



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) $50 \text{ OR } 52 \times 10 \text{ OR } 51(.8) \times 10$ $= 500 \text{ OR } 510 \text{ OR } 518 \text{ OR } 520$	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 = $15 \times 9 + 30$ $= (£) 165$ 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 <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> present work clearly, with words explaining process or steps AND <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> present work clearly, with words explaining process or steps OR <ul style="list-style-type: none"> 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) $\hat{R}PQ = 36^\circ$ $\hat{R}QP = 112^\circ$ Completed triangle	M1 M1 A1	Use overlay $\pm 2^\circ$ Use overlay $\pm 2^\circ$ 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

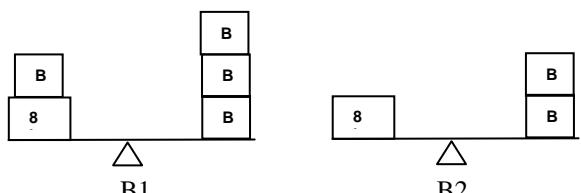
Summer 2012 Paper 1 (Non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
16. (a) $y^4 + 6y$	B2	B1 for one correct term. If B2 penalise further working -1 Do not accept $6xy$ for $6y$, however accept y^6
16. (b) $x/3 = 63 - 54$ OR $x/3 = 9$ OR $x + 3 \times 54 = 3 \times 63$ OR $x + 162 = 189$ $x = 27$	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 $4 \times n - 1$ 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. <i>B0 if both frequency diagram and frequency polygon given</i>
17. (b) $15 < x \leq 20$	B1	Accept any unambiguous indication of this interval.

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 $6 \times y$ for $6y$, however accept y^6
4.(b) $x/3 = 63 - 54$ OR $x/3 = 9$ OR $x + 3 \times 54 = 3 \times 63$ $x = 27$ OR $x + 162 = 189$	M1 A1	Award both marks for an embedded answer SC1 for an answer of 351
4.(c) $36 - x = 10 \times 4$ OR $9 - x/4 = 10$ $-x = 40 - 36$ $-x/4 = 10 - 9$ $x = -4$ or $-4 = x$	B1 B1 B1	FT until 2 nd 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 <i>If no marks SC1 for $\frac{36 + 4}{4} = 10$</i>
4.(d) $2x(x - 2)$	B2	B1 for correct but only partially factorised OR for $2x(x \dots)$ or $2x(\dots - 2)$
4.(e) $4n - 1$ or equivalent	B2	B1 for sight of $4n$. Accept $4 \times n - 1$ 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% $(36.80/80) \times 100$ (£)46	B1 M1 A1	Or equivalent full method, e.g. sight of attempt $\div 8$ and $\times 10$
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) plotted 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 $x=\dots$ and $y=\dots$ 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 <i>Alternatively for simultaneous equations: Strategy: correct method to solve S1 Stating 'they cannot be solved' B1 Reason: 'they are parallel' E1</i>
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. <i>B0 if both frequency diagram and frequency polygon given</i>
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) $3 \times 1/5$ $= 3/5$	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 $3.4 \times 10^3 + 0.12 \times 10^3$ 3.52×10^3
9.(b) Any two simplifications, such as 20^2 , $1/4$, 0.01 All three simplifications with one stage of working, e.g. $\frac{400 \times 1/4}{0.01}$ 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 2 nd 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 <i>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 $12 \times 19 (\times 4)$</i> <i>Trial and improvement methods from the start, or answers only, are awarded no marks</i>
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. <i>The two points do not need to be labelled, may be incorrectly labelled</i> <i>The horizontal line should be unambiguous, no credit if a vertical line also given</i> 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 $y < -3$ <i>Accept intention of $y = 1$ by indicating a horizontal line above the x-axis</i> 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 $\sqrt{3 \times 3 \times 5}$ 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) $x = 0.47878\dots$ and $100x = 47.878\dots$ 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

<p style="text-align: center;">Summer 2012 Paper 1 Linear Higher</p>		<p style="text-align: center;">FINAL MARK SCHEME Comments</p>
14.(a) 0	B1	
14.(b) Tangent drawn at $x=2$ Method, difference $y / \text{difference } x$ 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 <p style="text-align: center;">82.5</p>	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 <i>Working with twice this, MR-1 then apply marks for equivalent stages</i>

