GCSE MARKING SCHEME

MATHEMATICS - LINEAR

SUMMER 2012

INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2012 examination in GCSE MATHEMATICS - LINEAR. 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.

P1 (FOUNDATION TIER)

Summer 2012 Paper 1 (Non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
1. (a) (i) 50 244 (ii) sixty seven thousand three hundred (and) four	B1 B1	C.A.O.
1. (b) (i) 34 and 12 (ii) 76 and 37 (iii) 21	B1 B1 B1	C.A.O. C.A.O. C.A.O.
1. (c) (i) 7600 (ii) 8000	B1 B1	C.A.O. C.A.O.
1. (d) 1, 5, 25	B2	B1 for any 2 correct factors and up to 1 incorrect Accept 1×5 and/or repeated factors.
1. (e) (i) 8743 (ii) 3487	B1 B1	C.A.O. C.A.O.
2. (a) 7 hundred(s) OR 700	B1	Accept hundred(s), but not 100(s)
2. (b) 228	B1	C.A.O.
2. (c) Any correct method for finding how many notebooks 12 notebooks OR cost (£) 19.2(0) Change = (£) (0).8(0) OR 80 (p)	M1 A1 A1	For a strategy that finds the maximum number of books 3 marks for 80(p) if unsupported OR no wrong method seen. How much they cost F.T. their cost if M1 awarded
2. (d) 50 OR 52 × 10 OR 51(.8) ×10 = 500 OR 510 OR 518 OR 520	M1 A1	Good estimates F.T their estimates for simple calculations M0, A0 for actually calculating 51.8 × 10.2 Unsupported answers get M0, A0.
3. (a) Cost = 15 × 9 + 30 = (£) 165 ISW	M1 A1	Correctly substituted and correct attempt to evaluate 15 × 9 (15 × 39 gets M0, A0)
3. (b) Monthly payment = (220 – 40) /9 = (£) 20 ISW	M1 A1	For correct substitution with subtraction and division Allow embedded references to the correct answer.
4. (a) Red 9, Black 16, Yellow 8, Green 7 <u>Both axes labelled</u>, e.g. frequency along one axis and R(ed), B(lack), Y(ellow), G(reen) along other axis Anywhere within the base (inc.) of the corres. bar. <u>and uniform scale for the frequency axis starting at 0</u> and labelled 'frequency' OR 'number of discs'. Four bars at correct heights (bars must be of equal width) (b) B(lack) (c) 9/40 I.S.W.	B2 B2 B2 B1 B2	May be inferred from their bar chart. B1 for any two/three correct frequencies If frequencies score 0, then give B1 for all 4 correct tallies. B1 if no scale, but allow one square to represent 1 OR B1 if not labelled as 'frequency' or similar. If frequency scale starts with 1 at the top of the first square the starting at 0 will be implied for this axis. F.T. their frequencies throughout. B1 for any 2 or 3 correct bars on F.T. If no frequencies given in their working, penalise -1 for each incorrect frequency on their bars up to -4 (First and third B2s) Accept 16 and Black, but B0 for 16 only. Condone 'Blue'. F.T. 'their 9' and/or 'their 40'. B1 for the 9 (in a fraction < 1) OR B1 for a denominator of 40 (in a fraction < 1) Penalise -1 for incorrect notation, e.g. '9 out of 40', '9:40'

Summer 2012 Paper 1 (Non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
5. (a) At least one of the missing side segments = 6 Perimeter = Sum of all sides = 9+3+9+3+6+6 = 36 (cm)	S1 M1 A1	 Attempt to add all sides of the shape (Check their diagram) F.T. 'their 6'
5. (b) Area = Sum of the areas of the shape (= 27+18) = 45 cm^2	M1 A1 U1	Attempt to add all areas of the shape (accept 9×3 and 6×3) F.T. 'their 6' Independent of all other marks. Watch for other methods e.g. 9×9 - 6×6.
6. Number of rows = 18/2 (9) OR 18/2 (9) Number of people in each row 9 × 12 (108) = 2×12 (24) Total number of people = 24 × 9 × 2 = 216 and Yes OR > 200 Look for • spelling • clarity of text explanations, • the use of notation (watch for the use of rows, people, seats, metres being appropriate) QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	B1 B1 M1 A1 QWC 2	Using the 18m aisle appropriately Using the row information correctly Any complete correct method for finding the number of people. Allow different orders, e.g. finding how many on 1 side (108) and doubling. C.A.O. Show the marks awarded as 4 (or 3,2,1,0) With the QWC mark underneath 2 (or 1 or 0) QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar. OR Evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling
7. (a) $R\hat{P}Q = 36°$ $R\hat{Q}P = 112°$ Completed triangle	M1 M1 A1	Use overlay ± 2° Use overlay ± 2° If at least M1 awarded
7. (b) Obtuse	B1	
7. (c) Height = 84/(4×3) = 7 (cm)	M1 A1	(Check their diagram) **Watch for 4 + 3 = 7 !!** Accept embedded answers, e.g. 4×3×7 = 84.
8. (a) It is (15m) below sea level. Accept 'under the sea level'.	B1	Do not accept 'below zero'. Do not accept 'under the sea'. '-15(m) below' gets B0
8. (b) Chott Melrhir	B1	Accept -40 OR Algeria
8. (c) 395 (m)	B1	
9. (a) 42 56 30 40 18 24 (b) $\frac{7}{16}$ (of 160) = 70 Cost = 160 × 80p OR Prizes = 70 × £1.50 (£) 128 or 12800 (p) OR (£)105 or 10500 (p) 160 × 80(p) − their 70 × (£)1.50 = £23 OR 2300p	B2 M1 A1 M1 A1 M1 A1	B1 for at least 3 correct entries F.T. their table. F.T. 'their 7/16' if a fraction less than 1 Sight of bone fide 70 in later working OR 70/160 gets M1, A1. Accept words '7 out of 16', or '70 out of 160' here. For either method and accuracy for cost OR prizes. F.T. 'their 70' provided it is clearly identifiable. F.T. full method (ignore units for the M1). Rounded up or down figure if their 70 is not a whole number

