GCSE MARKING SCHEME

MATHEMATICS - LINEAR

SUMMER 2015

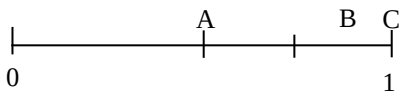
INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2015 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.

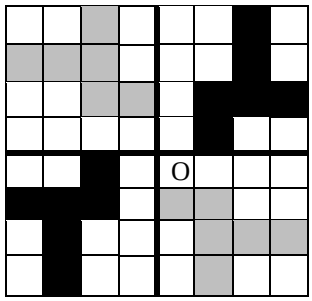
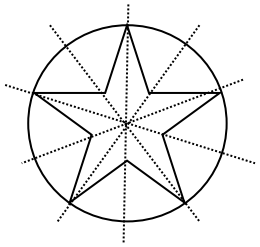
It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

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

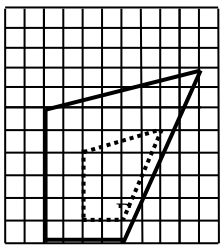
PAPER 1 - FOUNDATION TIER

2015 Summer Linear Paper 1 (Non calculator) Foundation Tier	Marks	Comments
Parts (i), (ii) and (iii) marked together 1. (a) (i) 26 043	B1	
1. (a) (ii) twenty thousand (and) fifteen	B1	
1. (a) (iii) 6028	B1	F.T. 'their (a)(i) in figures – 20 015' , provided equivalent difficulty. **Accept answer in figures OR in words**
1. (b) (i) 38 and 37	B1	
1. (b) (ii) 23 and 40	B1	
1. (b) (iii) 49	B1	Accept 7^2 OR 7×7 but NOT 7
1. (c) 10 000	B1	**B1 for 'ten thousand' in words.**
1. (d) 1, 3, 7, 21	B2	B1 for any 3 correct factors and up to 1 incorrect **OR B1 for 4 correct factors and 1 incorrect** **Accept 1×21, 3×7**
1. (e) (i) 2679	B1	
1. (e) (ii) 9627	B1	
2. (a) (i) 1 (ii) ¼ OR (0).25	B1 B1	B0 for 'Divide by 4' etc. Must be the term. B0 for 1÷4, but B1 for 1/4
2. (b) 600 OR 6 hundred OR hundred (s)	B1	B0 for 1 hundred OR 100 **OR 6H OR H**
2. (c) (0) ·66 (0) ·67 $\frac{33}{50}$, 67% , (0) ·68	B1 B1 B1	Accept (0) ·66 , (0) ·67 , (0) ·68 or equivalent F.T their decimal values
2. (d) 5 × 10 OR 5·1 × 10 OR 5·17 × 10 OR 5·2 × 10 OR 5 × 9·8 50, 51, 51.7, 52 OR 49	M1 A1	F.T their estimates for simple calculations **SC1 for unsupported 50 only** Penalise extra working (towards actual answer) M0A0
3. (a) Value = 6×7 – 5 = 37	M1 A1	Correctly substituted and correct attempt to evaluate. e.g. 6×7 – 5 = 6×2 (=12) gets M0, A0.
3. (b) term number = (67 + 5) /6 = 12	M1 A1	For correct substitution with addition and division Allow embedded references to the correct answer, e.g. 67 = 12×6 – 5. **NOTE: If a candidate then writes 'term number = 72' award M1A0. Their final answer must be correct.**
4. (a)  	B1 B1 B1	A should be at ½. Condone use of 6 for A. B should be between 0.75 (exclusive) and 1 exclusive. 0.75 is to the right of the 'e' in 'number'. Welsh scripts: To the right of the 'y' in 'cerdyn'. Condone use of 8 for B C should be at 1. Condone use of 5 for C. Letters must be seen on scale (i.e. not probabilities)
4. (b) unlikely	B1	C.A.O. **Award B1 3/10 AND unlikely, but B0 for 3/10 ONLY**

2015 Summer Linear Paper 1 (Non calculator) Foundation Tier	Marks	Comments
5. (a) 5a	B1	
5. (b) (W =) 8	B2	B1 for either 35 OR −27 **OR W = 35 – 27 =8W** B0 for 35R and/or −27T OR W = 35 – 27T
5. (c) y is 3 times x OR 'y = 3 times x' OR y = 3x OR x is 1/3 times y OR 'x = 1/3 times y OR x = y/3 **OR (x,3x)**	B2	B1 for ×3 OR 'times 3'OR 'x multiplied by 3' OR B1 for ÷3 OR 'divide by 3'
5. (d) (i) (x =) 4	**B1**	**Accept embedded answers. B0 for x4** **Ignore use of incorrect letter.**
5. (d) (ii) (y =) 12	**B1**	**Accept embedded answers. B0 for y12** **Ignore use of incorrect letter.**
5. (d) (iii) (t=) 2	**B1**	**Accept embedded answers. B0 for t2** **Ignore use of incorrect letter.**
To be viewed with diagram 6. (a) Missing inside segments = 2 or 5 (and 3) Perimeter = 6+3+2+3+3+6+3+2+3+3 = 34 (cm)	 S1 M1 A1	 One 2 or 5 in correct place gets S1 Attempt to add all sides of the shape FT 'their 2' for possible M1 If the 2 is not shown on diagram but is in the sum of sides for the perimeter then award S1 here. C.A.O
To be viewed with diagram 6. (b) Area = 6×3+2×3+6×3 OR 3×3 + 3×8 + 3×3 OR 4×3×3 + 3×2 = 42 cm^2	 M1 A1 U1	**You must check the diagram and their value for '2' or '5' in their part (a)** Attempt to add all areas of the shape F.T. if missing sides (even incorrect) are clearly indicated Independent of all other marks.
7. A(5, 2), B (−1, −5) and C(−4, 3) plotted.	✓ B3	B1 for each. Reversed coordinates get B0 every time. Letters A,B,C not needed as long as the point is identified.
Both parts (a) – (b) marked at the same time **To be viewed with diagram** 8. (a) **Use overlay** $P\hat{Q}R$ = 44° (±2º) QP = 8cm (±2mm)	 B1 B1	 **B0 if P drawn on QR**
To be viewed with diagram **If needed use the measuring tool to measure their PR** 8. (b) Their PR = '7' (±2mm) PR × 10 = '70' **(m)**	 B1 B1	 Their measurement in cm Their measurement × 10 evaluated correctly **Allow F.T. even if P is on QR**
9. 12 × 15 × 10 = 1800 (cm^3) = 1.8 (litres)	M1 A1 B1	 FT 'their 1800'÷1000

