GCSE MARKING SCHEME

MATHEMATICS - LINEAR

SUMMER 2013

INTRODUCTION

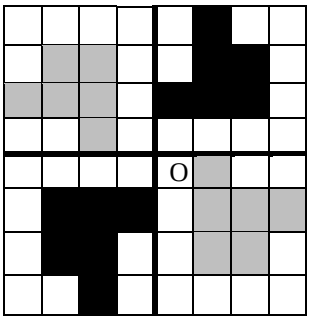
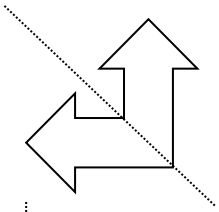
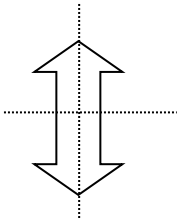
The marking schemes which follow were those used by WJEC for the Summer 2013 examination in GCSE MATHEMATICS - LINEAR. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken 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.

PAPER 1 - FOUNDATION TIER

2013 Summer Linear Paper 1 (Non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
1. (a) (i) 32 056	B1	
1. (a) (ii) ten thousand (and) one hundred and two	B1	
1. (b) (i) 44 and 23	B1	
1. (b) (ii) 12 and 41	B1	
1. (b) (iii) 36	B1	Accept 6^2, 6×6 but NOT 6
1. (c) (i) 6520	B1	
1. (c) (ii) 7000	B1	
1. (d) 1, 2, 3, 6, 9, 18	B2	B1 for any 4 correct factors and up to 1 incorrect
1. (e) (i) 1346	B1	
1. (e) (ii) 6314	B1	
Parts (i) and (ii) marked together 2. (a) (i) 11 (ii) 34	 B1 B1	
2. (b) 8000 OR 8 thousand OR thousand (s)	B1	B0 for 1 thousand OR 1000
2. (c) (0) ·75 (0) ·77 (0) ·73 , ¾ , 77%	B1 B1 B1	 Accept (0) ·73 , (0) ·75 , (0) ·77 or equivalent For the third B1, F.T. incorrect decimals **less than 1**. **B0 if given vertically.**
2. (d) 100 × 19 or 100 × 19.2 OR 100 × 20 OR 99 × 20 OR 98 × 20 OR 98.6 × 20 OR **90 × 20** = 1900 OR 1920 OR 2000 OR 1980 OR1960 **OR 1800**	M1 A1	Good estimates F.T their estimates for simple calculations **SC1 for unsupported 2000** **Penalise extraneous working (towards actual answer) M0A0**
3. (a) Value = 7×9 +4 = 67	M1 A1	Correctly substituted and correct attempt to evaluate. e.g. 7×9 +4 = 7×13 (=91) gets M0, A0. **OR 7×9 +4 = 66 gets M0, A0.**
3. (b) number of the term = (88 – 4) /7 = 12	M1 A1	For correct substitution with subtraction and division Allow embedded references to the correct answer.
All parts (a) – (b) marked at the same time 4. (a) Rugby 16, Soccer 12, Hockey 14, Tennis 8 Both axes labelled, e.g. frequency along one axis and R(ugby), S(occer), H(ockey),T(ennis) along other axis Anywhere within the base (inc.) of the corres. bar. Uniform scale for the frequency axis starting at 0. Four bars at correct heights (bars must be of equal width). Can be in any order. (b) Rugby OR 'R'	✓ B2 B2 B2 B1	Part (a) only ✓ 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' If frequency scale starts with 1 at the top of the first square the starting at 0 will be implied for this axis. Condone frequency numbers alongside squares instead of at the top of squares. F.T. their table of frequencies 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 Rugby, but B0 for 16 only **F.T. their frequencies**

2013 Summer Linear Paper 1 (Non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
5. (a) Missing inside segments = 5, (5) and 2 Perimeter = 8+8+8+3+3+5+5+2 = 42 (cm)	S1 M1 A1	One 5 with the 2 in correct places gets S1 Attempt to add all sides of the shape **FT 'their 2' for possible M1** **If the 5 and 2 are not shown on diagram but both 5s and 2 are in the sum of sides for the perimeter then award S1 here.** C.A.O.
5. (b) Area = 8×3+5×3+5×3 OR 8×8 – 5×2 = 54 cm^2	M1 A1 U1	Attempt to add all areas of the shape OR difference of areas F.T. if missing sides (even incorrect) are clearly indicated Independent of all other marks.
6. (a) 6x	B1	
6. (b) (*P* =) 66	B2	B1 for either 30 OR 36 **B0 for 30T and/or 36H**
7. A(6, −5), B (−2, −4) and C(−3, 3) plotted.	B3	B1 for each. Reversed coordinates get B0. **Letters A,B,C not needed.**
8. (a) **Use overlay** $A\hat{B}C$ = 54° (±2º) *BA* = 9 cm (±2 mm) Completed triangle.	 M1 M1 A1	 Dependent on at least one M1
8. (b) Reflex	B1	
8. (c) 2 litres = 2000 **(cm^3)** Height = 2000/(20×25) (Area of base =) 500 (cm^2) Height = 4 (cm)	✓ B1 M1 B1 A1	 FT their 2000 OR correct one stage of calculation. E.g. 2000/20 = 100 or 2000/25 = 80
9. (a)  **Parts (i) and (ii) marked together** (b) (i)  (ii) 	B2 B1 B1	B1 for each of 1st and 3rd quadrants Only the correct line drawn **The line gets B1 even if only the part that is in the shape** Only the correct two lines drawn 'Horizontal' line (and vertical line should look as if they are bisecting the shape