Summer 2012 Paper 1 (Non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
10. (a)Plots	P1	**Allow ONE error** **(Accuracy is within ½ square) either side.**
Line	L1	Accept an attempt to link the 3 plotted points.
10. (b) Any correct strategy, e.g. 5 times value at 10 nautical miles	M1	Any correct method using graph or table.
58	A1	F.T. their graph. Unsupported answers in the range 54 – 61 incl. get M1, A1.
11. A (11, −1)	B2	B1 for each ordinate
B (21, 9)	B2	B1 for each ordinate
C (21, 1)	B2	B1 for each ordinate. F.T. 'their 21' If answers missing in expected place check their diagram.
12. (a) 12:08 – 11:25	M1	SC1 (for Swansea to Newport) giving 1 hour 13 minutes
= 43 (minutes)	A1	OR 73 (minutes).
12. (b) (i) 12:12	B1	C.A.O.
(ii) 10 (minutes)	B1	Allow B1 for 41 (minutes) if (i) answer is 11:47.
(iii) Swansea train late does not matter as he has to wait at Bristol.	E1	The fact that the '10 mins late' can be ignored must be explicitly given.
Arrives in Birmingham at 15:11 or 3:11 (pm)	B1	C.A.O.
13. (a)	M1	For a method that produces 2 prime factors from the set {2, 2, 5, 7} before their second error. If their 2nd prime and 2nd error occurs at the same 'level' then allow M1.
2, 2, 5, 7	A1	C.A.O. for the four correct factors. (Ignore 1s).
$2^2 \times 5 \times 7$	B1	F.T. their answer if at least one index form used with at least a square. Ignore prime number requirement for this B mark. Use of brackets $(2^2)(5)(7)$ OR dot $2^2.5.7$ gets the B1. The inclusion of any 1s as factors, for example, $2^2 \times 5 \times 1 \times 7$ in their index form gets B0. Note that $2^2 \times 5^1 \times 7$ gets B1. F.T. their (a) if the M1 awarded.
(b) HCF = 14 OR 2×7	B1	
14. (The shape has) 5 sides or pentagon	S1	May be implied in working
(Interior) 3×180 OR (Exterior) $360 \div 5$	M1	
$= 540$ $= 72$	A1	Accuracy required, answer only however gains M1, A1
(Total of the other 2 angles or 2x =)		
$540 - 3 \times 106$ $108 \times 5 - 3 \times 106$	M1	FT their 540 or 108 (=180-their 72)). FT 'their pentagon'
(So 1 remaining angle is or x=) $222 \div 2$	M1	Realising need to halve, as there are two other angles OR FT 'their pentagon'
$= 111(°)$	A1	*Possible marks for candidates incorrectly believing, for example interior is 360° then: possible S1, M0, A0, then M1 for 360 - 3×106, then M1 for 42/2, and A1 for 21.* *Other examples are possible.* *Candidates thinking total of other 3 angles is 106, then for the final 3 marks, M0, possible M1for division by 2 and FT for possible A1 for correct evaluation*
15. $7y + 32 + 3y + 50 + 8y - 10 = 180$	M1	Idea that all three total 180. Formal notation not required
$18y + 72 = 180$ OR $18y = 108$ OR $y = 108 \div 18$	A1	Formal notation not required
$y = 6$	A1	C.A.O. *Candidates that believe =360 will have y as 16 worth SC1, then FT for B2 for answers of 144, 98 and 118 (or B1 for any 1 correct)*
74 68 38	B2	FT their unique 'y' if clearly identifiable. B1 for any one correct entry. Award also previous M1 A2 if any two correct entries seen

Summer 2012 Paper 1 (Non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
16. (a) $y^4 + 6y$	B2	B1 for one correct term. If B2 penalise further working -1 Do not accept 6×y for 6y, however accept y6
16. (b) $x/3 = 63 - 54$ OR $x/3 = 9$ OR $x + 3\times54 = 3\times63$ OR $x + 162 = 189$ $x = 27$	M1 A1	 Award both marks for an embedded answer SC1 for 351
16. (c) $4n - 1$ OR equivalent, e.g. $3 + 4(n-1)$	B2	B1 for sight of 4n. Accept 4×n -1 or n4 -1 for B2. Accept N for n, but penalise other letters – 1. 4n – n gets B0
17. (a) Correct frequency diagram	B2	**B1 for 3 correct bars**, OR for translated frequency diagram horizontally by one small square. *B0 if both frequency diagram and frequency polygon given*
17. (b) $15 < x \leq 20$	B1	Accept any unambiguous indication of this interval.

