 A1 M1 A1 6	Accept exact equivalent % and/or fractions
18. $6x - 7 = 4x + 12$ $2x = 19$ $x = 19/2$ ISW ($= 9.5$ OR $9\frac{1}{2}$)	B1 B1 B1 3	Clearing brackets correctly F.T. until second error Correctly collecting terms on both sides of the equation F.T. $ax = b$ ($a \neq 1$)
19. Total is 48 Range is 12 Median is 10 $4^{\text{th}} = 2^{\text{nd}} \times 2$ 4, 6, 10, 12, 16 H9	B1 B1 B1 B1 B1 5	All 5 numbers correct and in ascending order
20. (a) 2500.00 <u>175.00</u> 2675.00 <u>187.25</u> <i>OR</i> 2862.25 $2500(1.07)^2$ M2 2862.25 A1 H10a	B1 M1 A1 3	For a correct 7%. For the overall method (2 stages of adding <u>different</u> 7%). C.A.O. Ignore subsequent working. SC1 for $(\pounds)2850$ (simple interest), alternatively they may get the B1 for $(\pounds)175$ if seen.

PAPER 1 - HIGHER TIER (WALES PILOT)

GCSE Higher Tier Wales Nov. 2009. Paper 1	Mark	Comments
1.(a) 2.2 (b) $2.2 \times 15 \times 10$ 330 (litres) (c)(i) Use of $1000\text{g} = 1\text{kg}$ $25 \times 1.5/100$ or equivalent or $25 \times 1500/100$ 375(g) (ii) 34(.4 %)	B1 M1 M1 A1 M1 M1 A1 B1 8	FT their (a) CAO CAO. Do not accept 35%. 34.4 g gets B0
2. $x = 35^0$ $y = 35^0$ $z = 145^0$	B1 B1 B1 3	FT $y = x$
3.(a) All points plotted correctly (b) Positive (c) Line of best fit with points above and below (d) Percentage cloud from their line of best fit	B2 B1 B1 B1 5	B1 for at least 3 correct plots, or B1 if tests reversed Ignore line of best fit, <i>Penalise joined point to point -1</i> <i>Do not accept descriptions.</i>
4. $\frac{1}{2} \times 11 \times 7$ $= 38.5$ cm^2	M1 A1 U1 3	Attempt $\frac{1}{2}$ base x height seen, e.g. 5.5×7 Award only if multiplication of 7×11 implied, irrespective of halving
5.(a) Correct enlargement Correct position (b) Correct reflection (c) Correct rotation	B2 B1 B2 B2 7	B1 for 2 points correct, or B1 for consistent but incorrect scale factor used. FT their consistent scale factor B1 reflection in any vertical line OR sight of $x=1$ B1 for 90^0 anticlockwise rotation about (1,2), OR, 90^0 clockwise rotation about (2,1)
6.(a)(i) 6pm (ii) Between 12 30pm & 2pm UK, 8 30pm & 10pm HK (b) 4×80 OR 3×107 320 321 Hotel Bear and reason, e.g. 4 dinners for £1 (c)(i) $400 \times 15 (=6000)$ $400 \times 15 - 1500$ $= 4500 (\$)$ (ii) Less with reason, e.g. $1500/17 < 100$	B1 B3 M1 A1 A1 E1 M1 M1 A1 E2 13	Could be a shorter period within this. B2 for either OR UK & HK time within period given, OR B1 for strategy timeline OR E1 for Hotel Gelton and acceptable reason. FT OR $1500 / 15 (=100)$ OR $\{400 - 100\} \times 15$ E1 for Less with no or incorrect reson
7.(a) 97, 99, 101, (103), 105, 98, 100, 102, 104, 106 (b) Strategy: must be odd numbered Strategy: $65/5$ or algebraic method 9, 11, 13, 15, 17 (c) Strategy: two consecutive numbers times to 380 19 and 20	B1 B1 B1 B1 B1 B1 6	Correctly placed B1 implies both strategy marks Or product of their numbers is 380, e.g. 10 & 38
8. Arc centre X, radius $\text{DX} \pm 2\text{mm}$ Arc centre corner of building, correct radius $\pm 2\text{mm}$ Correct answer	B1 B1 B1 3	Arc length shows intention. Allow series of dots as arc CAO. Intention not to go into the building
9.(a) $4y^4 + y$ (b) t^4 (c) $6x^9y^5$	B2 B1 B2 5	ISW. B1 for each term. B1 for $6x^9y^5$ or $6x^9y^5$ or $\dots x^9y^5$
10.(a) $3V = 4\pi r^3$ OR $V / (4/3 \pi) = r^3$ $3V / 4\pi = r^3$ OR $\sqrt[3]{V / (4/3 \pi)} = r$ $r = \sqrt[3]{3V/4\pi}$ (b) $de - 2d = c + g$ $d(e - 2) = c + g$ $d = (c + g) / (e - 2)$	B1 B1 B1 B1 B1 B1 6	Accept π written numerically throughout <i>FT until 2nd error in (a) & (b)</i> Collecting d Factorising