2013 Summer Linear Paper 1 (Non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
Both parts (a) & (b) marked at the same time		
10. (a) **Overlay (viewed with diagram)**		
Plots	P1	Allow ONE error within a small square.
Line	G1	If the points are plotted incorrectly, allow a curve through points, line segments or line of best fit.
10. (b) Any correct strategy, e.g. 10 times value at 37	M1	Any correct method using graph or table.
980 (N)	A1	F.T. their graph. Unsupported answers in the range 970 – 1000 **inclusive** get M1, A1.
All parts (a) – (b) marked at the same time		
11. (a) (2) 1 (1) 2 (1) 0 (2) 3 (1) 2 (4) 5 (2) 3 (5) 6	B2	B1 for at least 4 correct entries from 2nd and 4th columns
(b) (i) $\frac{10}{16}$ I.S.W.	B2	F.T. their table B1 for a numerator of 10 in a fraction less than 1. B1 for a denominator of 16 in a fraction less than 1. **Penalise -1 once only for wrong notation, e.g. 10 out of 16**
(ii) $\frac{10}{16}$ of 80 OR $\frac{10}{16} \times 80$	M1	F.T. their (b)(i) if a fraction less than 1 **and ≠ ½.**
= 50	A1	Penalise incorrect cancelling of 10/16 here. **50 out of 80 gets the M1, A1 but 50/80 gets M1, A0.**
(iii) 80 × 90(p) − 50 × (£)1.20 OR OR 7200(p) − 6000(p) OR (£)72 − (£)60	M1	F.T. full method of 80 × 90p – 'their 50' × £1.20 rounded up or down figure if their 50 is not a whole number OR 30×90 –50×30 (=2700–1500)
= (£)12 or 1200(p)	A1	=1200
12. (Weight of half the water) = 18 – 11 = 7 (kg)	B1	**Weight of water = 14(kg) gets B1**
(Weight of bucket) = 18 – 2×7 OR 11 – 7	M1	**FT 'their 7'**
= 4 (kg)	A1	
13. (a) (x =) 180 – 90 – 36 OR 90 – 36	M1	
= 54(°)	A1	
13. (b) 65 + 57 + 98 = 220	B1	
360 – 220 OR sight of 140(°)	M1	F.T. 'their 220'
(y =) 40(°)	A1	**Condone mathematical reversals, e.g. 220 –360 if correct answer follows i.e. 140 in this case.**
14. (a) All points plotted correctly	B2	B1 for at least 3 correct plots Ignore line of best fit
14. (b) Positive	B1	Do not accept descriptions.
14. (c) Line of best fit with points above and below	B1	Line of best fit must be appropriate for the trend of points Do not accept a line drawn corner-to-corner of graph paper
14.(d) Their estimate, from their line of best fit	B1	FT for their incorrect line of best fit OR only if **no line** shown then accept answers in the range (£)430 to (£)460 **inclusive**
14. (e) Evidence of takings / number of customers	M1	Accept for any pair of values in proportion or any pair of values on the line of best fit, or using the gradient of the line of best fit. For the idea of proportion of takings/customers, which candidates may find from one set of values or summations
Approximately (**£**)5 (Accept £4.40 to £5.50 **inclusive**)	A1	**Accept unsupported answers in the range**

2013 Summer Linear Paper 1 (Non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
15. (Manana Water cost for 700m^3 of water) 0.06×700 OR 6×700 42(€) 4200(cents) (Channel Water cost for 700m^3 of water) 30 + 0.02×700 = 44(€) (But, for Channel Water first bill cost is) 44×0.8 OR 44 – 0.2×44 (= 44 – 8.8(0)) 35.2(0 €) Choice, with any valid reason, e.g. 'Manana because after 1st 3 months change', 'Channel first 3 months (then change to Manana)', 'In the long run Manana', Look for • spelling • clarity of text explanations, • the use of notation (watch for the use of '=', € 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	 M1 A1 M1 A1 M1 A1 E1 QWC 2	*Award equivalent seen within looking at a fixed time period, e.g. 1 year, 2 years* Do not accept 4200€ Or equivalent. Must be consistent units for M1 FT 'their 44' provided previous M1 awarded or sight of 30 +(0.0)2×700 (or 1430) used in calculation or similar calculation with place value error *If M0, A0, due to working with only 1/3 of 44 reduced by 20%, then SC1 for an answer of 41.06(..) or 41.07* FT provided 1st two M1 marks awarded for each Water Company. Do not FT from 1430 or similar mixed unit error Accept answers based on a fixed time period, e.g. considering 3 years *Ignore any further incorrect calculation* 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, punctuation and grammar.
16.(a) Method with at least 2 correct prime factors Sight of correct factors (2, 2, 2, 3, 3, 13) 2^3 x 3^2 x 13 or 2^3 . 3^2. 13	M1 A1 B1	2 correct primes before 2nd error Ignore 1s seen FT their factors (with at least one index >1 used). Do not ignore 1s.
16. (b) E.g. '2 x 5^2 not even powers', or '2 x 25 but not square' Or '7x7=49 and 8x8=64 (so 50 not square)'	E1	*Do not accept "even powers" without relevant working, nor "no number times itself gives 50". But do accept "no <u>whole</u> number times itself gives 50"*
17. $A\hat{D}P = 130°$ $A\hat{P}D = 25°$ OR $P\hat{A}D = 25°$ $B\hat{R}C =$ OR $C\hat{B}R = (180° - 50°)/2$ OR 130/2 = 65° x = 180°– 25° – 65° = 90°	✓ B1 B1 M1 A1 m1 A1	Look at diagram throughout and award appropriate credit. Some answers will imply preceding ones, e.g. B2 if only 25 given F.T. 'their 50' using the isosceles triangle property correctly C.A.O. Dependent on the M1 Unsupported answers of x = 90° get 0.