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 $8 \times 4 - 12 = 20$ 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 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 $\times 4$
7. (b) $(T =) 75 - 6 \times 8$ $= 27$	M1 A1	Correct substitution. $75 - 68$ gets M0. C.A.O.
7. (c) (i) (£) $45x$	B1	Accept $45 \times x$ $45x$ 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. $2/7 \times 28$ 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 <u>59</u> <u>62</u> 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)	M1 A1	Units are not required, but incorrect units , e.g. £1428 gets A0
9. (b) Pounds = $404.60/1.19$ $= (£) 340$	M1 A1	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) $69/150 \times 100$ $= 46$ (%)	M1 A1	M1 for 69/'their 150' $\times 100$, if addition clearly seen. C.A.O.
11. (b) Cost of journals = $£29.04 - 3 \cdot 12 \times 6$ $= (£) 10.32$ 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 60°	M1 A1	Allow construction of 60° at the other end of the line for M1 and A1 Allow $\pm 2^\circ$
12. (b) Intersecting arcs of equal radii above and below the given line. Line bisector	M1 A1	
12. (c) $360 - 56 - 128 - 103$ $= 73$ ($^\circ$) $x = 107$ ($^\circ$)	M1 A1 B1	Look at diagram. C.A.O. Allow M1, A1 for answer of $x=73$ F.T. their 73 ($^\circ$)

<p style="text-align: center;">Summer 2012 Paper 2 (Calculator allowed) Foundation Tier</p>	<p style="text-align: center;">Marks</p>	<p style="text-align: center;">FINAL MARK SCHEME Comments</p>
<p>13. (a) Sight of 21 (units) (Cost of all units =) $25 \times 93 + 21 \times 132$ (= 2325 + 2772) = (£)50.97 or 5097(p)</p> <p>(Adding on standing charge 7.45 to give) (£)58.42 or 5842(p)</p> <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</p> <p>Look for</p> <ul style="list-style-type: none"> • 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) <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, with clear process or steps shown <p>AND</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, with clear process or steps shown • explaining process or steps <p>OR</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar 	<p>B1 M1 A1 A1</p> <p style="text-align: center;">QWC 2</p>	<p>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</p> <p>SC1 for answer of 68(.)17 or 50(.)23 (working: $46 \times 1(.)32 = 60(.)72$ or $46 \times (0.)93 = 42(.)78$, then add 7.45 leading to 68(.)17 or 50(.)23)</p> <p>OR</p> <p>SC1 for an answer of 30(.)7(0) (working: $25 \times (0.)93 = 23(.)25$, then add 7.45 leading to 30(.)70)</p> <p>OR</p> <p>SC1 for an answer of 35(.)17 (working: $21 \times 1(.)32 = 35(.)17$ then add 7.45 leading to 35(.)17)</p> <p><u>N.B. With SC1s, B1 may also be awarded for sight of ‘21’</u></p> <p>*Sight of (£)5104.45 comes from mix of units, ‘5097+7.45’ with supported working this is awarded 3 marks</p> <p>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.</p> <p>QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar.</p> <p>OR</p> <p>Evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar.</p> <p>QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling</p>
<p>13.(b) $10 \times 1.5(0)$ (=15) $(x - 10) \times 2$ $4 + 15 + 2x - 20$ = (£) $2x - 1$</p>	<p>B1 B1 B1 B1</p>	<p>Sight of ‘19’ implies 15, hence B1 With intention of brackets, may be implied later</p> <p>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</p>
<p>13.(c) 24 (cubic metres) $100 \times \frac{8}{24}$ = 33(.3333....%)</p>	<p>B1 M1 A1</p>	<p>Ignore units FT their 24, provided >8. Multiplication must be seen or implied</p> <p>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</p>