GCSE Higher Tier Wales Nov. 2009. Paper 1	Mark	Comments								
11. (a) $\frac{3}{4}$ $\frac{2}{5}, \frac{3}{5} \quad \frac{2}{5}, \frac{3}{5}$ (b) $\frac{1}{4} \times \frac{3}{5} + \frac{3}{4} \times \frac{2}{5}$ $= 9/20$	B1 B1 M1 A1 4	On correct branch On correct branches, or on one pair with other blank FT their probabilities, not all $\frac{1}{2}$, not 0 or 1								
12.(a)(i) Polygon with at least two vertices correct (horizontal & vertical) All 4 vertices at correct positions (ii) $10 < t \leq 20$ (b) Interquartile range = ... - ... 10 (c) Yes with a correct explanation referring to median of the second class and the group containing the median for the first class	M1 A1 B1 M1 A1 B2 7	Ignore bars. Accept the intention of straight lines drawn without a ruler Ignore starting at 0 and right hand end. SC1 for a correct polygon or curve using all 4 vertices but translated horizontally, or SC1 for all vertices plotted corrected but no polygon or points joined with a curve. Accept any indication "10 to 20", but not a single value. Allow M1 for correct intention but with incorrect reading of time scale. (8.75 gives 12, 26.25 gives 22.) CAO B1 for Yes, explanation refers only to median of the second class								
13.(a) $V = 1/3 \times 18 \times x$ (b) $V = 10x^2$ (c) Table completed correctly 5 correct points plotted correctly All correct points joined with a curve (d) Equal volume	B1 B1 B1 B1 B1 E1 6	Accept $V = 10 \times x \times x$ FT their $V = 10x^2$ provided that it is not linear FT their points (0,0), (0.2,0.4),(0.4,1.6),(0.6,3.6),(0.8,6.4),(1, 10)								
14. (a) $9/2 \times 3$ $= 13.5 \text{ (cm)}$ (b) Area scale factor 3^2 Area of large shape = their area scale factor $\times 5$ $= 45 \text{ (cm}^2\text{)}$	M1 A1 B1 M1 A1 5	Or equivalent calculation Do not accept 3×5 CAO								
15.(a) $(7x - 2)(2x + 1)$ $x = 2/7$ and $x = -1/2$ (b) $(q + 7)(q - 7)$ (c) $(x + 3)(x + 2)$ $3(x + 2)$ $(x + 3)/3$ (d) $27a^3b^{21}$	B2 B1 B1 B1 B1 B1 B2 9	B1 for $(7x - 2)(2x + 1)$ FT their pair of brackets Mark final answer, further incorrect working penalised B1 for $27a^3b^{21}$ or $27a^{21}b^{21}$ or $\dots a^3b^{21}$								
16. $\angle BCQ = \angle ABC$ or $\angle PCA = \angle ABC$, AND parallel line $\angle BCQ = \angle BAC$ or $\angle PCA = \angle ABC$, AND alternate segment Conclusion $\angle CAB = \angle CBA$	B1 B1 B1 3									
17. (a) $y \propto 1/x$ OR $y = k/x$ $3 = k/8$ $y = 24/x$ (b) <table><tr><td>x</td><td>$\frac{1}{2}$</td><td>6</td><td>8</td></tr><tr><td>y</td><td>48</td><td>4</td><td>3</td></tr></table>	x	$\frac{1}{2}$	6	8	y	48	4	3	B1 M1 A1 B2 5	FT(throughout) non linear only Maybe implied in part (b) B1 for each value, do not accept $24 / \frac{1}{2}$ for 48
x	$\frac{1}{2}$	6	8							
y	48	4	3							
18.(a) Steeper (b) Translation to the left Clearly touches (-5,0) (c) Vertical translation -3 indicated on the y axis	B1 B1 B1 B1 B1 5	Allow SC1 for right shift with 5 indicated. Up or down								
19. $20(n+3) + 5n(n+1)$ Common denominator or multiplier thru $(n+1)(n+3)$ $20n + 60 + 5n^2 + 5n$ $= 6(n^2 + 4n + 3)$ $n^2 - n - 42 = 0$ $(n - 7)(n + 6) = 0$ $n = 7$ and $n = -6$	M1 M1 M1 M1 A1 M1 A1 7	FT their LHS for equivalent level of difficulty FT their RHS for equivalent level of difficulty FT equivalent level of difficulty Factorising or sub. into formula FT to solution containing 1 term under $\sqrt{\quad}$								