P1 (HIGHER TIER)

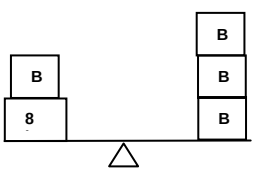
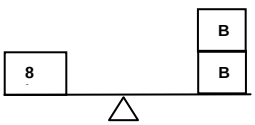
Summer 2012 Paper 1 Linear Higher		FINAL MARK SCHEME Comments
1. w = 121° x = 142° y = 59° z = 83°	B4	B1 for each correct response FT y = 180 –w, z = w + x – 180 or z = x-y
2.(a) (The shape has) 5 sides or pentagon (Interior) 3×180 OR (Exterior) 360÷5 = 540 = 72 (Total of the other 2 angles or 2x =) 540 - 3×106 108×5 - 3×106 (So 1 remaining angle is or x=) 222÷2 = 111(°)	S1 M1 A1 M1 M1 A1	May be implied in working Accuracy required, answer only however gains M1, A1 FT their 540 or 108 (=180-their 72) Realising need to halve, as there are two other angles *Possible marks for candidates incorrectly believing, for example interior is 360° then: possible S1, M0, A0, then M1 for 360 - 3×106, then M1 for 42/2, and A1 for 21. Other examples are possible.* *Candidates thinking total of other 3 angles is 106, then for the final 3 marks, M0, possible M1for division by 2 and FT for possible A1 for correct evaluation*
Look for • relevance • spelling • clarity of text explanations, • the use of notation (watch for the use '=' and '° ' being appropriate) QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their final answer	QWC 2	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar. OR Evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling
2.(b) 7y + 32 + 3y + 50 + 8y – 10 = 180 18y + 72 = 180 OR 18y = 108 OR y = 108÷18 y = 6 74 68 38	M1 A1 A1 B2	Idea that all three total 180. Formal notation not required Formal notation not required CAO *Candidates that believe =360 will have y as 16 worth SC1, then FT for B2 for answers of 144, 98 and 118 (or B1 for any 1 correct)* FT their unique 'y' if clearly identifiable. B1 for any one correct entry. <u>Award also previous M1 A2 if any two correct entries seen</u>
3.(a) Correct enlargement Intention of correct position	B2 B1	B1 for any 1 line enlarged by scale factor 2
3.(b) Correct rotation	B2	B1 for a near miss or for 90° anticlockwise rotation
3.(c) 180 + 35 or equivalent 215(°)	M1 A1	Mark final answer

Summer 2012 Paper 1 Linear Higher		FINAL MARK SCHEME Comments
4.(a) $y^4 + 6y$	B2	B1 for one correct term. If B2 penalise further working -1 Do not accept 6×y for 6y, however accept y6
4.(b) x/3 = 63 - 54 OR x/3 = 9 OR x + 3×54 = 3×63 OR x + 162 = 189 x = 27	M1 A1	 Award both marks for an embedded answer SC1 for an answer of 351
4.(c) 36 – x = 10×4 OR 9 – x/4 = 10 -x = 40 – 36 -x/4 = 10 – 9 x = -4 or -4 = x	B1 B1 B1	FT until 2nd error unless –x becomes x (as dropping the negative simplifies the question) Award all marks for an embedded answer Do not accept –x = 4 as a final answer, B1, B1, B0 *If no marks SC1 for* $\frac{36 + 4}{4} = 10$
4.(d) 2x(x -2)	B2	B1 for correct but only partially factorised OR for 2x(x …) or 2x(… -2)
4.(e) 4n – 1 or equivalent	B2	B1 for sight of 4n. Accept 4×n -1 or n4 -1 for B2 Accept N for n, but penalise other letters – 1. 4n – n gets B0
5.(a) Idea that 36.80 is 80% (36.80/80) × 100 (£)46	B1 M1 A1	 Or equivalent full method, e.g. sight of attempt ÷8 and × 10
5.(b) 60y/x	B2	Accept y/ (x/60) ISW. B1 for x/60 or y/x including embedded within an incorrect expression
6.(a) Attempt to find at least three points on $y=x^2$ $y=x^2$ drawn with (1,1) (2,4) (3,9) plottted and joined by curve For x+y=8: At least two points correct Line x+y=8 drawn accurately FT intersection their **curve** & their **straight line** (Approx (x = 2.3 or 2.4, y = 5.4 to 5.9 (not 6))	M1 A1 M1 A1 B2	 (0,0) and (4,16) may also be plotted, the other 3 must be there and accurate. Any error in (0,0) and (4,16) is A0. Must be the correct straight line B1 for x and B1 for y Coordinate notation not required, accept x=… and y=… Reading for x and y tolerance of 1 small square, 0.1 for x and 0.4 for y
6.(b)Strategy, e.g. attempt to form y=mx+c (to find gradient) Deducing that gradients are the same Statement that lines are parallel (or similar description)	S1 B1 E1	 Appropriate next step *Alternatively for simultaneous equations:* *Strategy: correct method to solve S1* *Stating 'they cannot be solved' B1* *Reason: 'they are parallel' E1*
7.(a) 0.3 0.8 0.2 0.8 on the correct branches	B2	B1 for any two correct entries Accept fractions
7.(b) 0.7 × 0.2 = 0.14	M1 A1	
8.(a)(i) Correct frequency diagram	B2	B1 for 3 correct bars, OR for translated frequency diagram horizontally by one small square. *B0 if both frequency diagram and frequency polygon given*
8.(a)(ii) $15 < x \leq 20$	B1	Accept any unambiguous indication of this interval.
8.(b)(i) 23, 25, 5 (ii) Median 15 (kg) Interquartile range: 18 - 11.5 to 12 Answers in the range 6 to 6.5 (kg)	B2 B1 M1 A1	B1 for any 1 correct entry CAO From a correct calculation if seen