Higher Tier Linear GCSE Mathematics Summer 2013 - Paper 1	Marks	FINAL MARK SCHEME Comments
1(a) a = 125° b = 55° c= 52°	B3	B1 for each, **FT b = 180 – a**, e.g. a=128 leads to b=52, which B0, B1.
2(a) All points plotted correctly	B2	B1 for at least 3 correct plots Ignore line of best fit
2(b) Positive	B1	Do not accept descriptions.
2(c) Line of best fit with points above and below	B1	Line of best fit must be appropriate for the trend of points Do not accept a line drawn corner-to-corner of graph paper
2(d) Their estimate, from their line of best fit	B1	FT for their incorrect line of best fit OR only if **no line** shown then accept answers in the range (£)430 to (£)460 inclusive
2(e) Evidence of takings / number of customers Approximately (**£)**5 (Accept £4.40 to £5.50)	M1 A1	Accept for any pair of values in proportion or any pair of values on the line of best fit, or using the gradient of the line of best fit. For the idea of proportion of takings/customers, which candidates may find from one set of values or summations Accept unsupported answers in the range
3(a)(i) (12/30)×100 40(%)	M1 A1	
3(a)(ii) 20(%)	B1	FT ½ (a)(i) provided it is a percentage
3(b) Fractions 15/30 (or ½) Fairtrade and 2/30 (or 1/15) non-Fairtrade	B2	B1 for either 15/30 (=1/2) OR 2/30 *Ignore any further working*
4 Accurate perpendicular bisector constructed with all necessary arcs Accurate bisection with evidence of all necessary arcs and the angle 45° (±2°) indicated	 B1 B2	*No marks if no arcs* Accept 1 pair of arcs with a correct mid point B1 for pair of arcs on appropriate lines with an attempt at the next step, but some inaccuracy, OR Accurate bisection with evidence of all necessary arcs but the angle 45° (±2°) NOT indicated

Higher Tier Linear GCSE Mathematics Summer 2013 - Paper 1	Marks	FINAL MARK SCHEME Comments
5. (Manana Water cost for 700m^3 of water) 0.06×700 OR 6×700 42(€) 4200(cents) (Channel Water cost for 700m^3 of water) 30 + 0.02×700 = 44(€) (But, for Channel Water first bill cost is) 44×0.8 OR 44 – 0.2×44 (= 44 – 8.8(0)) 35.2(0 €) Choice, with any valid reason, e.g. 'Manana because after 1st 3 months change', 'Channel first 3 months (then change to Manana)', 'In the long run Manana', Look for • spelling • clarity of text explanations, • the use of notation (watch for the use of '=', € 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	 M1 A1 M1 A1 M1 A1 E1 QWC 2	*Award equivalent seen within looking at a fixed time period, e.g. 1 year, 2 years* Do not accept 4200€ Or equivalent. Must be consistent units for M1 FT 'their 44' provided previous M1 awarded or sight of 30 +(0.0)2×700 (or 1430) used in calculation or similar calculation with place value error *If M0, A0, due to working with only 1/3 of 44 reduced by 20%, then SC1 for an answer of 41.06(..) or 41.07* FT provided 1st two M1 marks awarded for each Water Company. Do not FT from 1430 or similar mixed unit error Accept answers based on a fixed time period, e.g. considering 3 years *Ignore any further incorrect calculation* 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, punctuation and grammar.
6(a) Correct enlargement Intention of correct position	B2 B1	B1 for any2 lines enlarged by scale factor 2
6(b) Correct rotation	B2	B1 for a near miss i.e. not on grid points, or for 90° clockwise rotation
7(a) 133(°)	B1	
7(b) 360 – 47 OR 133 + 180 313(°)	M1 A1	FT their '133' for M and A marks, however do not FT measured 110(±2) leading to 290 (M0,A0)
8 (a) Sight of 2×3×3×5 or 15 × 6 AND 3×5×7 or 15×7 HCF is 15	M1 A1	Or equivalent work with factors, other than 1, for both 90 and 105, e.g. 2×45 with 5×21 or equivalent showing exact divisions CAO