PAPER 2 - HIGHER TIER (WALES PILOT)

GCSE Higher Tier Wales Nov 2009. Paper 2	Mark	Comments
<p>1.</p>	<p>B2</p> <p>B2</p> <p>4</p>	<p>First net (dots or numbers) B1 for one pair of opposite sides completed correctly</p> <p>Second net (dots or numbers) B1 for one pair of opposite sides completed correctly</p> <p><i>Orientation of the dots or numbers does not matter!</i></p>
<p>2.(a) $14 + 24 \times 0.5$ $= 26$ (cm) (b) $(18.6 - 9) / 1.2$ (=8) 9 (cups) (c) $9 + 20 \times 1.2$ (= 33 cm) $(33 - 14) / 0.5$ 39 (cups)</p>	<p>M1</p> <p>A1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>7</p>	<p>SC1 for 26.5(cm)</p> <p>An answer of 8 cups implies the first B1</p> <p>FT for their "33", e.g. $9 + \dots \times 1.2$ CAO. An answer of 38 cups implies the second B1 <i>Alternatively accept a trial & improve method</i></p>
<p>3. Units used 1100 Units used $\times 14.2 / 100$ (= 156.2(0)) $5/100 \times (156.2(0) + 34.88)$ VAT £ 9.55(4) Total charge £ 200.63(4) Amount to pay £ 188.63(4)</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>6</p>	<p>FT each step independently</p> <p>FT</p> <p>FT their 156.20, accept other methods to find 5%</p> <p>FT</p> <p>FT</p> <p>FT their total charge - £12</p>
<p>4. (a) Attempt to add to check total is/is not 1 No, showing total probability is 1 (b)(i) $0.06 + 0.4$ $= 0.46$ (ii) $1 - 0.15$ OR $0.25 + 0.14 + 0.06 + 0.4$ $= 0.85$</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>6</p>	
<p>5. (a) 11, 14, 19 (b) $8x - 2x = 10 - 7$ $6x = 3$ $x = 3/6$ ISW (c) $y = 50$</p>	<p>B2</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>6</p>	<p>B1 for any 2 correct OR 1+10, 4+10, 9+10 FT until 2nd error in (b)</p> <p>Accept embedded answer</p>
<p>6. (a) $104/260 \times 100$ $= 40(\%)$ (b) 3.53 (c) $280 / 7 \times 3$ or $280/7 \times 4$ 120 and 160</p>	<p>M1</p> <p>A1</p> <p>B2</p> <p>M1</p> <p>A1</p> <p>6</p>	<p>B1 for 3.5259..... rounded or truncated</p>
<p>7. Mid-points 4.5, 14.5, 24.5 sum of (mid pts \times frequency) / 20 (=240/20) 12</p>	<p>B1</p> <p>M1</p> <p>A1</p> <p>3</p>	<p>FT incorrect mid-point (mid-points 5, 15, 25 gives $250/20 = 12.5$: B0 M1 A1)</p>
<p>8. (a) 3 and -3 (b) Plotting 4 points correctly All points plotted correctly AND joined with a curve (c) Approximately -1.6 and 1.6 (d) -5</p>	<p>B2</p> <p>M1</p> <p>A1</p> <p>B2</p> <p>B1</p> <p>7</p>	<p>B1 for each value FT from (a)</p> <p>FT from their graph FT from their graph</p>
<p>9. Total is 48 Range is 12 Median is 10 4th = 2nd \times 2 4, 6, 10, 12, 16</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>5</p>	<p>All 5 numbers correct and in ascending order</p>
<p>10. (a) 2500.00 $\underline{175.00}$ 2675.00 $\underline{187.25}$ 2862.25 OR $2500(1.07)^2$ M2 2862.25 AI</p>	<p>B1</p> <p>M1</p> <p>A1</p>	<p>For a correct 7%.</p> <p>For the overall method (2 stages of adding <u>different</u> 7%).</p> <p>C.A.O. Ignore subsequent working. SC1 for (£)2850 (simple interest), alternatively they may get the B1 for (£)175 if seen.</p>