Summer 2012 Paper 1 Linear Higher		FINAL MARK SCHEME Comments
9.(a)(i) 32 - 121 = -89	B2 B1	B1 for 32 or 121 CAO
9.(a)(ii) 1	B1	
9.(a)(iii) 3 × 1/5 = 3/5	B2 B1	B1 for 3 OR 1/5 or 5^{-1} or $1/\sqrt{25}$ CAO
9.(a)(iv) 3400 + 120 = 3520 or equivalent ISW	M1 A1	Or $3.4\times10^3 + 0.12\times10^3$ 3.52×10^3
9.(b) Any **two** simplifications, such as 20^2, ¼, 0.01 All **three** simplifications with one stage of working, e.g. $\frac{400 \times ¼}{0.01}$ OR 400×25 OR $\frac{400 \times 0.2}{0.01}$ 10000 OR 10000 OR 8000	B1 M1 A1	Do not accept 0.5 as a reasonable simplification of 0.249, however do accept 0.2, 0.25, 0.3. Accept 0.009 as a simplification of 0.0099 May be shown in parts Accept other approximations following reasonable working
10. $4(x+2)(x+9) = 912$ $(x+2)(x+9) = 912/4$ OR $4(x^2 +2x + 9x + 18) = 912$ $x^2 +2x + 9x + 18$ (= 228) OR $4x^2 + 44x + 72$ (= 912) $x^2 +11x - 210 = 0$ OR $4x^2 + 44x – 840 = 0$ $(x + 21)(x – 10) = 0$ OR $4(x + 21)(x – 10) = 0$ $x = 10$ Dimensions (4cm) 12(cm) and 19(cm) only	B1 M1 M1 M1 A1 A1 A1	Right hand side may be inserted at a later stage FT until 2nd error FT equivalent level FT equivalent level. For the expression FT equivalent level Or factorised without the factor of 4 extracted, or equivalent Ignore negative value for x FT provided at least 2 M marks awarded No negative dimensions included *For candidates trying to find, from their equation, 2 numbers with a difference of 7 that give a product of 228, allow full credit for 12× 19(× 4)* *Trial and improvement methods from the start, or answers only, are awarded no marks*
11. Strategy, e.g. sketch with axes and with a horizontal line (y=1) with a point in the first quadrant above this horizontal line, and a point in the fourth quadrant vertically below their first point. *The two points do not need to be labelled, may be incorrectly labelled* *The horizontal line should be unambiguous, no credit if a vertical line also given* T (a, …) Method to find y-coordinate, e.g. sight of b-1 above y=1 T (… , 2-b) or equivalent	S2 B1 M1 A1	S2 for modelling using appropriate values, with a $\geq$ 5 or b $\geq$ 5 e.g. showing (6, 7) with (6, -5) (this example also gains M1 for trying to find the y coordinate) OR S1 for axes showing a horizontal line, or for the mirrored two points, or sight of 'b<-3' meaning y<-3 *Accept intention of y = 1 by indicating a horizontal line above the x-axis* Accept without coordinate notation OR for use of appropriate values to model, e.g. (.., 7) with (.., -5) OR sight of 'b<-3' meaning y<-3 Accept without coordinate notation
12. (a) $\sqrt{45} = \sqrt{(9 \times 5)}$ or $\sqrt{(3\times3\times5)}$ or $3\sqrt{5}$ $\{ (\sqrt{45} - \sqrt{5})^2 \} = (3\sqrt{5} - \sqrt{5})^2$ $(= (2\sqrt{5})^2)$ = 20	M1 M1 A1	**OR** M2 for $45 - 2\sqrt{45}\sqrt{5} + 5$ OR M1 for 2 of the 3 (or 4) expansion terms correct FT from M1 awarded
12.(b) $x = 0.47878…$ **and** $100x = 47.878…$ with an attempt to subtract 474/990 ISW	M1 A1	Or 10x **and** 1000x with attempt to subtract, or equivalent. Or alternative method An answer of 47.4/99 gains M1 only
13. Angle CAB = x AND stating alternate segment theorem Stating triangle CAB isosceles AND (180 – x)/2	B1 B1	May be indicated on the diagram

Summer 2012 Paper 1 Linear Higher		FINAL MARK SCHEME Comments
14.(a) 0	B1	
14.(b) Tangent drawn at x=2 Method, difference y / difference x Evaluated/ estimated answer from their reasonable tangent	B1 M1 A1	 Does not require leading to negative answer The answer must be negative
14.(c) Finding y values: 25, 24, 21, 16, 9, (0) Split into 5 areas and attempt to sum Correct substitution into trapezium rule 82.5	B1 M1 M1 A1	Sight of 25, 24, 21, 16, 9, (0) Or equivalent. (24.5+22.5+18.5+12.5+4.5) FT their values for y, OR 3 areas correct in sum of 5 CAO *Working with twice this, MR-1 then apply marks for equivalent stages*

P2 (FOUNDATION TIER)