Higher Tier Linear GCSE Mathematics Summer 2013 - Paper 1	Marks	FINAL MARK SCHEME Comments
8(b) $15 \times 2 \times 3 \times 7$ or $15 \times 6 \times 7$ LCM is 630	M1 A1	Or equivalent correct expression for LCM CAO
8(c) Method with at least 2 correct prime factors Sight of correct factors (2, 2, 2, 3, 3, 13) $2^3 \times 3^2 \times 13$ or $2^3 . 3^2 . 13$	M1 A1 B1	2 correct primes before 2nd error Ignore 1s seen FT their factors (with at least one index >1 used). Do not ignore 1s.
9. Circumference or width $2 \times \pi \times 10$ or $\pi \times 20$ 62.8(…cm) Area rectangle 62.8×200 OR 0.628×2 $12560\ cm^2$ OR $1.256\ m^2$	M1 A1 M2 A1	Or equivalent in metres Or equivalent in metres FT only if 'their 62.8' is clearly a circumference, i.e. from '$\pi \times$value', do not FT for 'area×2(00)' etc. M1 for appropriate calculation but units inconsistent and not corrected later CAO Units must be given *Allow ISW once correct answer seen*
10.(a) $y^2 = g + t$ $y = (\pm)\sqrt{(g+t)}$	B1 B1	 FT from $y^2 = g - t$ to $y = (\pm)\sqrt{(g-t)}$
10(b) $3y + w = 10y + 15$ $3y - 10y = 15 - w$ OR $w - 15 = 10y - 3y$ $-7y = 15 - w$ OR $w - 15 = 7y$ $y = \frac{15 - w}{-7}$ OR $y = \frac{w - 15}{7}$	B1 B1 B1 B1	Includes correct expansion FT until 2nd error FT if total of y terms has not been simplified. Mark final answer
11. $6l + 8w = 55$ and $4l + 12w = 50$, OR alternative full strategy Method to equate coefficients (allow 1 slip) First variable Method to find second variable Second variable	S1 M1 A1 m1 A1	Accept other informal notation FT for their logical simultaneous equations, including semi-perimeter ($3l + 4w = 55$ and $2l + 6w = 50$), or equivalent inconsistent type of error, for M1, FT from M1 to A1 provided answer positive FT provided 1st M1 FT from m1 to A1 provided answer positive Width = 2(cm) Length = 6.5(cm) *Alternative:* *S1 Trial & improvement method working with all criteria* *M1 Two different trials attempting to match criteria* *M1 Two trials, one either side of desired (This may imply previous M1also)* *A1 Width 2(cm)* *A1 Length 6.5(cm)* *If final answers of 2(cm) and 6.5(cm), award S1 and B4*
12(a) 275	B1	
12(b) Selecting Cat Boots UK with a reason, e.g. 'right skew', 'more calls longer than 10 minutes'	E1	
12(c) 25, 125, 300, 360	B2	B1 for any two correct values, OR FT cumulative from 1 error finding 2 further cumulative values accurately
12(d) 3 unique vertical plots correct at upper bounds All plots correct and joined, **including** to zero at t=0	M1 A1	Now only FT their cumulative table to (d) *Ignore bars only if intention clear that line or curve is being used in (e)*
12(e) (i) Median from cumulative graph (180th)	B1	FT from their cumulative graph of joined points (Actual is approximately 11.5)
12(e)(ii) Attempt, (using the reading on the horizontal from 270 and 90) UQ – LQ IQR	M1 A1	FT for their cumulative graph of joined points (Actual is approximately 14 or 14.5 – 8 or 8.5) (5.5 to 6.5)