2015 Summer Linear Paper 1 (Non calculator) Foundation Tier	Marks	Comments
10. (a)  (b) 	B2 B2	B1 for each of 1st and 3rd quadrants B1 for at least 3 correct lines and none incorrect
11. (60 shirts at £8 each, 60×8 = £) 480 (Selling Price for profit of 50% = £) 12 (15 shirts at £12 **= 15×12** = £) 180 (Reduced selling price **= 12 – 5** = £) 7 (45 shirts at £7 **= 45 × 7** = £) 315 Having the (£)495 and (£)480 and stating 'profit' OR (£)15 profit Alternative method using 'Profit' Considers profit on full price shirt AND loss on reduced price shirt. (Profit on one shirt = 50% of £8 = £) 4 (Profit on 15 shirts = 15 x 4 = £) 60 (Loss on one shirt = £5 - £4 = £) 1 (Loss on 45 shirts = 45 x £1 = £) 45 Having the (£)60 and (£)45 and stating 'profit' OR (£)15 profit	✓ B1 B1 B1 B1 B1 B1 S1 B1 B1 B1 B1 B1	F.T. 'their £12' **but NOT £8 for this B1 ONLY** F.T. 'their £12' F.T. 'their £7' Correct conclusion on their figures **Do not penalise an incorrect evaluation of their profit** F.T. 'their £4' F.T. 'their £4'. **Could also be profit of '–(£)1' etc** F.T. 'their £1' Correct conclusion on their figures **Do not penalise an incorrect evaluation of their profit**
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	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, punctuation and grammar.

2015 Summer Linear Paper 1 (Non calculator) Foundation Tier	Marks	Comments
Parts (a) to (b)(ii) marked together 12. (a) (Yellow, 1) Yellow, 2 Yellow 3 Yellow, 4 Red, 1 Red, 2 Red, 3 Red, 4 Blue, 1 Blue, 2 Blue, 3 Blue, 4	B2	B1 for a complete row OR a complete column **OR any 6 extra correct** **OR B1 for Y 1, 2, 3, 4 AND** **R 1, 2, 3, 4 AND** **B 1, 2, 3, 4**
12. (b) (i) 2/12 (ISW) OR 1/6	B2	**F.T. sample space in part(a) only if at least B1 awarded.** Ignore incorrect attempts at cancelling. B1 for the numerator of 2 in a fraction <1 OR B1 for the denominator of 12 in a fraction <1 Penalise −1 once only for consistent use of words such as "2 out of 12", "2 in 12" OR "2:12". When fraction and wrong notation seen, DO NOT penalise wrong notation. If incorrect reduction of fraction in (b) (i), then give the full marks at that point, but if they go on to use the incorrect fraction in (b) (ii), penalise −1.
12. (b) (ii) 1/6 × 120 = 20 (people)	 M1 A1	There is no F.T. for the use of any probabilities outside the range 0 to 1 inclusive **OR for ½** Penalise incorrect cancelling of 2/12 here, but F.T. 20 out of 120 gets the M1, A1 but 20/120 gets M1, A0
13. (a) (x =) 180 – 56 – 90 OR equivalent (x =) 34(°)	M1 A1	Look at diagram also, but written work takes precedence. **Mark final answer. Candidates who get 34 then go on to divide by 2 to get 17 should be awarded M0,A0.**
13. (b) Other angle of rhombus = 180 – 126 = 54(°) (y =) 27(°)	M1 A1 A1	OR in triangle ABC, angle at A = angle at C = (180 - 126)/2 (y =) 27(°)	M1 m1 A1	For any correct method to find y For correctly calculating first angle For correctly calculating y on F.T. SC2 for sight of unsupported (y=) 54(°)
14. For spoons: sight of 450÷180 OR sight of 450 split as 360**,** 90 or 180, 180, 90 (Machine stopped at) 11(:)30 (am) For forks: 240 × 2.5 OR 240÷60 = 4 (forks per minute) **and** (4)× 150 or equivalent 600 (forks**)**	✓ M1 A2 M1 A1	OR 3(spoons per min) or 30(spoons in) 10 mins A1 for 2.5 (hours) or 2 hours 30 minutes or 150 minutes For A1 allow poor or incorrect notation of time, e.g. 2.3 hrs FT 'their 2.5 hours' or 'their 150 minutes' FT 'their 2.5 hours' provided not a whole number or 'their 150 minutes' provided not a multiple of 60 *Alternative if the time period is not considered (for max 3 marks):* *M1 for an attempt to find the multiplier180 × … = 450, e.g. 18:24 **and** 450÷18 (=25),* *M1 for a final calculation that could lead to a correct answer, e.g. applying the multiplier to the right hand side of their ratio, for attempt 24×450÷18* *A1 for 600 forks*

2015 Summer Linear Paper 1 (Non calculator) Foundation Tier	Marks	Comments
15. (a) 1 cm represents either 25 km or 25 000 m or 2 500 000cm 1 : 2 500 000	M1 A1	Do not accept 4 cm represents 100 km (given in question) **<u>An answer of</u>** 1 : 25 is M0 (and A0) however allow 1 : 25 km for M1 1 : 2.5 million Allow 1: 2 500 000cm (must be within a ratio)
15.(b) 100 / 2hr 30 min or 200 km in 5 hours 100 / 2.5 or 200/5 40 (km/h)	M1 m1 A1	Accept time written incorrectly, for the idea distance /time, e.g. 100/2.3, 100/150 Alternatively M1, m1 for 20km in 30 minutes Sight of 40 irrespective of units given
16. (<ECB =) 76(°) (<EBC =) 180(°) - 76(°) - 76(°) (=) 28(°) (x =) 152(°) Reasons in any order: • Alternate or allied or (co)interior • Isosceles triangle (with angle sum 180°) • Angles on a straight line (180°) OR exterior angle equal to the sum of the two opposite interior angles OR for a 2nd time: Alternate or allied or (co)interior	✓ B1 M1 A1 A1 E2	Accept shown on the diagram or other indication FT 'their 76°' FT their 28(°) provided M1 awarded *Alternatively:* *(<ECB =) 76(°)* *B1* *((x =) <BEC = 76(°) leading to) 76(°) + 76(°)* *M2* *FT 'their 76°'* *152(°)* *A1* All 3 appropriate reasons given E1 for any 2 of the 3 reasons given Do not accept informal descriptions of angles on parallel lines
17. (a) Correct rotation	B2	B1 for a near miss i.e. not on grid points but within the small grid square, or for 90° clockwise rotation about (2, -1), or for 2 vertices correct.
17. (b) Correct enlargement, scale factor 2 in correct position 	B2	B1 for scale factor 2 enlargement but incorrect position, or for correct position with intention scale factor 2 with at least 2 lines drawn correctly. Incorrect scale factor should be marked as if correct SF then penalise –1.
18. 180 – 162 (= 18) 360 ÷ (180 – 162) 20 (sides)	M1 m1 A1	**<u>C.A.O.</u>** *Alternative:* *n × 162 = (n – 2)×180* *M2* *OR M1 for sight of matched trials with values of n with attempt to calculate n × 162 <u>and</u> (n – 2)×180* *n = 20 (sides)* *A1*
19. Volume = $\pi \times 4^2 \times 10$ or $3 \times 4^2 \times 10$ 480(cm^3) Conclusion, e.g. 'incorrect as it is approximately (0).48 litres', 'no he is wrong it holds about 480cm^3 not 5000cm^3', 'no he is incorrect as it is 4520cm^3 difference'	M1 A1 E1	ISW (change of units). Ignore units given for A1, but they must be correct in order to award E1 **<u>160 π gets M1A0</u>** 'No' or 'incorrect' may be implied. The reason must be showing comparison (like units), e.g. 0.48(0) (with 5 litres), or 480 with 5000 (cm^3), **<u>or 480cm^3 approximately 500cm^3 with 5000cm^3</u>** FT 'their 480 (cm^3)' provided M1 awarded and 'their 480' has dimensionally correct units for comparison with 5 litres