Summer 2012 Paper 2 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
1. (a) (49.32) (jeans) 38.1(0) (shirts) 30.(00) (socks) 51.98 (trainers) 169.4(0) (b) 10% = (£) 16.94 5% = (£) 8.47 OR 847 (p) I.S.W.	 B1 B1 B1 B1 M1 A1	 Any correct method for finding 5%. F.T. their total (£) 160.93 even unsupported gets this M1, A1
2. metres m litres l kilometres km kilograms kg	B1 B1 B1 B1	 Do NOT accept kilo(s) Do NOT accept kilo(s)
3. (a) Evidence of square counting 53 – 61 inclusive	M1 A1	 Accept numbers in this range even if no evidence of square counting.
3. (b) Lines Arc	B1 B1	For all 3 lines. F.T. their lines, must have opposite curvature.
4. (a) cylinder pentagon (triangular) prism	B1 B1 B1	 square based prism, rectangular based prism get 0 Accept misspellings of 'prism'
4. (b) radius chord tangent	B1 B1 B1	
4. (c) (i) Both lines of symmetry (ii) Line of symmetry	B2 B1	B1 for either one of them and no incorrect lines OR both correct lines and 1 incorrect line. Any extra lines is B0.
5. (a) 10/25 and 4/10 circled	B2	B1 for either one of them and up to 1 incorrect one OR B1 for both correct and 1 incorrect.
5. (b) 2 triangles shaded	B1	
5. (c) 2/5	B2	B1 for 6/15. 6 out of 15 OR 6:15 get B0. 2 out of 5 OR 2:5 get B1. B0 for decimals and/or percentages.
6. (a) 8	B2	B1 for 32 OR 'their 32' ÷ 4 correctly evaluated. Accept embedded answers such as 8 × 4 – 12 = 20 Condone answer of 20 if correct answer of 8 is seen.
6. (b) (*x*=) 11	B1	Accept embedded answer such as 11 – 7 = 4 11 - 7 = 4 , x = 4 gets B0. 11x also gets B0.
6. (c) By diagrams  B1  B2	 B1 B1 B1 B1	 Two numbers or letters such that A – B = 8 Two numbers or letters such that A = 3B OR left hand diagram OR B+8=B+B+B (worth B1) OR right hand diagram OR B+B = 8 (worth B2) A = 12 (kg) B = 4 (kg)

Summer 2012 Paper 2 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
7. (a) Multiply the previous term by 4	B1	Accept ×4
7. (b) (T =) 75 – 6×8 = 27	M1 A1	Correct substitution. 75 – 68 gets M0. C.A.O.
7. (c) (i) (£) 45*x*	B1	Accept 45 × *x* 45x litres gets B0 x = 45 followed by £45x gets B0, because it is 2 or more answers with one being an incorrect answer.
7. (c) (ii) $y - 3$	B1	y – 3 = 3y gets B0
7. (d) 1/7 of 28 = 4 AND 2×4 = 8	M1 A1	Any full correct method. 2/7 × 28 gets M1.
7. (e) 1% of £1200 = (£) 12 AND 12 × 4 4% = (£) 48 I.S.W.	M1 A1	Any correct method Unsupported (£)1248 gets M1, A0
8. (a) 45	B1	
8. (b) Sum of the numbers (492) Sum/8 61·5 I.S.W.	M1 m1 A1	For attempt to add the numbers For dividing a number in the range 410 – 570 by 8. C.A.O. Unsupported 62 gets M0, A0.
8. (c) 35 45 59 59 62 73 79 80 Median = 60·5	M1 A1	For identifying the middle TWO numbers OR for arranging the 8 numbers in ascending or descending order. Must be an even number of numbers. M1 for 6 numbers listed AND the middle two identified. C.A.O.
9. (a) euros = 1200 × 1.19 = 1428 (euros) 9. (b) Pounds = 404.60/1.19 = (£) 340	M1 A1 M1 A1	Units are not required, but incorrect units , e.g. £1428 gets A0 Units are not required, but incorrect units , e.g. 340 euros gets A0
10. Side of square = $\sqrt{25}$ (Diameter of circle = side of square) = 5 (cm) Perimeter of box = 16×5 = 80 (cm)	M1 A1 M1 A1	For finding the '5'. Including on the diagram. F.T. 'their 5'(but not 25)
11. (a) 69/150 × 100 = 46 (%)	M1 A1	M1 for 69/'their150' ×100, if addition clearly seen. C.A.O.
11. (b) Cost of journals = £29.04 – 3·12 × 6 = (£) 10.32 Cost of 1 journal = 10.32/4 = (£) 2.58	M1 A1 M1 A1	 F.T. 'their (£)10.32' but NOT (£)29.04
12. (a) Two appropriate arcs Angle of 60º	M1 A1	Allow construction of 60° at the other end of the line for M1 and A1 Allow ± 2 º
12. (b) Intersecting arcs of equal radii above and below the given line. Line bisector	M1 A1	
12. (c) 360 – 56 – 128 – 103 = 73 (º) x = 107 (º)	M1 A1 B1	Look at diagram. C.A.O. Allow M1, A1 for answer of x=73 F.T. their 73 (º)

Summer 2012 Paper 2 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
13. (a) Sight of 21 (units) (Cost of all units =) 25×93 + 21×132 (= 2325 + 2772) = (£)50.97 or 5097(p) (Adding on standing charge 7.45 to give) (£)58.42 or 5842(p) <u>Notes for QWC:</u> QWC2 can only be awarded if the correct unit is shown in the final answer QWC2 requires words throughout the response, not just connected to the final answer Look for • within process and steps, "25 – 46 = 21" is unacceptable • spelling • clarity of text explanations, • the use of notation (watch for the use of '=', £, p being appropriate) QWC2: Candidates will be expected to • present work clearly, with clear process or steps shown AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar QWC1: Candidates will be expected to • present work clearly, with clear process or steps shown • explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar	B1 M1 A1 A1 QWC 2	FT their '46 – 25'. Place value need not be correct Intention to add may be implied If units are given they need to be correct If units are given they need to be correct. FT from M1, A0, for correct evaluation of adding 7(.)45 to their cost of units with consistent place value SC1 for answer of 68(.)17 or 50(.)23 (working: 46×1(.)32=60(.)72 or 46×(0.)93 = 42(.)78, then add 7.45 leading to 68(.)17 or 50(.)23) OR SC1 for an answer of 30(.)7(0) (working: 25×(0.)93=23(.)25, then add 7.45 leading to 30(.)70) OR SC1 for an answer of 35(.)17 (working: 21×1(.)32=35(.)17 then add 7.45 leading to 35(.)17) <u>N.B. With SC1s, B1 may also be awarded for sight of '21'</u> *Sight of (£)5104.45 comes from mix of units, '5097+7.45' with supported working this is awarded 3 marks QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar. OR Evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling
13.(b) 10×1.5(0) (=15) (x -10)×2 4 + 15 + 2x - 20 = (£) 2x - 1	B1 B1 B1 B1	Sight of '19' implies 15, hence B1 With intention of brackets, may be implied later If no marks: Answer of 2x + 9 gets 3 marks Answer of 2x + 5 gets 2 marks Answer of 2x – 5 gets 3 marks Answer of 2x + 19 gets 2 marks Answer of 2x – 16 gets 2 marks
13.(c) 24 (cubic metres) 100 × 8/24 = 33(.3333….%)	B1 M1 A1	Ignore units FT their 24, provided >8. Multiplication must be seen or implied Note: Award B1 only, (M0, A0) for an answer of 1/3 or 0.33…. or equivalent. An unsupported answer of 0.3 award no marks