Higher Tier Linear GCSE Mathematics Summer 2013 - Paper 1	Marks	FINAL MARK SCHEME Comments
13(a) xy/z OR x×y÷z	B2	B1 for sight of xy, x/z or y/z, this may be within an incorrect expression involving multiplication and division only, e.g. 'xyz', 'y/xz'
13(b) E.g. 'all pigs eat the same', 'same amount given to pigs each day'	E1	Must include idea of 'same' or 'equality'
14(a) x(x+6) – x(x-3) as a numerator (x-3)(x+6) as a denominator 9x / (x-3)(x+6)	M1 M1 A1	Accept intention of brackets when working not shown, e.g. $x^2 + 6x – x^2 – 3x$, or 3x CAO. If (x-3)(x+6) expanded, must be correct If M1, M1, A1 awarded penalise further incorrect work -1. If no marks then SC1 for 9x
14(b) (7x + 10)(7x -10) 2(7x +10) (7x – 10)/2	B2 B1 B1	B1 for (7x … 10)(7x … 10) FT provided no more than 1 previous error and provided simplification required. Mark final answer. Accept 3.5x - 5
14(c) $(2x – 5)^2$ (ISW) OR $4x^2 – 20x + 25$ (ISW)	B1	Do not accept $4x^2 – 10x – 10x + 25$
15(a) 10x = 4.3535... **and** 1000x = 435.3535... with an attempt to subtract 431/990 ISW	M1 A1	Or x = 0.43535… **and** 100x = 43.535… with an attempt to subtract, or equivalent. Or alternative method An answer of 43.1/99 gains M1 only
15(b) 1/10	B1	Do not accept 0.1
15(c)(i) 1	B1	CAO
15(c)(ii) $2\sqrt{10}$	B1	CAO
15(c)(iii) $2\sqrt{5}$	B1	CAO
16. OBQ or OAQ = 90(°) Reason: radius meets tangent Angles of quadrilateral total 360(°), OR angles of a triangle 180(°) with equal tangents 90 – x or unsimplified equivalent	B1 E1 E1 B1	Accept shown on the diagram, accept indication of right angle symbolically Accept mention of symmetry or isosceles triangles or indication of equal sides on the diagram
17.(a) Correct evaluation of at least 3 coordinates Suitable axes with appropriate scale and labels Plotting at least 4 correct points All 6 points correct and joined with a curve	B1 B1 M1 A1	t: 0 1 2 3 4 5 v: 0 4 6 6 4 0 FT for their axes if reasonable. FT their coordinates provided at least B1 previously awarded CAO. Not a FT from incorrect coordinates
17(b)(i) 2.3 to 2.35	B1	
17(b)(ii) Draw a tangent at t = 1 Use of or stating difference v / difference t Gradient from working with tangent and differences m/s^2	M1 m1 A1 U1	Must be differences, not readings from axes Accept unsimplified fraction but not if it contains a decimal Independent of M and A marks
17(b)(iii) Splitting area under curve into areas that can be approximated At least two correct areas within a sum to calculate the total area Estimate for area from correct calculation of suitable areas	M1 M1 A1	Maybe shown on the graph (e.g. equal ordinates width 1 is 0.5+2+3.5+3.5) (= 9.5)

PAPER 2 - FOUNDATION TIER

2013 Summer Linear Paper 2 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
1. **Parts (a) & (b) marked at the same time** (a) (40.41) 39.51 (sausages) 8 (packs) (3.04) (stuffing) 75.84 (steaks) 158.8(0) (b) 10% = (£) 15.88 20% = (£) 31.76	 B1 B1 B1 B1 M1 A1	 For the 8 F.T. unless both 39.51 AND 75.84 are incorrect Any correct method for finding 20%. F.T. their total. Ignore extra decimal places in their answer. If (£)31.76 not given then (£) 127.04 gains M1 A1
2. 120km (120m) 120mm 120cm (80kg) 80g 80mg 800kg 2 litre 10 cm^3 (200 ml) 1 ml $4m^2$ ($400cm^2$) $40mm^2$ $400cm^3$	✓ B1 B1 B1 B1	
3. Readings 960 (g), 240 (g) One block weighs (960 – 240)/8 = 90 (g)	B1 M1 A1	720 implies B1 FT readings
4. (a) chord tangent	B1 B1	
4. (b) (i) 12.1 (cm) to 12.5 (cm) inclusive	B1	
4. (b) (ii) Perpendicular through C	B1	Line should be between a line touching the left of A and between the p and a of 'passes'. Perpendicular does not need to cut AB
5. (a) **(Viewed with diagram)** Evidence of square counting 46 – 52 inclusive 276 – 312 inclusive (m^2)	 M1 A1 B1	 F.T. 'their 46 – 52' × 6 Unsupported answer in the range 276 – 312 gets 3 marks.
5. (b) Both lines Arc	B1 B1	Ignore extra lines that look like wrong attempts F.T. the end of their line and opposite curvature.
6. 7 by 4 rectangle 7 by 5 rectangle Two 3,4, 5 triangles Makes a valid net	B1 B1 B1 B1	Notes: Wrong dimensions gets B0; allow ±2mm Ignore 'flaps'. Must be a correct net that would produce the prism.
7. (a) 12/20, 9/15 and 6/10 circled	B2	B1 for any 2 correct and up to 1 incorrect OR B1 for all 3 correct and 1 incorrect.
7. (b) 6 shaded sectors OR 2 unshaded sectors	B1	
7. (c) 1/4 I.S.W.	B2	B1 for equivalent , e.g. 10/40 Do NOT accept decimals
8. (a) Up 2(°C) –8(°C)	B1 B1	Allow –2(°C) Down
8. (b) 53/100 × 82 = 43.46 I.S.W.	M1 A1	Any correct method for finding 53%. C.A.O. 43.46% gets M1, A0. Unsupported 43, 43.4, 43.5 gets M1, A0
8. (c) 73 35 (38) (17) 18 20 10 7 11 (9) 8 2 (5) 6 (3)	B1 B1 B1	For the 6 and the 11 For any four other correct numbers on F.T. For the 8, C.A.O. X=8 gets 3 marks.