PAPER 1 - HIGHER TIER

2015 Summer Linear Paper 1 Higher Tier		Comments
1(a) 300 × 1.52 or equivalent calculation 456 (US dollars)	M1 A1	
1(b) 600÷1.5 or 600×2÷3 or 585×2÷3 or 585÷1.5 or other suitable estimation calculation Estimate in the range (£)360 to (£)410 or (£)300, from at least 1 appropriately estimated value	M2 A1	Allow 600÷2 (as both values are rounded to1 sig. fig.) Do not accept 585÷2 M1 for 600÷1.52 or 590÷1.52 or 585÷1.52 (original question) or trial as far as '£100 is approximately $150' without further refinement *If no working, SC1 for a suitable estimate within tolerance given*
2(a) 1 cm represents either 25 km or 25 000 m or 2 500 000cm 1 : 2 500 000	M1 A1	Do not accept 4 cm represents 100 km (given in question) An answer of 1 : 25 is M0 (and A0) however allow 1 : 25 km for M1 1 : 2.5 million Allow 1: 2 500 000cm (must be within a ratio)
2(b) 100 / 2hr 30 min or 200 km in 5 hours 100 / 2.5 or 200/5 40 (km/h)	M1 m1 A1	Accept time written incorrectly, for the idea distance /time, e.g. 100/2.3, 100/150 Alternatively M1, m1 for 20km in 30 minutes Sight of 40 irrespective of units given
3. (<ECB =) 76(°) (<EBC =) 180(°) - 76(°) - 76(°) (=) 28(°) (x =) 152(°) Reasons in any order: • Alternate or allied or (co)interior • Isosceles triangle (with angle sum 180°) • Angles on a straight line (180°) OR exterior angle equal to the sum of the two opposite interior angles OR for a 2nd time: Alternate or allied or (co)interior	B1 M1 A1 A1 E2	Accept shown on the diagram or other indication FT 'their 76°' FT their 28(°) provided M1 awarded *Alternatively:* *(<ECB =) 76(°) B1* *((x =) <BEC = 76(°) leading to) 76(°) + 76(°) M2* *FT 'their 76°'* *152(°) A1* All 3 appropriate reasons given E1 for any 2 of the 3 reasons given Do not accept informal descriptions of angles on parallel lines
4. Bearing of 055(°)	B2	B1 for an answer of 55(°), or their final answer is from the calculation 235(°)-180(°) or 90(°)-35(°)

2015 Summer Linear Paper 1 Higher Tier		Comments
5. For spoons: sight of 450÷180 OR sight of 450 split as 360**,** 90 or 180, 180, 90 (Machine stopped at) 11(:)30 (am) For forks: 240 × 2.5 OR 240÷60 = 4 (forks per minute) **and** (4)× 150 or equivalent 600 (forks) Look for: • Appropriate labelling of calculations, e.g. 'number of spoons', 'time to produce 450 spoons', 'number of spoons produced in 10 minutes', 'number of forks produced', etc • Time written correctly, 11(:)30 (am) QWC2: Candidates will be expected to • present work clearly, maybe with diagrams and 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, maybe with diagrams and 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 A2 M1 A1 QWC 2	OR 3(spoons per min) or 30(spoons in) 10 mins A1 for 2.5 (hours) or 2 hours 30 minutes or 150 minutes For A1 allow poor or incorrect notation of time, e.g. 2.3 hrs FT 'their 2.5 hours' or 'their 150 minutes' FT 'their 2.5 hours' provided not a whole number or 'their 150 minutes' provided not a multiple of 60 *Alternative if the time period is not considered (for max 3 marks):* *M1 for an attempt to find the multiplier180 × … = 450, e.g. 18:24* ***and*** *450÷18 (=25),* *M1 for a final calculation that could lead to a correct answer, e.g. applying the multiplier to the right hand side of their ratio, for attempt 24×450÷18* *A1 for 600 forks* 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 or grammar.
6(a) Correct rotation	B2	B1 for a near miss i.e. not on grid points but within the small grid square, or for 90° clockwise rotation about (2, -1), or for 2 vertices correct
6(b) Correct enlargement, scale factor ½ in correct position	B2	B1 for scale factor ½ enlargement but incorrect position, or for correct position with intention scale factor ½ with at least 2 lines drawn correctly
7. 180 – 162 (= 18) 360 ÷ (180 – 162) 20 (sides)	M1 m1 A1	 CAO *Alternative:* *n × 162 = (n – 2)×180* *M2* *OR M1 for sight of matched trial with value of n>9 with attempt to calculate n × 162 <u>and</u> (n – 2)×180* *n = 20 (sides)* *A1*
8. ⅙ × ⅙ 1/36	M1 A1	Allow for identification of 1 out of 36 outcomes, e.g. 2-way table, or sight of 1 in 36, or 1 out of 36, or 1:36 CAO