Summer 2012 Paper 2 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
14.(a) (i)All 10 points correctly plotted with no lines (either joining the points or as vertical line graph) 14.(a)(ii) 80 (years) (£)40 14.(a)(iii) Implies "no" with a reason (e.g. 'points scattered', or 'not in line', or 'all over the grid', or 'no relationship between price and age', 'no pattern', random, etc.)	B2 B2 E1	B1 for at least 6 points correctly plotted ignoring any lines drawn. (Tolerance of ½ small square) *Intention for correct points is that they line on grid lines* B1 for each correct response Do not accept 'does not have a correlation between price and age', or ' points are not all together', or 'the points vary' without further clarification
14.(b) Any correct 18% of a value seen in working $2400 - 0.18 \times 2400$ (= 2400 – 432 = 1968) $1968 - 0.18 \times 1968$ (= 1968 – 354.24 = (£)1613.76) (£)786.24	B1 M1 M1 A1	OR B1and M2 for 2400×0.82^2 Or B1 and M1 for 2400×0.82 FT their 1968, but not 2400 CAO. Penalise further working -1 *Appreciate: B1 and SC1 for 3341.76* *Simple depreciate: B1 and M1 for 1536* *Working towards simple depreciation: B1 for sight 864*
15. Correct statement of Pythagoras' Theorem ($x^2 =$) $9.2^2 - 8.4^2$ ($x^2 =$) 14.08 OR sight of $\sqrt{14.08}$ 3.75(… cm) rounded or truncated	M1 A1 A1	Accept $9.2^2 = x^2 + 8.4^2$ Do not accept x = 14.08. Ignore further rounding to 4, if 3.7… seen in working FT from M1, A0, for correct evaluation of the √ of their value for final A1
16. Scale factor ×1.6, or equivalent Sand 28.8 or 29 (kg) Gravel 57.6 or 58 (kg) Water 8 (l)	 M1 A3	Alternative method ×1.8 to find sand, double sand to gravel, water is half cement. Award M1 for sight of any part of this alternative method. A1 for each correct answer. Any 1 correct answer implies M1 *Do not accept an answer of 28 for sand, or 57 for gravel, however award M1* If M1, A1 awarded for water 8 (litres), then award SC1 if their gravel = 2×their sand. If no marks then SC1 if their gravel = 2×their sand.

P2 (HIGHER TIER)

Summer 2012 **Paper 2 Linear Higher**		**FINAL MARK SCHEME** **Comments**
1.(a)(i) 0 or equivalent	B1	Do not accept 'not possible' or other written comment *Do not accept incorrect notation throughout this question*
1.(a)(ii) 7/10 or 0.7 or 70%	B1	Do not accept 2/10 + 5/10' without correct evaluation Mark final answer *Do not accept incorrect notation throughout this question*
1.(b) 2/6 or 1/3 or 0.33	B2	B1 for square numbers 1 and 4, OR knowing there are 2 squares numbers on a dice. An answer of 0.3 gets B1 only Or B1 for **stating** that either 1 or 4 is a square number with an answer 1/6
1.(c)(i) 0.09 1.(c)(ii) Red	B2 B1	B1 for evidence of 1 – total of the probabilities given FT Green if their (i) > 0.23
2.(a) Sight of 21 (units) (Cost of all units =) 25×93 + 21×132 (= 2325 + 2772) = (£)50.97 or 5097(p) (Adding on standing charge 7.45 to give) (£)58.42 or 5842(p) Notes: QWC2 can only be awarded if the correct unit is shown in the final answer QWC2 requires words throughout the response, not just connected to the final answer Look for • within process and steps, "25 – 46 = 21" is unacceptable • spelling • clarity of text explanations, • the use of notation (watch for the use of '=', £, p being appropriate) QWC2: Candidates will be expected to • present work clearly, with clear process or steps shown AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar • QWC1: Candidates will be expected to • present work clearly, with clear process or steps shown explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar	B1 M1 A1 A1 QWC 2	May be implied later FT their '21' from 46 – 25 evaluated incorrectly Place value need not be correct Intention to add may be implied If units are given they need to be correct If units are given they need to be correct. FT from M1, A0, for correct evaluation of adding 7(.)45 to their cost of units with consistent place value *If 23.25 + 27.72 + 7.45 (or equivalent), place value correct, is seen with an incorrect answer, from 1 slip in addition then award, B1, M1, A0, A1* SC1 for answer of 68(.)17 or 50(.)23 (working: 46×1(.)32=60(.)72 or 46×(0.)93 = 42(.)78, then add 7.45 leading to 68(.)17 or 50(.)23) OR SC1 for an answer of 30(.)7(0) (working: 25×(0.)93=23(.)25, then add 7.45 leading to 30(.)70) OR SC1 for an answer of 35(.)17 (working: 21×1(.)32=35(.)17 then add 7.45 leading to 35(.)17). This also is awarded B1 for 21 implied N.B. With SC1s, B1 may also be awarded for sight of '21' *Sight of (£)5104.45 comes from mix of units, '5097+7.45' with supported working and is awarded 3 marks QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar. OR Evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling

Summer 2012 Paper 2 Linear Higher		FINAL MARK SCHEME Comments
2.(b) $10\times1.5(0)$ (=15) $(x-10)\times2$ $4 + 15 + 2x - 20$ = (£) $2x - 1$	B1 B1 B1 B1	Sight of '19' implies 15, hence B1 With intention of brackets, may be implied later OR $200x - 100$ pence, unit must be given For these answers award the number of marks stated, and **no** other B marks: $2x - 5$ award 3 marks $2x + 9$ award 3 marks $2x + 5$ award 2 marks $2x + 19$ award 2 marks $2x - 16$ award 2 marks
2.(c) 24 (cubic metres) $100 \times 8/24$ = 33(.3333….%)	B1 M1 A1	Ignore units FT their 24, provided >8. Multiplication by 100 must be seen or implied Note: Award B1 only, (M0, A0) for an answer of 1/3 or 0.33…. or equivalent. An unsupported answer of 0.3 is awarded no marks
3.(a) $10x - 5\times7 = 75$ OR $2x - 7 = 75/5$ $10x = 75 + 35$ $2x = 15 + 7$ $x = 11$	B1 B1 B1	*FT until 2nd error* Answer needs to be simplified. Mark final answer
3.(b) $7x - 12x + 3$ $-5x + 3$	B1 B1	*FT until 2nd error* Mark final answer *Award B1 only for a final answer of -5x -3* *SC1 if treated as a pair of brackets, but sight of '-12x + 3' or sight of $28x^2 - 19x + 3$*
4.(a) (i)All 10 points correctly plotted	B2	Do not ignore any lines drawn, expect to point the (80, 40) B1 for at least 6 points correctly plotted ignoring any lines drawn *Intention for correct points is that they lie on grid lines, allow tolerance of ± half a square*
4.(a)(ii) 80 (years) (£)40	B2	B1 for each correct response
4.(a)(iii) Implies "no" with a reason (e.g. 'points scattered', or 'not in line', or 'all over the grid', or 'no relationship between price and age', or 'no pattern', 'randomly scattered', etc.)	E1	Do not accept 'does not have a correlation between price and age', or ' points are not all together', or 'the points vary' without further clarification
4.(b) Mid points 75, 125, 175 $75\times6 + 125\times10 + 175\times4$ ($\Sigma fx = 2400$) their $\Sigma fx/20$ (£)120	B1 M1 m1 A1	 FT their mid points from within or at the bounds of the appropriate groups FT their $\Sigma fx/20$ correctly evaluated
4.(c) Any correct 18% of a value seen in working $2400 - 0.18 \times 2400$ (= 2400 – 432) $1968 - 0.18 \times 1968$ (= 1968 – 354.24 = (£)1613.76) (£)786.24	B1 M1 M1 A1	OR B1and M2 for 2400×0.82^2 or B1 and M1 for 2400×0.82 (=1968) FT their 1968, but not 2400 CAO. Penalise further working -1 *Total marks to award for common errors:* *Appreciation: B1 and SC1 for 3341.76* *Simple depreciation: B1 and M1 for 1536* *Working towards simple depreciation: B1 for sight 864 if 432 not seen*

Summer 2012 Paper 2 Linear Higher		FINAL MARK SCHEME Comments
5.(a) Sight of 50.5 (cm) or 0.505 (m) 200× 50.5 OR 200× 0.505 101 (m)	B1 M1 A2	If units are given they must be correct FT their 50.5 only if $\geq$50.4 and $\leq$50.5 A1 for 10100(cm). If units are given they must be correct *SC1 for an answer of 100m from 200×0.5, unit m (or metres) must be given* *Use of 10cm or 20cm as length of the kerb stone:* *Award SC2 for* *200×20.5 or 200×0.205 with an answer of 41(m),* *or 200×10.5 or 200×0.105 with an answer of 21(m)* *OR* *Award SC1 for* *this working leading to 41 or 21 with incorrect units, or if the answer above is left in cm, i.e. 4100(cm) or 2100(cm), OR 41 or 21 with incorrect units*
Assumption: e.g. 'no gaps', 'fit together', 'side faces touching'	E1	*Accept 'the road is flat', 'all kerbstones are at the upper bound', 'all kerbstones are 50.5cm long'* *Do not accept 'all kerbstones are 50.4cm'* *Only accept reference to upper bound or maximum length, however accept 'all are at upper bound 50.4'*
5.(b) Scale factor ×1.6, or equivalent Sand 28.8 or 29 (kg) Gravel 57.6 or 58 (kg) Water 8 (l)	M1 A3	*Alternative method:* *×1.8 to find sand, double sand to gravel, water is half cement. Award M1 for sight of any part of this alternative method* A1 for each correct answer. Any 1 correct answer implies M1 *Do not accept an answer of 28 for sand, or 57 for gravel, however award M1* *If M1 A1 awarded for water 8(litres), then award SC1 if their gravel = 2×their sand* *If no marks then SC1 if their gravel = 2×their sand*
6. Correct statement of Pythagoras' Theorem ($x^2 =$) $9.2^2 - 8.4^2$ (x^2=) 14.08 or sight of $\sqrt{14.08}$ 3.75(… cm) rounded or truncated	M1 A1 A1	Accept $9.2^2 = x^2 + 8.4^2$ Do not accept x = 14.08 Ignore further rounding to 4, if 3.7… seen in working FT from M1, A0, for correct evaluation of the $\sqrt{}$ of their value for final A1
7.(a) $2(.0) \times 10^7$	B1	
7.(b) (i) 3.3×10^8	B2	B1 for a correct answer 2sf , e.g. 330 000 000, or 33×10^7 B1 for using standard form but not 2 sig. fig., $3.31(2)\times10^8$
7.(b)(ii) 4.9×10^{-12}	B2	B1 for $4.93(5\ldots) \times 10^{-12}$, or 4.94×10^{-12}, or 5×10^{-12}, or 0.49×10^{-11} ***Penalise incorrect notation once only -1 throughout***
8. $x = 85 \times \sin 34$ (or $x = 85 \times \sin 34/\sin 90$) 47.5(mm) or 48(mm)	M2 A2	M1 for $\sin 34 = x/85$ or $x/\sin 34 = 85/\sin 90$ A1 for 47.531….. to 2 or more d.p., or 47 from correct working, or for an answer (whole or 1dp) from premature approximation
9. Any 2 of the lines x+y=6, y=3x+1 and y= 2 correct Correct region shaded	B2 B1	B1 for any 1 correct line If y = 2 and x = 2 are both shown do not award a mark unless y = 2 is selected for the region or clearly labelled CAO. Accept indication by 'shading out'