2013 Summer Linear Paper 2 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
9. (a) (i) Add 4 to the previous term	B1	Accept +4. B0 for n+4 or 4n+1
9. (a) (ii) Divide the previous term by 3	B1	Accept ÷3. B0 for n/3
9. (b) (i) (£) t/100	B1	Accept $t \div 100$ or (0).01t
9. (b) (ii) $m - 10$	B1	Allow $m = m - 10$
9. (c) 3x = 18 (x=) 6	B1 B1	F.T. 3x=b, if b is a multiple of 3 then answer must be integer Accept embedded answers such as 3×6 – 7 = 11 3×6 = 18 gets 0, but 3x = 18 then 3×6 = 18 gets B2
9. (d) (i) (5, 8) I.S.W. OR (5, 8), (6, 9), (7, 9) , ...	B1	But B0 for (5, 8, 9, ,10, ...)
9. (d) (ii) (x, **x+3**)	B1	B0 for (x,+3)
All parts (a) to (c) marked together 10. (a) (£) 58	B1	
10. (b) Sum of the amounts (416) Sum/8 (£) 52 10. (c) (i) (£) 37 10. (c) (ii) (£)58	M1 **M1** A1 B1 B1	For attempt to add the numbers For dividing a number in the range 330 – 500 by 8. C.A.O. F.T. 'their mean' – 15 F.T. their range in part (a)
11. (a) 9·7 (cm) 9·7 × 8 = 77·6 (km)	B1 M1 A1	Allow 9·5 – 9·9 FT 'their 9·7' Unsupported answers in the range 76 – 79.2 inclusive get 3 marks.
11. (b) **Use Overlay** Bearing 147º from P Bearing 021º from Q Point (X)	 M1 M1 A1	 Allow ±2° Allow ±2° F.T. if at least M1 awarded Unambiguous dots within the boundaries of the overlay can get the M1s. One unambiguous dot within the 'box' gets all 3 marks. An unambiguous point of intersection does not require X.
12. e.g. Paper A 1200/60 = 20 Paper B 1200/30 = 40 For either 2 markers OR 4 markers. 6 markers needed in total. Look for • spelling • clarity of text explanations, • the use of notation (watch for the use of papers, markers, days 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	✓ M1 A1 M1 A1 B1 B1 QWC 2	Accept 20 × 60 = 1200 for M1, A1 Accept 40 × 30 = 1200 OR 2×20 for M1, A1 Unsupported answer of '6 (markers)' gets 6 marks. Unsupported 'about 6' OR 'at least 6' gets B0, B0. 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

2013 Summer Linear Paper 2 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
13. (a) Arcs to show 60º or 120º 120º angle drawn with either 60° or 120° labelled correctly	M1 A1	Allow unlabelled angles of 60 as the supplementary angle will be 120. A0 for incorrect labelling of the 60° and/or 120°, or no labelling. Watch out for when either end of the line to A is used as the radius of the arc.
13. (b) Correct intersecting arcs which are above and below the given line. Line bisector	M1 A1	Candidates may draw 2 pairs of correct arcs above the line (or 2 pairs below the line) to get this M1.
14. (a) 85000/540 157.41	M1 A2	 Mark final answer A1 for sight 157(.407407…) not to 2dp as required
14. (b)(i) Wednesday Method, e.g. 13:50 + 5 hours + 7hrs 51 minutes (0)2(:)41 or 2(:)41 am	B1 M1 M1 A1	 Do not penalise poor notation for M marks Award M2 for '+12hr 51mins' Notation for 24 or 12 hour time must be correct Do not accept 241pm The A mark depends on M2, award all marks for a correct answer
14. (b)(ii) (Speed) 434 × 1.85 (802.9 or 803) (Distance) × 7.75 6222(.475 km) or 6223.(25km)	✓ M1 M2 A2	 M1 for '× 7hr 45min' 'or × 465 min' A1 for an answer of 3363.5, OR 6215.5(km) or other similar answers that would be correct apart from premature approximation
15. (a) 122	B1	
15. (b) (0 kelvin) -273.15 and (100 kelvin) -173.15	B2	B1 for either, or 2 negative answers with their 0 kelvin answer being 100 less than their 100 kelvin answer
15.(c) 340 kelvin to Celsius: working with 100 difference in both kelvin and Celsius 66.85 (degrees Celsius) Answer for Fahrenheit <u>between 140 and 158</u> exclusive 6.85 tenths of 18 OR (6.85/10)×18 152(.33 Fahrenheit)	✓ M1 A1 B1 M1 A1	 e.g. sight of 40 + 26.85, 126.85 – 60, 340-273.15 Look for response in the table. Accept 66.8, 66.9, 67 Look for evidence in the table. FT from rounding 66.85 (Celsius), e.g. 7 tenths of 18 Accept 153 from correct working *Allow final B1, M1, A1 for a correct evaluation of 'their 66.85' × 1.8 + 32* Penalise reversed answers - 1
16. Any three different pairs of congruent triangle identified	✓ B3	 B1 for each pair. Watch out for repeats. If letters are used then ignore the order of letters 'Watch out for usage of 4 letters which still make a triangle (eg ABED)'
17. 80 × 600 ×0.4(0) = 19200 19200 – 1200 OR 18000 red buttons ÷ 500 AND ÷80 OR ÷40 000 0.45 or 45%	✓ M2 A1 B1 m2 A1	 M1 for product of any two seen. Or equivalent calculation FT 'their 18000' provided M2 awarded m1 for ÷ 500 or ÷80 Accept 36 buttons per bag as evidence for m1 CAO