2015 Summer Linear Paper 1 Higher Tier		Comments
9(a) (x =) 3	B2	Accept embedded answers for B2 or B1 B1 for one correct **evaluated** trial (excluding x=0) x | $x^3 - 2x$ 1 | -1 2 | 4 3 | 21 4 | 56 B1 for 27 – 6 = 21 without showing an embedded x = 3 or giving an answer x =3 **and** x = -3
9(b) y = 7, y = -7 OR y = ±7	B2	B1 for either solution, or B1 for (y – 7)(y + 7) = 0, y = ±√49 B0 for (y – 7)(y + 7) or y = √49 Allow B2 for embedded answers, e.g. $-7^2 = 49$ and $7^2 = 49$, or B1 for one embedded answer
9(c) Expression $3x^4 – 5x^3$	B2	Mark final answer B1 for sight of either term correct
10. 19/4 + 19/8 or 4+2 + 6/8 + 3/8 or $4^6/_8 + 2^3/_8$ or $\frac{38}{8} + \frac{19}{8}$	B1	For B1 allow 28.5/4 or 7.125 or $7^{0.5}/_4$
$\frac{38 + 19}{8}$ or $\frac{57}{8}$ or $6\,^9/_8$	B1	Or equivalent, e.g. 114/16 or 228/32, etc. FT from 1 error in the calculation of 1 of the numerators provided the denominators are common
$7^1/_8$	B1	*If no marks, allow SC1 for an answer of 1⅛ from ¾+⅜*
11. Volume = $\pi \times 4^2 \times 10$ or $3 \times 4^2 \times 10$	M1	
$480(cm^3)$	A1	ISW (change of units). Ignore units given for A1, but they must be correct in order to award E1
Conclusion, e.g. 'incorrect as it is approximately (0).48 litres', 'no he is wrong it holds about $480cm^3$ not $5000cm^3$', 'no he is incorrect as it is $4520cm^3$ difference'	E1	'No' or 'incorrect' may be implied. The reason must be showing comparison (like units), e.g. 0.48(0) (with 5 litres), or 480 with 5000 (cm^3), or $480cm^3$ approximately $500cm^3$ with $5000cm^3$ FT 'their 480 (cm^3)' provided M1 awarded and 'their 480' has dimensionally correct units for comparison with 5 litres
12(a)(i) 4n + 5 or equivalent unsimplified	B2	B1 for sight of 4n
12(a)(ii) States or implies 'YES' with a reason, e.g. ' yes as 149-5 = 144 and this can be divided (exactly) by 4', OR 'correct as 144 is a multiple of 4', OR 'n = 36', OR 'adding 4 repeatedly after the 29 giving 149', OR 'Yes as (149 – 29)÷4 is a whole number'	E1	Do not award for 'correct' or 'yes' without a valid reason Accept 'n=36' as 'implies yes' Accept correct full sequence to 149 or partial sequence shown with at least 3 correct terms including 149, e.g. 145, 149, 153 or 49… 69…. 129 … 149 FT based on 149 – 'their 5' then divided by 4, provided equivalent level of difficulty
12(b)(i) 9×10 or 90 or 10 × 11 States or implies Imran is incorrect, e.g. 'Imran is incorrect as there are 90 panes', 'It is the number of panes in Pattern 9', '90 is Pattern 8', '110 is Pattern 9'	M1 A1	

2015 Summer Linear Paper 1 Higher Tier		Comments
12(b)(ii) **Shows** that $n^2 + 3n + 2 = (n+1)(n+2)$ Pattern justification: e.g. 'Product of 1 more across than Pattern number and one more vertically than across', OR 'Multiplication of one extra across and two extra up'	E1 E1	Alternative: E2 for working from spatial arrangement $(n+1)(n+2)$ expanding to show $n^2 + 3n + 2$ OR E2 for full spatial description with justification based on shading or labelling parts in diagrams as n^2, 3n and 2 OR alternative: E1 for sight of $an^2 + bn + c$ and second difference 2 leading to a = 1, and E1 for use of n = 1 and number of squares 6, with n = 2 and number of squares 12 to find b=3 and c = 2, or other 2 values of n with the correct number of squares *If no marks, allow SC1 for correct substitution and evaluation of n=1, n=2, n=3 and n=4 in n^2+3n+2 giving answers 6, 12, 20 & 30, substitution must be seen, not for answers only*
13(a) 32, 78, 132, 150, 160	B1	
13(b) Plotting all points at the upper bounds All 7 accurate upper bound plots joined with a curve or lines	B2 B1	FT their cumulative table only if cumulative Must be accurate on vertical lines and horizontal lines B1 if one error in plots, OR for all vertical points (not bars) correct but not at upper bounds
13(c) Idea UQ – LQ, with an attempt at readings in £s and intention to subtract Interquartile range accurate for their cumulative graph	M1 A1	FT from their cumulative graph Accuracy within 1 small square
13(d) Answer from their cumulative graph OR an answer in the range 24 to 25	B1	*Answer approximately 24* Accuracy within 1 small square
14(a) $(x – 3)(x + 5) (= 0)$ $x = 3$ and $x = -5$	B2 B1	B1 for $(x \ldots 3)(x \ldots 5)$ Strict FT from their factorising. FT provided B1 previously awarded *Alternative:* $x = \frac{-2 \pm \sqrt{(2^2 - 4\times1\times-15)}}{2}$ *M1 allow 1 slip in substitution* $= \frac{-2 \pm \sqrt{64}}{2}$ *A1* *$x = 3$ and $x = -5$* *A1* If trial & improvement is used, both solutions are required for B3, otherwise B0
14(b) $12a^9b^6$	B2	B1 for $12a^9..$, or $12..b^6$, or $\ldots a^9b^6$ or $12\times a^9\times b^6$ Mark final answer

2015 Summer Linear Paper 1 Higher Tier		Comments
15. Sight of $2x+3y + 2x + 3y = 94$ OR $x+6+y+4+x+6+y+4 =56$	S1	May be implied in later working
$4x + 6y = 94$ AND $2x + 2y = 36$, or unsimplified equivalents of both equations	M1	Allow S0 but M1 for $2x + 3y = 94$ AND $x + y = 46$, or consistent unsimplified equivalents of these equations
Method to solve, equating x or y, allowing 1 error in non equate variable	M1	FT 'their equations' with equivalent level of difficulty
First variable	A1	**x = 7 (cm)** or **y = 11 (cm)**
Method to find 2nd variable, substitution	m1	FT 'their equations' or 1st variable
Second variable	A1	
Method to calculate 1 area, e.g. $(2\times7) \times (3\times11)$ or $(7+6) \times(11+4)$	M1	FT, for the M mark only, 'their x' and 'their y' provided at least M1 previously awarded
462 (cm^2) AND 195 (cm^2)	A1	CAO *(Incorrectly using ½ perimeter leads to:* *$2x + 3y = 94$ AND $x + y = 46$ giving x=44(cm) & y=2(cm) and areas $528cm^2$ and $300cm^2$ which is awarded S0, M1, M1, A1, m1, A1, M1, A0 giving 6 marks)*
16(a) Method of finding an area	M1	
2 correct areas AND intention to add all areas	M1	Areas are 10+60+100+40+20+20
250	A1	CAO
16(b) $(100 \times) 30/250$	M1	FT their (½ ×20 + 20)/ 'their 250', including from non area consideration in (a) 3/25
12(%)	A1	*If no marks, award SC1 for an answer of 88(%)*
16(c) Identifying the 125, 125 split or 125.5	M1	Accept sight of (250÷2 =) 125 FT must be from <u>at least M2 awarded in (a)</u> <u>No FT</u> from an answer of 25 in (a) May be indicated on the histogram. Sight of $20 + 10 \times 55/100$, or $30 – 10 \times 45/100$ is awarded M1, m1
55 or 55.5 (or 44.5 or 45) as a proportion of the 100 or equivalent	m1	Accept a vertical line at 25.5 indicated on the histogram
25.5 (minutes) or 25.6 (minutes)	A1	CAO. Must be stated. Do not accept 25.55 (minutes)
17(a) Attempt to subtract $10x = 3.4646..$ from $1000x = 346.46…$ or alternative method	M1	Or equivalent for $100x = 34.646..$ and $x =0.34646..$
343/990	A1	Final answer of 34.3/99 M1 only
17(b) $49 - 35\sqrt{2} -35\sqrt{2} + 50$	B1	
$= 99 -70\sqrt{2}$	B1	FT correctly simplified (equivalent level of difficulty) provided at least 3 of the terms are correct OR $49 \pm a\sqrt{2} + 50$ with $a\neq0$
Irrational	E1	Depends on 'their answer' including a surd and at least B1 previously awarded
18(a) Tangent drawn at t=1.5	B1	
Method, difference y / difference x	M1	
Evaluated answer correct to 1dp from their reasonable tangent	A1	
18(b)(i) For the 4 appropriate values of v	B1	May be seen on the graph or in working t: 0, 3, 6, 9 v: 0, 8, 5, 0
Split into the 3 areas and attempt to sum, or an attempt to substitute into the trapezium rule	M1	*Attempt at substitution would be …(0+0+2(8+5)) or $^3/_2$(0+0+2(8 +5)) with either 8 or 5 incorrect*
Correct substitution into trapezium rule, $^3/_2$(0+0+2(8 +5))	A1	OR for 3 correct areas 12, 19.5, 7.5 with an attempt to sum
39 (m)	A1	CAO
18(b)(ii) Example, 'use more ordinates', 'cut into narrower strips', or consideration of the additional area	E1	Do not accept 'count squares'