<p style="text-align: center;">Summer 2012 Paper 2 (Calculator allowed) Foundation Tier</p>	<p style="text-align: center;">Marks</p>	<p style="text-align: center;">FINAL MARK SCHEME Comments</p>
<p>14.(a) (i) All 10 points correctly plotted with no lines (either joining the points or as vertical line graph)</p> <p>14.(a)(ii) 80 (years) (£)40</p> <p>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.)</p>	<p>B2</p> <p>B2</p> <p>E1</p>	<p>B1 for at least 6 points correctly plotted ignoring any lines drawn. (Tolerance of ½ small square) <i>Intention for correct points is that they line on grid lines</i></p> <p>B1 for each correct response</p> <p>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</p>
<p>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</p>	<p>B1</p> <p>M1</p> <p>M1</p> <p>A1</p>	<p>OR B1 and 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 <i>Appreciate: B1 and SC1 for 3341.76</i> <i>Simple depreciate: B1 and M1 for 1536</i> <i>Working towards simple depreciation: B1 for sight 864</i></p>
<p>15. Correct statement of Pythagoras’ Theorem ($x^2 = 9.2^2 - 8.4^2$) $(x^2 =) 14.08$ OR sight of $\sqrt{14.08}$ $3.75(\dots \text{ cm})$ rounded or truncated</p>	<p>M1</p> <p>A1</p> <p>A1</p>	<p>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 $\sqrt{\quad}$ of their value for final A1</p>
<p>16. Scale factor $\times 1.6$, or equivalent</p> <p>Sand 28.8 or 29 (kg) Gravel 57.6 or 58 (kg) Water 8 (l)</p>	<p>M1</p> <p>A3</p>	<p>Alternative method $\times 1.8$ to find sand, double sand to gravel, water is half cement. Award M1 for sight of any part of this alternative method.</p> <p>A1 for each correct answer. Any 1 correct answer implies M1 <i>Do not accept an answer of 28 for sand, or 57 for gravel, however award M1</i></p> <p>If M1, A1 awarded for water 8 (litres), then award SC1 if their gravel = $2 \times$ their sand. If no marks then SC1 if their gravel = $2 \times$ their sand.</p>

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 <i>Do not accept incorrect notation throughout this question</i>
1.(a)(ii) $\frac{7}{10}$ or 0.7 or 70%	B1	Do not accept $\frac{2}{10} + \frac{5}{10}$ without correct evaluation Mark final answer <i>Do not accept incorrect notation throughout this question</i>
1.(b) $\frac{2}{6}$ or $\frac{1}{3}$ or 0.33	B2	B1 for square numbers 1 and 4, OR knowing there are 2 square 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 $\frac{1}{6}$
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
<p>2.(a) Sight of 21 (units) (Cost of all units =) $25 \times 93 + 21 \times 132$ (= 2325 + 2772) = (£)50.97 or 5097(p) (Adding on standing charge 7.45 to give) (£)58.42 or 5842(p)</p> <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</p> <p>Look for</p> <ul style="list-style-type: none"> • 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) <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, with clear process or steps shown <p>AND</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, with clear process or steps shown explaining process or steps <p>OR</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar 	<p>B1 M1 A1 A1</p> <p>QWC 2</p>	<p>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</p> <p><i>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</i></p> <p>SC1 for answer of 68(.)17 or 50(.)23 (working: $46 \times 1(.)32 = 60(.)72$ or $46 \times (0.)93 = 42(.)78$, then add 7.45 leading to 68(.)17 or 50(.)23) OR SC1 for an answer of 30(.)7(0) (working: $25 \times (0.)93 = 23(.)25$, then add 7.45 leading to 30(.)70) OR SC1 for an answer of 35(.)17 (working: $21 \times 1(.)32 = 35(.)17$ then add 7.45 leading to 35(.)17). This also is awarded B1 for 21 implied</p> <p><u>N.B. With SC1s, B1 may also be awarded for sight of ‘21’</u></p> <p>*Sight of (£)5104.45 comes from mix of units, ‘5097+7.45’ with supported working and is awarded 3 marks</p> <p>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.</p> <p>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.</p> <p>QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling</p>

Summer 2012 Paper 2 Linear Higher		FINAL MARK SCHEME Comments
2.(b) $10 \times 1.5(0) (=15)$ $(x-10) \times 2$ $4 + 15 + 2x - 20$ $= (\pounds) 2x - 1$	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) $100 \times 8/24$ $= 33(3333\dots\%)$	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 $0.33\dots$ or equivalent. An unsupported answer of 0.3 is awarded no marks
3.(a) $10x - 5 \times 7 = 75$ OR $2x - 7 = 75/5$ $10x = 75 + 35$ $2x = 15 + 7$ $x = 11$	B1 B1 B1	<i>FT until 2nd error</i> Answer needs to be simplified. Mark final answer
3.(b) $7x - 12x + 3$ $-5x + 3$	B1 B1	<i>FT until 2nd error</i> Mark final answer <i>Award B1 only for a final answer of $-5x - 3$</i> <i>SC1 if treated as a pair of brackets, but sight of '$-12x + 3$' or sight of $28x^2 - 19x + 3$</i>
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 <i>Intention for correct points is that they lie on grid lines, allow tolerance of \pm half a square</i>
4.(a)(ii) 80 (years) (\pounds)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 $75 \times 6 + 125 \times 10 + 175 \times 4$ ($\Sigma fx = 2400$) their $\Sigma fx/20$ (\pounds)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 $2400 - 0.18 \times 2400 (= 2400 - 432)$ $1968 - 0.18 \times 1968 (= 1968 - 354.24 = (\pounds)1613.76)$ (\pounds)786.24	B1 M1 M1 A1	OR $B1$ and $M2$ for 2400×0.82^2 or $B1$ and $M1$ for $2400 \times 0.82 (=1968)$ FT their 1968, but not 2400 CAO. Penalise further working -1 <i>Total marks to award for common errors:</i> <i>Appreciation: B1 and SC1 for 3341.76</i> <i>Simple depreciation: B1 and M1 for 1536</i> <i>Working towards simple depreciation: B1 for sight 864 if 432 not seen</i>