Higher Tier Linear GCSE Mathematics Summer 2013 - Paper 2	Marks	FINAL MARK SCHEME Comments
1. 38×3 + 39×9 + 40×5 + 41×3 (= 788) Their ∑fx / 20 39.4 (ISW)	M1 m1 A1	 CAO Must be from a correct method. Need to check method to watch for incorrect ÷4
2. ½ × 1/6 1/12 or 0.083(3…) or equivalent	M1 A1	OR 3/6 × 1/6. Accept 1/6 written as 0.166.. or 0.17, NOT 0.16 OR 3/36
3(a) 85000/540 157.41	M1 A2	 Mark final answer A1 for sight 157(.407407…) not to 2dp as required
3(b)(i) Wednesday Method, e.g. 13:50 + 5 hours + 7hrs 51 minutes (0)2(:)41 or 2(:)41 am	B1 M1 M1 A1	 Do not penalise poor notation for M marks Award M2 for '+12hr 51mins' Notation for 24 or 12 hour time must be correct Do not accept 241pm The A mark depends on M2, award all marks for a correct answer
3(b)(ii) (Speed) 434 × 1.85 (Distance) × 7.75 6222(.475 km) or 6223.25(km) Look for • spelling • clarity of text explanations, • the use of notation (watch for the use of '=' , and units 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	M1 M2 A2 QWC 2	M1 for '× 7hr 45min' or '×465 mins' A1 for an answer of 3363.5, OR 6215.5(km) or other similar answers that would be correct apart from premature approximation 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, punctuation and grammar.
4(a) 122	B1	
4(b) (0 kelvin) -273.15 and (100 kelvin) -173.15	B2	B1 for either, or 2 negative answers with their 0 kelvin answer being 100 less than their 100 kelvin answer

Higher Tier Linear GCSE Mathematics Summer 2013 - Paper 2	Marks	FINAL MARK SCHEME Comments
4(c) 340 kelvin to Celsius: working with 100 difference in both kelvin and Celsius 66.85 (degrees Celsius) Answer for Fahrenheit <u>between 140 and 158</u> exclusive 6.85 tenths of 18 OR (6.85/10)×18 152(.33 Fahrenheit)	M1 A1 B1 M1 A1	e.g. sight of 40 + 26.85, 126.85 – 60, 340-273.15 Look for response in the table. Accept 66.8, 66.9, 67 Look for evidence in the table. FT from rounding 66.85 (Celsius), e.g. 7 tenths of 18 Accept 153 from correct working *Allow final B1, M1, A1 for a correct evaluation of 'their 66.85' × 1.8 + 32* Penalise reversed answers - 1
5(a) $8x – 3x = 29 + 11$ $5x = 40$ OR $x = 40/5$ $x = 8$	B1 B1 B1	**FT until 2nd error** Must be simplified
5(b) $7(x +7)$	B1	CAO
5(c) $x(x – 10)$	B1	CAO
5(d) $2x^2 + 12x$	B2	Must be as one complete expression. Mark final answer B1 for each term
6. Any three different pairs of congruent triangles identified	B3	B1 for each pair. If letters are used then ignore the order of letters Watch for repeats!
7. $a^2 = 6.4^2 – 4.7^2$ $a^2 = 18.87$ x is $\sqrt{22.9}$ to $\sqrt{23.28}$ x is 4.78… to 4.8(249…)	M1 A1 M1 A1	 Accept sight of a = 4.3(439…) FT 'their a^2' or 'their a' provided M1 awarded or *M1 for x from $\sqrt{66.82}$ to $\sqrt{67.46}$* (*when 'a^2= 63.05' or 'a=7.94..')* Accept 5 from correct working *FT from a^2= 63.05 is x = 8.174… to 8.2134..*
8. $80 \times 600 \times 0.4(0)$ $= 19200$ 19200 – 1200 OR 18000 red buttons ÷ 500 AND ÷80 OR ÷40 000 0.45 or 45%	M2 A1 B1 m2 A1	M1 for product of any two seen. Or equivalent calculation FT 'their 18000' provided M2 awarded m1 for ÷ 500 or ÷80 Accept 36 buttons per bag as evidence for m1 CAO
9. Any two lines drawn correctly Correct region identified	B2 B1	B1 for any 1 line drawn correctly CAO
10(a) All correct entries	B2	B1 for 2 pairs of branches correct
10(b) 0.7×0.3 + 0.3×0.7 $= 0.42$	M1 M1 A1	FT from their tree, probabilities must be <1