2015 Summer Linear Paper 1 Higher Tier		Comments
19(a) 10/20 × 10/19 (= 100/380) 10/20 ×10/19 + 10/20 × 10/19 200/380 (=10/19)	B1 M1 A1	 OR 2× 10/20 × 10/19 Ignore incorrect cancelling *Alternative* *1 × 10/19 M2* *10/19 A1*
19(b) 1 – P(even, even) = 1 – 10/20 × 9/19 (1 – 9/38) = 29/38 (= 290/380)	 S1 M1 A1	*FT from (a) if P(OE) and P(EO) and P(OO) used* OR P(OE) + P(EO) + P(OO) OR FT (a) + P(OO) May include replacement 10/20×10/19+10/20×10/19+10/20×9/19 OR (a) + 10/20×9/19 CAO. Ignore incorrect cancelling

PAPER 2 - FOUNDATION TIER

2015 Summer Linear Paper 2 (Calculator allowed) Foundation Tier	Marks	Comments
1. **Parts (a) & (b) marked at the same time** (a) (3.56) (milk) 14.82 (apple juice) 8.35 (biscuits) 13.47 (tea) 40.2(0)	✓ B1 B1 B1 B1	F.T. until second error Award B1 for a correct total (F.T.)even if only seen in (b)
(b) 10% = (£) 4.02 5% = (£) 2.01 OR (0).05 × 40.2(0) Discount is (£) 2.01 (I.S.W.)	M1 A1	Any correct method for finding 5%. F.T. their total. Ignore extra decimal places in their answer. Allow 2.01% for A1, but **2.01p gets M1,A0**. If (£)38.19 given then award M1, A1 for implied (£) 2.01. 10%=(£)4, 5% = (£)2 gets M0,A0 not of equivalent diff.
2. Width of pitch 50km (50m) 50mm 50cm Weight (man) (70kg) 70g 70mg 7kg Volume (cup) 1 litre 25 cm^3 (250 ml) 1 ml Area of page $3m^2$ ($300cm^2$) $30mm^2$ $300cm^3$	✓ B1 B1 B1 B1	
3. **All parts (a) to (c) marked together** (a) Water mark at 320 ml	B1	Look at the diagram also in (a) to (c) Water level shown at ONE GRADUATION ABOVE 300 Closer to 320 than 300 OR 340
3. (b) Water level = 480 Water in a jug = 480/6 = 80 (ml) I.S.W.	B1 M1 A1	FT 'their 480'
3. (c) 480 + 360 = 840 Water marked at 840	B1 B1	For 'their 480 from part (b)' + 360 Water level shown at ONE GRADUATION ABOVE 800. F.T. 'their 840', if not a multiple of 200. Closer to 840 than 800 OR 880
4. (a) **(Viewed with diagram)** Evidence of square counting **49 – 54 inclusive** **196 – 216 inclusive (cm^2)**	M1 A1 B1	F.T. 'their 49 – 54' × 4 **Unsupported answer in the range 196–216 gets 3 marks**.
4. (b) Lines Arc	B1 B1	For both lines. F.T. their lines, must have opposite curvature, start at the correct place and end at the start of their line.
5. (a) tangent radius	B1 B1	Accept misspellings as long as recognisable Accept misspellings as long as recognisable
5. (b) (i) 9.5 (cm) to 9.9 (cm) inclusive	B1	
5. (b) (ii) Parallel through C	B1	Watch out for perpendicular(r(s) as well as a parallel line which could be their way of 'constructing the parallel line'
6. (a) $\frac{10}{15}$ (0.4) ($\frac{6}{15}$) $\frac{8}{10}$ ($\frac{4}{10}$)	B2	B1 for any 2 correct and up to 1 incorrect OR B1 for all 3 correct and 1 incorrect.
6. (b) 13 (crates) 13 (crates) with 64 **(apples left over.)**	M1 A1	For 13 or 13.8(88…) OR 1000/72 OR 936 OR repeated subtraction 13 or 14 times. **13×72=936, 64 gets M1,A1** M1,A0 for 14 crates and 64 apples. **14 (crates) OR 64 (apples) on its own get M0,A0**
6. (c) (0).07	B1	Do NOT accept 7/100
6. (d) $\frac{48}{100} \times 82.5$ OR (0).48 × 82.5 = 39.6 **(I.S.W.)**	M1 A1	Any correct method for finding 48% A0 for 39.6%, but allow A1 for £39.6(0)
6. (e) 3 × 12 OR 252÷7 36	M1 A1	Any correct method which should get 36 C.A.O. **Mark final answer.** **36/84 gets M1, A0.** Premature approximation methods such as 3/7 = (0).42 OR (0).43, then 35.28 or 36.12 gets M1,A0 Unsupported answers other than 36 get M0,A0

2015 Summer Linear Paper 2 (Calculator allowed) Foundation Tier	Marks	Comments
Overlay 7. **At least one** 6 by 3 rectangle **At least two** 6 by 4 rectangles **At least two** 4 by 3 rectangles Makes a valid net	 B1 B1 B1 B1	Rectangles must have at least one side in common Notes: Wrong dimensions gets B0; allow ±2mm Ignore 'flaps'. Must be a correct net that would produce **a** cuboid. Allow this B1 even if only 5 sides (open box)
8. (a) (i) Subtract 5 (from the previous term)	B1	Accept –5, take away 5. B0 for n–5 or –5n+51
8. (a) (ii) Multiply (the previous term) by –4	B1	Accept ×–4. B0 for n×–4 B1 for (1) multiply by 4 and change sign OR (2) times the previous term by 4 using a positive then minus number pattern OR (3) B1 for times by 4 each time but every other number is negative B0 for 'times 4 add a minus then times 4 take away the minus'
8. (b) (i) 10b	B1	Accept b × 10 or b10. Ignore b= or =b **or any other letter** **B0 for b buttons ×10 shirts. 10b = b = 10 gets B0.**
8. (b) (ii) $k/5$	B1	**Allow k÷5.** B0 for k blocks / 5 rows Ignore k= or =k **or any other letter**
9. (a) 4 (°C)	B1	Accept –4 (°C)
9. (b) 97 (°C)	B1	Accept –97 (°C)
9. (c) 2 (°C)	B1	
10. Week hire = 32.20 4 day hire = 16.10 + 3 × 8.15 = (£)40.55 Difference = 40.55 – 32.20 = (£) 8.35	 M1 A1 M1 A1	 FT 'their derived 40.55'
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	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, punctuation and grammar.