Summer 2012 Paper 2 Linear Higher		FINAL MARK SCHEME Comments
10.(a) $3g - 6f = ag + 5h$ OR $g - 2f = (ag + 5h)/3$ $3g - ag = 6f + 5h$ or $-6f - 5h = -3g + ag$ $g(3 - a) = 6f + 5h$ or $-6f - 5h = g(-3 + a)$ $g = (6f+5h)/(3-a)$	B1 B1 B1 B1	*FT until 2nd error in (a)* Terms in g one side, with other terms on the other side Or equivalent factorising g Or equivalent
10.(b) $(2x + 13)(2x – 13)$	B2	B1 for (2x-13)(2x-13) or (2x+13)(2x+13)
10.(c) $-6n > -12$ OR $12 > 6n$ $n < 2$ or $2 > n$	M1 A1	CAO. Mark final answer *SC1 for any answer n<-1 from working -6>6n, or* *For an answer of n<1 from working -6n>-6* *Candidates working with '=' gain no marks, however if replaced to give final answer of n<2 or 2>n then award M1, A1*
10.(d) $x = \{ -4 \pm\sqrt{(4^2 – 4 . 3 . -18)}\} / 2\times3$ $= [-4 \pm\sqrt{232}] /6$ $x = 1.87$ and $x = -3.21$ (Answer to 2dp)	M1 A1 A1	Allow 1 slip in substitution, but must be correct formula CAO
11.Side (hypotunese) = 6.2/sin50 = 8(.0935… cm) Perimeter = 13.8 + 13.8 + their side + their side Answers in the range 43.6 to 43.8 (cm)	M2 A1 M1 A1	M1 for sin50=6.2/hyp. Accept alternatives e.g. Hyp =6.2/Cos40 M2, or cos40=6.2/hyp M1 Only FT provided M1 awarded previously, and not 6.2 or 13.8
12.(a) $y \alpha 1/x^2$ OR $y = k/x^2$ $8 = k/0.5^2$ $y = 2/x^2$ 12.(b) x: **0.05**, 0.2, 0.5 y: 800, **50**, 8	B1 M1 A1 B2	Must be in the correct form, not FT Maybe implied in part (b) FT non linear only FT their non linear expression B1 for each value
13.Ratio of surface areas 9:4 OR scale factor 2.25 or 4/9 Use of ratio of surface areas = (ratio of lengths)^2 or equivalent Ratio of lengths = 3:2 OR scale factor lengths 1.5 or 2/3 Length of longest edge = 18 (cm)	B1 M1 A1 A1	Or sight of division 297/132 or 132/297 *Award B1 for an answer of 27, linear scale factor implied* Or sight of $\sqrt{2.25}$ or equivalent Or equivalent CAO
14.Use of cosine rule with triangle ABC **and** ½ab sinC with triangle ACD $AC^2 = 8.8^2 + 7.2^2 - 2\times8.8\times7.2\times\cos84$ AC = 10.7719… Area ACD = ½ ×18.6 × AC × sin47 Answers in the range 72.7 to 73.5 (cm^2)	S1 M1 A2 M1 A1	Or alternative full strategy A1 for AC^2=116(.03…) FT their AC, but not 8.8, 7.2 or 18.6 CAO
15.(a) Sine curve Correct sine curve with 2 and 4 shown on the y-axes, and 360° shown or implied	M1 A1	Intention to sketch a portion of a sine curve minimum period 360° Accept an implied vertical scale, use of graduations
15.(b) $3.5 = \sin x + 3$ OR $\sin x = 3.5 – 3$ OR $\sin x = 0.5$ 30° and 150° only (no other values)	M1 A2	A1 for either answer
15.(c) Explanation, e.g. translation horizontal 90°, so implies Denia is correct	E2	E1 for shift horizontal but no conclusion Accept answers illustrated with diagrams provided translation clear E1 for a correct trial, e.g. x=30, sin30 = cos-60 = 0.5

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