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) Assumption: e.g. 'no gaps', 'fit together', 'side faces touching'	B1 M1 A2 E1	If units are given they must be correct FT their 50.5 only if ≥ 50.4 and ≤ 50.5 A1 for 10100(cm). If units are given they must be correct <i>SC1 for an answer of 100m from 200×0.5, unit m (or metres) must be given</i> <i>Use of 10cm or 20cm as length of the kerb stone:</i> <i>Award SC2 for</i> <i>200×20.5 or 200×0.205 with an answer of 41(m),</i> <i>or 200×10.5 or 200×0.105 with an answer of 21(m)</i> OR <i>Award SC1 for</i> <i>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),</i> OR 41 or 21 with incorrect units 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 $\times 1.6$, or equivalent Sand 28.8 or 29 (kg) Gravel 57.6 or 58 (kg) Water 8 (l)	M1 A3	Alternative method: $\times 1.8$ 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 = $2 \times$ their sand If no marks then SC1 if their gravel = $2 \times$ 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 $\sqrt{\quad}$ 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., $3.31(2) \times 10^8$
7.(b)(ii) 4.9×10^{-12}	B2	B1 for $4.93(5\dots) \times 10^{-12}$, 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	<i>FT until 2nd error in (a)</i> 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 <i>SC1 for any answer $n < -1$ from working $-6 > 6n$, or For an answer of $n < 1$ from working $-6n > -6$</i> <i>Candidates working with '=' gain no marks, however if replaced to give final answer of $n < 2$ or $2 > n$ then award M1, A1</i>								
10.(d) $x = \{ -4 \pm \sqrt{4^2 - 4 \cdot 3 \cdot (-18)} \} / 2 \cdot 3$ $= [-4 \pm \sqrt{232}] / 6$ $x = 1.87$ and $x = -3.21$ (Answer to 2dp)	M1 A1 A1	Allow 1 slip in substitution, but must be correct formula CAO								
11.Side (hypotunese) $= 6.2/\sin 50$ $= 8.(0935... \text{ cm})$ Perimeter $= 13.8 + 13.8 + \text{their side} + \text{their side}$ Answers in the range 43.6 to 43.8 (cm)	M2 A1 M1 A1	M1 for $\sin 50 = 6.2/\text{hyp}$. Accept alternatives e.g. Hyp $= 6.2/\cos 40$ M2, or $\cos 40 = 6.2/\text{hyp}$ M1 Only FT provided M1 awarded previously, and not 6.2 or 13.8								
12.(a) $y \propto 1/x^2$ OR $y = k/x^2$ $8 = k/0.5^2$ $y = 2/x^2$ 12.(b) <table border="1" style="margin-left: 20px;"> <tr> <td>x</td> <td>0.05</td> <td>0.2</td> <td>0.5</td> </tr> <tr> <td>y</td> <td>800</td> <td>50</td> <td>8</td> </tr> </table>	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
x	0.05	0.2	0.5							
y	800	50	8							
13.Ratio of surface areas 9:4 OR scale factor 2.25 or 4/9 Use of ratio of surface areas $= (\text{ratio of lengths})^2$ 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 <i>Award B1 for an answer of 27, linear scale factor implied</i> Or sight of $\sqrt{2.25}$ or equivalent Or equivalent CAO								
14.Use of cosine rule with triangle ABC and $\frac{1}{2}ab \sin C$ with triangle ACD $AC^2 = 8.8^2 + 7.2^2 - 2 \times 8.8 \times 7.2 \times \cos 84$ $AC = 10.7719...$ Area ACD $= \frac{1}{2} \times 18.6 \times AC \times \sin 47$ 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. $x=30$, $\sin 30 = \cos 60 = 0.5$								



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