2015 Summer Linear Paper 2 (Calculator allowed) Foundation Tier	Marks	Comments
All parts (a) to (d) marked together 11. (a) 15 24 28 31 32 39 47 60 Median = 31.5 (years)	 M1 A1	 For identifying the correct TWO middle numbers OR for arranging the 8 numbers in ascending or descending order. C.A.O. Unsupported 31.5 gets M1, A1.
(b) 45 (years)	B1	B0 for 60 – 15 only
(c) Sum of the amounts (276) Sum/8 34.5 (years)	M1 M1 A1	For attempt to add **all** the numbers For dividing a number in the range 216 – 336 by 8. C.A.O.
(d) Because 31 is less than 34.5 the mean will decrease OR because the new member is younger than the mean age **the mean will decrease.**	E2	Consider their reason then consider their conclusion. F.T. their mean **in part (c)** if M1 was awarded E1 for a valid reason or calculating the new mean as 307/9 = 34.1, without a conclusion in their table or in their explanation E0 for 'because you are dividing by a larger number (9)'
12. (a) 950 × 2.12 = 2014 (BND)	M1 A1	 BND not needed. Do not penalise $ but A0 for £ or euros
12.(b) 180/2.12 = (£)84.9(0) OR (£)84.91	M1 A1	 Accept (£)85(.00) Accept unrounded correct answers **84.90(566)** £ not needed but A0 for BND OR $ OR euros.
13. Carpet Tiles (Area of a tile = 0.5×0.5=) 0.25(m^2) **OR(10×4)=40(m^2)** OR (50×50(cm^2) =) 2500 OR **(1000×400=) 400000(cm^2)** (Number of tiles = 40 ÷ 0.25 =)160 **OR (0.25×32)=8** (Number of boxes = 160/32 =) 5 **OR (40÷8 =) 5** (Cost = 5 × £40 =) (£) 200 Wood Strips (No of strips in the 10 by 4 = 40 × 2 =) 80 (Number of packs = 80/8 =) 10 (packs) (Cost = 10 × (£)22 =) (£)220 Carpet tiles cheaper **(by £20)**	✓ B1 B1 B1 B1 B1 B1 B1 E1	 OR **(10÷0.5 =) 20 AND (4÷0.5 =) 8** F.T. 40 ÷ 'their 0.25 OR 'their 20'×'their 8' F.T. 'their 160'/32 F.T. 'their 5'×(£) 40, **provided number of boxes is a whole number ≠ 1 OR 32.** OR (40÷(2×0.25) = 40÷0.5 =) 80 (OR 5×16 =) 80 F.T. 'their 80'/8 F.T. 'their 10' × (£)22, **provided number of packs is a whole number ≠ 1 OR 8.** Conclusion on their figures if at least B1 awarded for 'carpet tiles' AND for 'wood strips'.
14.(a) 30 – x = 44÷2 or 60 – 2x = 44 30 – x = 22 or -2x = 44 – 60 or 60 -44 = 2x or –x=-8 **or 16 = 2x** x = 8	B1 B1 B1	FT until 2nd error FT equivalent level of difficulty *Accept an embedded answer for B3* *Note:* *Writing 2x = -16 or -2x = 16 leading to x = -8 is generally from 1 error.* *Sight of 2x = 44 – 60 is regarded as 1 error* *60 – x = 44 leading to x = 16 is awarded B0, B1, B0 (as level of difficulty is eased)*
14. (b) 8a – 14c	B2	B1 for any TWO correct terms from 12a –6c – 4a – 8c OR B1 for 8a OR B1 for –14c
14. (c) 2, 3, 4, 5	B3	B1 for the 2, B1 for the 5 AND NO 6 or above, B1 for the 3 and 4 AND NO incorrect numbers, but allow 6 here. **SC1 for 5/3 ≤ n < 6 (not 18/3)**
15.(a) Reason to include, without contradiction……. • FreeFlight: fewest complaints • Best2Fly: fewest lost suitcases • GoJet: best arrival on time record	B2	B1 for any 2 correct responses *Allow, if respectively, 'complaints', 'suitcases' or 'arrival time' is mentioned uniquely or if mentioned as the positive feature.*