Higher Tier Linear GCSE Mathematics Summer 2013 - Paper 2	Marks	FINAL MARK SCHEME Comments
11. Strategy: relevant sketch showing understanding of centre of the road and vertical buildings **and** angle(s) of elevation shown in the correct positions	S1	Ignore placement of 20m in the sketch This S1 may be implied by relevant working
(x =) tan72 × 10 OR (y =) tan38 × 10	M2	M1 for tan72=x/10 or tan38=y/10, OR M1 for x = tan72 × 20 or y = tan38 × 20
(x =) 30.7768…. AND (y =) 7.812856… Answers in the range 22.9(m) to 23(m)	A1 A1	FT use of 20, answers 61.55… AND 15.6257… FT use of 20, answer of 46(m) or 45.9(3m)
		Accept sine rule as an equivalent method.
		Incorrect placement of the angles leads to: *<u>Either</u>* *S0 sketch appropriate but angles at top vertices* *M1 for x =10/tan72 OR y = 10/tan38* *A1 for x = 3.249… AND y = 12.799…* *A1 for 9.55… (m) rounded or truncated* *<u>Or</u>* *20 used, not 10, then SC2 for an answer of 19.1…(m), or SC1 for 6.498… or 25.598…*
		Do not accepted unsupported answers, as scale drawing are not accepted, max S1 for meeting the criteria for the sketch
12. $24x^2 - 6x + 20x - 5$ AND $24x^2 - 3x + 40x - 5$ OR $-24x^2 + 3x - 40x + 5$	B3	B2 for either expansion of pair of brackets correct B1 for one slip in both expansions
Clearly reducing to -6x + 20x +3x -40x to -23x	B1	CAO. Convincing from correct working
13(a) x/0.8= 4.5/3 OR x = (4.5/3)× 0.8 OR x = 1.5×0.8 x = 1.2 (cm)	M1 A1	Or equivalent
y = (3/4.5) ×2.4 OR y = 2.4/1.5 OR y = 2.4× 0.8/x y = 1.6 (cm)	M1 A1	Or equivalent FT their *x*
13(b) Area scale factor 1.5^2 or 2.25 or 9/4 $1.5^2 \times 3.4(0)$ OR $2.25 \times 3.4(0)$ (£)7.65	B1 M1 A1	Or equivalent FT for M1 only incorrect evaluation of 1.5^2 CAO
14. Interpreting that 75% equates to 5 billion 5 billion / 3 or equivalent (e.g. ÷75×25) 1 666 666 666.66... or 1.66.. billion 1.7×10^9	B1 M1 A1 B2	Accept rounded answers. Do not accept truncated answers FT 'their 1 666 666 666.66...' provided it is >1 million B1 for an answer with attempt at standard form but not correctly expressed, e.g. 16.667×10^8, 1.67×10^9 *If no marks SC1 for 5 billion expressed as 5×10^9*
15(a) (2x + 5)(4x – 1) x = -5/2 AND x = 1/4	B2 B1	B1 for (2x … 5)(4x … 1) FT from their pair of brackets, equivalent difficulty *No marks for the use of the quadratic formula, or trial & improvement*
15(b) $\{ 5+\sqrt{(-5^2 - 4x3x-7)}\}/2x3$ $= \{5 \pm \sqrt{109}\}/6$ 2.57 and -0.91	M1 A1 A1	For substitution, allow one slip CAO *Accept method of completing square*
16. Correct sketch, reflection in the x-axis	B1	

Higher Tier Linear GCSE Mathematics Summer 2013 - Paper 2	Marks	FINAL MARK SCHEME Comments
17(a) (x=) -2, 3 and 5	B2	Mark final answer B1 for any one correct answer Accept embedded answers
17(b) Realising that the line needed is y = -5x + 10 Method to find points to plot for y=-5x+10 Accurate graph of y = -5x + 10 drawn x-value of intersection from their graph (-1.4)(±0.1)	M1 m1 A1 A1	 E.g. table with coordinates for 2 correct points CAO. Remember this depends on M1 *If y=5x + 10 selected leading to answers of -2 and 1.5(±0.1), SC1 for each of -2 and 1.5(±0.1)* *If y=5x -10 selected leading to answers of 2.7(±0.1) and 5.8(±0.1), SC1 for both answers given*
18. Answers that round to 203.6(°) or 336.4(°) Then: the other angle with no other values	B1 B1	Accept 204 or 336 FT 540 – first answer. FT must be in required range. Accept embedded answers
19. $6.4^2 = 4.6^2+5.8^2- 2\times4.6\times5.8\times\cos X$, or $4.6^2= 6.4^2+5.8^2- 2\times6.4\times5.8\times\cos Y$, or $5.8^2= 6.4^2+4.6^2- 2\times6.4\times4.6\times\cos Z$, or Correct rearrangement 74.967(…°) or 43.95(..°) or 61(.07….°) Use of area = ½ ab sinC with appropriate substitution ½ ×4.6×5.8×sin75, or ½ ×6.4×5.8×sin44, or ½ ×4.6×6.4×sin61 12.9 (m^2) Volume compost = 0.12 × 12.9 or 12×129 000 1.5(46.. m^3) or 1 546 017(.335cm^3)	M1 m1 A1 M1 A1 M2 A1	 This implies the first M1 With appropriate rounding, 75, 44, 61 FT their 75, 44, 61 if clear this is the included angle as appropriate for M1 only. Not for use of spurious angles (needs to be from calculation) Accept 12.883… or appropriately rounded, accept 13 FT their 12.9 provided M1 for cosine rule and M1 for ½ abSinC awarded. M1 for 12 × their 12.9, or sight the product with the digits 12 and their 129, may be implied by an answer with correct digits but incorrect place value Or correct FT response from M2 Accept reasonable rounding or truncation If an incorrect unit is given then A0

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