GCSE Higher Tier Wales Nov 2009. Paper 2	Mark	Comments
(b) 2 hours 45 minutes 115.5/ 2 hr 45 mins 42(mph)	B1 M1 A1 6	FT for distance divided by their time, time maybe written incorrectly CAO M1 only for 0.7 (m.p.min) or 47.14... B1 implied also for the correct time
11. $(x + 5)(x - 2) = 120$ $x^2 + 3x - 130 = 0$ $(x + 13)(x - 10) = 0$ $x = 10$ selected	M1 A1 M1 A1 4	OR Trial & imp.: Sub. value for x, area & compare 120 OR 2 values x an ans. >120 and an ans <120; OR ans 120 <i>FT for equivalent difficulty solution of equation</i> OR values to give 120 $x = 10$ Answer only $x = 10$ B4
12. Any 3 of the lines drawn correctly Correct region indicated	B3 B1 4	Award B2 for any 2 lines OR B1 for any 1 line indicated CAO
13.(a) $6x(x + 3y)$ (b) $2(x + 3)$ or $2x + 6$ (c) $(x+5)(x-5)$ (d) $4n - n < 22 + 5$ $n < 9$	B2 B1 B1 B1 B1 6	B1 for 1 error inside bracket OR correct partial factorised FT 1 error. B0 for $n < 27/3$. No marks if “=”
14.(a) $(AD) = 8.2 \sin 36$ $4.8198...$ $\tan x = (AD) / 12.3$ $= 0.3918...$ $x = 21(^{\circ} 398...)$ (b) Strategy, idea of right angle and Pythagoras' Theorem $11^2 = AB^2 + BC^2$ OR $AB^2 = 5.5^2 + 5.5^2$ $121 = 2AB^2$ OR $AB^2 = 60.5$ OR $AB = \sqrt{60.5}$ $AB = 7.778... (cm)$	M2 A1 M1 M1 A1 B1 M1 A1 A1 10	M1 for $\sin 36 = (h)/8.2$ Seen, used or implied FT their h FT their h CAO $AB / 11 = \cos 45$ $AB = 11 \cos 45$ Accept rounded or truncated
15. $x = \{ -19 \pm \sqrt{(19^2 - 4 \cdot 3 \cdot 11)} \} / 6$ $= [-19 \pm \sqrt{229}] / 6$ -0.64 and -5.69	M1 A1 A1 3	Use of correct formula, allow one slip in substitution CAO. Must be correct to 2 decimal place
16. (a) $P(RR) = 16/21 \times 15/20$ or $P(GG) = 4/21 \times 3/20$ $P(\text{same colour}) = 16/21 \times 15/20 + 4/21 \times 3/20$ $= 252/420$ (b) $P(Y'Y) + P(Y'Y) = 1/21 \times 20/20 + 20/21 \times 1/20$ $= 40/420$	B1 M1 A1 M1 A1 5	Accept including $P(Y'Y)$ Accept including $P(Y'Y)$ Accept equivalent fraction Or other complete method Accept equivalent fraction Ignore incorrect cancelling of final answers.
17.(a) 30 (seconds) (b) Frequency density 0.6, 1.9, 2.5, 3.6 and 0.7 Histogram drawn	B1 M1 A1 3	Allow 31
18.(a) Sight any 1 of: 0.795, 79.5, 0.545, 54.5 (value 0.795 to 0.799) x (value 0.545 to 0.549) x 100 Using values to give an answer < 43.5 Statement “Not true” (b) Sight of 1 of: 0.805, 80.5, 0.555, 55.5 (0.805 x 0.555 x 100 =) 44.6775 or 44.7	B1 M1 A1 E1 B1 B1 6	(Min is 43.3275) Maybe implied with use of inequalities
19. (a) Sine curve through the origin -1 to 1, -180° to 360° shown (b) -52° , -128° , 232° , 308°	M1 A1 B3 5	B2 for any 2 correct values, or B1 for a correct value. SC1 for all 4 but rounding error. FT their -52 for B2
20. Overall strategy, line + arc Arc AB $68/360 \times 2\pi r$ $= 6.17... (cm)$ Line AB, use of cos rule OR rt. ang. triangle with 34° or 56° $AB^2 = 5.2^2 + 5.2^2 - 2 \times 5.2 \times 5.2 \times \cos 68$ OR $\sin 34 = \frac{1}{2} AB / 5.2$ $AB^2 = 33.82...$ OR $\cos 56 = \frac{1}{2} AB / 5.2$ $AB^2 = 33.82...$ OR $\frac{1}{2} AB = 2.907...$ Line AB = 5.815... Perimeter 12(cm) or 11.9(8709...cm)	B1 M1 A1 M1 A1 A1 A1 B1 8	OR use of Sine rule FT provided all M marks awarded



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