2015 Summer Linear Paper 2 (Calculator allowed) Foundation Tier	Marks	Comments
15.(b) 30000 – 0.88×30000 OR 0.12×30000 3600 (flights late)	M1 A1	Accept (1 – 0.88) × 30000 *If the incorrect airline is selected, award SC1 for either* *Freeflight or 0.15 × 30000 = 4500 (flights late), or* *GoJet or 0.08 × 30000 = 2400 (flights late)* *Do not accept these as unlabelled unsupported answers; need sight of workings or the airline name as sufficient identification*
15.(c) Use of 0.36 and 0.42 (per 1000 compared) 500×(0.42 – 0.36) OR 500×0.06 OR 500 × 0.42 – 500 × 0.36 or equivalent 30 (suitcases)	B1 M1 A1	Use of (0.)36 and (0.)42 in any calculation(s), or sight of 0.06 **OR 6%.** Ignore consistent place value errors for '500 thousand passengers', e.g. 21(00) – 18(00) **C.A.O. I.S.W.** *If no marks and no working allow SC1 for an answer of 3 or 300 or 3000 or 30000* *GoJet and FreeFlight are mentioned twice in the question, hence no MR or SC marks awarded for use of the incorrect airlines*
15.(d) 8(%)	B1	Do not accept 8/100 or 0.08. **I.S.W. conversion to fractions or decimals.** The answer must be a percentage
16. **SCROLL DOWN FOR SECOND PAGE** (Length common side BD is) 3900 ÷ 75 (BD =) 52 (cm) (Area of triangle BDC =) ½ × 25 × BD (=) 650 (cm^2) (BC^2 =) $25^2 + BD^2$ (BC =) √3329 or $BC^2 = 3329$ (BC =) 57.697…(cm) rounded or truncated	 M1 A1 M1 A1 M1 A1 A1	*Check the diagram for any answers* FT 'their BD', including BD as 25(cm) or spurious BD FT 'their BD' provided both previous M marks awarded FT 'their BD', including BD as 25(cm) or spurious BD FT 'their BD' provided ≠25(cm) and it is not a spurious BD CAO. Do not accept 60 (cm) unless 57(.697…) seen *Alternative for the first 4 marks:* *Base of triangle = ⅓ × base rectangle B1* *Area of the triangle = ⅓ × ½ ×3900 M1* *= 650 (cm^2) A2* *Alternative for the final 3 marks:* ***Complete** method, all stages required to find BC M1* *Intermediate stages answer correct A1* *Final answer correct A1*
17.(a) Explanation, e.g. 'this information was not recorded', 'don't know how many peaches are in the other boxes', 'don't know if boxes have fewer than 8 peaches', 'doesn't show more or less than 8', 'could be fewer than 8 peaches', **'not all boxes may (or will) have 8 peaches'**	E1	Do not accept, e.g. 'because some boxes only had 7 peaches', 'because they should contain exactly 8 peaches (not at least 8)' (given in the question), 'because 2/5 of the boxes are under 8'
17.(b)(i) (8) (18) (25) (32) (41) (10) (20) (30) 40 50 (0.80) 0.9(0) 0.83 0.8(0) 0.82	B2	Must be to appropriate 2dp, although allow 0.9 and 0.8 for 0.90 and 0.80 respectively B1 for any 4 or 5 correct entries
17.(b)(ii) Uniform scale on the vertical axis, suitable for values of relative frequency Correct plots (allow joined or not joined)	M1 A1	Allow not starting at 0, but must be uniform from their first marked value. Do not accept inappropriate scales, the maximum value on the top of the vertical scale must not exceed 2.5, unless clearly working with percentage FT from (i) if possible provided all relative frequencies <1 , or shown as percentages and they are not all identical. Tolerance of plotting is within the appropriate small square *Ignore any 'line of best fit drawn' or additional bars*
17.(b)(iii) 0.82 or equivalent probability	B1	FT from their final decimal in the table in (b)(i) and provided it is <1 Do not accept 0.82% unless a correct equivalent to 0.82 is also seen

PAPER 2 - HIGHER TIER

2015 Summer Linear Paper 2 Higher Tier		Comments
1(a) $6x + 4x = 43 - 13$ $10x = 30$ or $x = 30/10$ $x = 3$	B1 B1 B1	FT until 2nd error Must be simplified *Accept an embedded answer for B3*
1(b) $(x =) 100$	B1	Accept embedded answer
1(c) $30 – x = 44 \div 2$ or $60 – 2x = 44$ $30 – x = 22$ or $-2x = 44 – 60$ or $60 - 44 = 2x$ or $–x=-8$ $x = 8$	B1 B1 B1	FT until 2nd error FT equivalent level of difficulty *Accept an embedded answer for B3* *Note:* *Writing $2x = -16$ or $-2x = 16$ leading to $x = -8$ is generally from 1 error.* *Sight of $2x = 44 – 60$ is regarded as 1 error* *$60 – x = 44$ leading to $x = 16$ is awarded B0, B1, B0 (as level of difficulty is eased)*
2(a) Reason to include, without contradiction……. • FreeFlight: fewest complaints • Best2Fly: fewest lost suitcases • GoJet: best arrival on time record	B2	B1 for any 2 correct responses *Allow, if respectively, 'complaints', 'suitcases' or 'arrival time' is mentioned uniquely or if mentioned as **the** positive feature.*
2(b) $30000 – 0.88 \times 30000$ OR 0.12×30000 3600 (flights late)	M1 A1	Accept $(1 – 0.88) \times 30000$ *If the incorrect airline is selected, award SC1 for either* *Freeflight or 0.15×30000 = 4500 (flights late), or* *GoJet or 0.08×30000 = 2400 (flights late)* *Do not accept these as unlabelled unsupported answers; need sight of workings or the airline name as sufficient identification*
2(c) Use of 0.36 **and** 0.42 (per 1000 compared) $500 \times (0.42 – 0.36)$ OR 500×0.06 OR $500 \times 0.42 – 500 \times 0.36$ or equivalent 30 (suitcases)	B1 M1 A1	Use of (0.)36 and (0.)42 in any calculation(s), or sight of 0.06 Ignore consistent place value errors for '500 thousand passengers', e.g. 21(00) – 18(00) CAO. ISW *If no marks and no working allow SC1 for an answer of 3 or 300 or 3000 or 30000* *GoJet and FreeFlight are mentioned twice in the question, hence no MR or SC marks awarded for use of the incorrect airlines*
2(d) 8(%)	B1	Do not accept 8/100 or 0.08. ISW conversion to fractions or decimals. The answer must be a percentage

2015 Summer Linear Paper 2 Higher Tier		Comments
3. Expect to pay: Standing charge 3×24.4(0 euros) (=73.2(0 euros) Cost of electricity (31008 – 30256) × 0.78 (euros) = 586.56 (euros) Total bill 1.12 × (73.2(0) + 586.56) (euros) (or 1.12×659.76) 738.93(12 euros) Difference 21(.0688 euros)	B1 M1 A1 M2 A1 B1	 (752 × 0.78) CAO FT 'their non-zero 73.2(0)' (including 24.4(0)) and 'their 586.56' provided it was evaluated from a calculation involving '×0.78' M1 for 0.12×(73.2(0)+586.56) (euros) CAO. Accept 739 or 738.9. Do not accept 738 FT 760 – 'their total bill' correctly evaluated, provided at least M1 previously awarded, e.g. FT from omitting the standing charge is allowed provided M1 awarded for the method to calculate the cost of electricity *Note: FT from 738 will give an answer of 22 (euros)*
4(a)(i) Mid-points 5,6,7,8,9 5×4 + 6×2 + 7×0 + 8×2 + 9×2 ÷ 10 6.6(mm)	B1 M1 m1 A1	 FT their mid points including bounds provided they fall within the classes. 20 + 12 + 0 + 16 + 18 (= 66) Intention their ∑fx / 10 For correct evaluation of their ∑fx / 10
4(a)(ii) Modal class $4.5 \leq r < 5.5$	B1	Accept '4.5 to 5.5' or other unambiguous indication of the group Do not accept 5
4(a)(iii) Median $5.5 \leq r < 6.5$	B1	Accept '5.5 to 6.5' or other unambiguous indication of the group Do not accept 6
4(b) Correct frequency polygon (for range of data given)	B2	If B2, penalise -1 if joined to any other point (apart from at (7, 0)) on horizontal axis other than (4, 0) and (10, 0) Must be accurate, indication to be on the horizontal grid line and on the vertical grid line B1 if joined with curve or not joined OR one plot incorrect within the polygon OR if translated provided the polygon is at the bounds or within the bounds for the group *Ignore frequency diagram as working*

2015 Summer Linear Paper 2 Higher Tier		Comments
5. (Length common side BD is) $3900 \div 75$ (BD =) 52 (cm) (Area of triangle BDC =) $\frac{1}{2} \times 25 \times BD$ (=) 650 (cm^2) (BC^2 =) $25^2 + 52^2$ (BC =) $\sqrt{3329}$ or $BC^2 = 3329$ (BC =) 57.697…(cm) rounded or truncated 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 A1 QWC 2	*Check the diagram for any answers* FT 'their BD', including BD as 25(cm) or spurious BD FT 'their BD' provided both previous M marks awarded FT 'their BD', including BD as 25(cm) or spurious BD FT 'their BD' provided ≠25(cm) and it is not a spurious BD CAO. Do not accept 60 (cm) unless 57(.697…) seen *Alternative for the first 4 marks:* *Base of triangle = ⅓ × base rectangle* *B1* *Area of the triangle = ⅓ × ½ ×3900* *M1* *= 650 (cm^2)* *A2* *Alternative for the final 3 marks:* ***Complete** method, all stages required to find BC* *M1* *Intermediate stages answer correct* *A1* *Final answer correct* *A1* 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 or grammar.
6(a) Explanation, e.g. 'this information was not recorded', 'don't know how many peaches are in the other boxes', 'don't know if boxes have fewer than 8 peaches', 'doesn't show more or less than 8', 'could be fewer than 8 peaches', 'not all boxes may (or will) have 8 peaches'	E1	Do not accept, e.g. 'because some boxes only had 7 peaches', 'because they should contain exactly 8 peaches (not at least 8)' (given in the question), 'because 2/5 of the boxes are under 8'
6 (b)(i) (8) (18) (25) (32) (41) (10) (20) (30) 40 50 (0.80) 0.9(0) 0.83 0.8(0) 0.82	B2	Must be to appropriate 2dp, although allow 0.9 and 0.8 for 0.90 and 0.80 respectively B1 for any 4 or 5 correct entries
6(b)(ii) Uniform scale on the vertical axis, suitable for values of relative frequency Correct plots (allow joined or not joined)	M1 A1	Allow not starting at 0, but must be uniform from their first marked value. Do not accept inappropriate scales, the maximum value on the top of the vertical scale must not exceed 2.5, unless clearly working with percentage FT from (i) if possible provided all relative frequencies <1 , or shown as percentages and they are not all identical. Tolerance of plotting is within the appropriate small square *Ignore any 'line of best fit drawn' or additional bars*
6(b)(iii) 0.82 or equivalent probability	B1	FT from their final decimal in the table in (b)(i) and provided it is <1 Do not accept 0.82% unless a correct equivalent to 0.82 is also seen

2015 Summer Linear Paper 2 Higher Tier		Comments
7. 3.5/4.2 = x/3.36 or equivalent correct statement x = 2.8 (cm) y/4.2 = 3.04/3.36 or equivalent correct statement y = 3.8 (cm)	M1 A1 M1 A1	OR appropriate use of scale factor (×)0.8 (or (÷)1.25) Do not accept errors from premature approximation OR appropriate use of scale factor (÷)0.8 (or (×)1.25) Do not accept errors from premature approximation *Accept unlabelled answers if given unambiguously*
8(a) $k^2 = m/3$ $k = (\pm)\sqrt{m/3}$	B1 B1	 Clearly must show square root of m/3 entirely FT from 1 error, e.g. k^2 = m-3 to give k =(±)$\sqrt{m-3}$ (B0, B1) or 3k=√m to give k =(±)√m/3 (B0, B1)
8(b) g(e + f) = h OR e + f = h/g $g = \frac{h}{e+f}$	B1 B1	Factorise FT from 1 error provided equivalent difficulty (not single term denominator), e.g. from incorrectly factorising as 2g(e+f) = h to give a response g = h/2(e+f) is awarded B0, B1
9. 1.3×10^7	B1	CAO
10. Sight of 31450, 31550, 45.5 and 46.5 Least 31450/46.5 (Least number of hours is) 676 ISW Greatest 31550/45.5 (Greatest number of hours is) 693 ISW	 B1 M1 A1 M1 A1	. . Accept 46.49 or 31549.9 Do not accept 46.49 or 31549.9 Must be clearly their least FT 31400 ≤ numerator < 31500 FT 46 < denominator ≤ 47 CAO from correct calculation. Must be whole number of hours Must be clearly their greatest FT 31500 < numerator ≤ 31600 FT 45 ≤ denominator < 46 CAO from correct calculation Must be whole number of hours *If both A0 due to not to the nearest hour, then **also** allow SC1for 676.344… and 693.406… rounded or truncated*
11(a) 0.2 indicated for no soup Idea 0.8 ×… = 0.32 P(buys an apple) = 0.4 Second branches 0.4 0.6 0.4 0.6	B1 M1 A1 B1	In working or on tree In working or on tree FT from their P(buys an apple) if M1 awarded
11(b) 0.2 × 0.6 = 0.12	M1 A1	FT 'their 0.6' from their lowest 2nd branch in (a)
12(a)(i) 180 – 90 – 74/2 53(°)	M1 A1	Indication of a complete correct method *Ignore a slip in notation, e.g. 90+37 = 53, award M1, A1*
12(a)(ii) (180 – 53)÷ 2 63.5(°)	M1 A1	Indication of a complete correct method. FT 'their 53' Accept 64(°) from correct working
12(a)(iii) 127(°)	B1	FT 2×'their 63.5' or 180° - 'their 53°'

2015 Summer Linear Paper 2 Higher Tier		Comments
12(b) AT (or BT) = 8/tan (74°/2) or AT (or BT) = 8 × tan 53° or AT (or BT) = 8 × tan (90°-74°/2) or AT (or BT) = 8 × sin53°/sin37° or AT (or BT) = 8 × sin(90°-74°/2)/sin37°	M2	M1for tan (74°/2) = 8/AT OR tan (74°/2) = 8/BT or $\frac{AT(or\ BT)}{sin53°} = \frac{8}{sin37°}$ or tan 53° = AT(or BT)/8 OR tan (90°-74°/2) = AT(or BT)/8 *Alternative:* *$OT/sin90° = 8/sin(74°/2)$ followed by AT^2 or $BT^2 = OT^2 - 8^2$* *M2* *(M1 for 1 **rearrangement** error in either sine rule or Pythagoras' Theorem)*
10.6(16358…. cm)	A1	Do not accept other answers from premature approximation, their response must be such that it would round to 10.6 (cm)
Perimeter of TAOB is 37.2(327….cm)	A1	FT 2×'their 10.6' + 16 evaluated correctly provided at least M1 awarded
13. Any two lines drawn correctly Correct region identified	B2 B1	B1 for any 1 line drawn correctly CAO
14.(a) Sight of x(2x + 6) or equivalent Convincing $2x^2 + 6x – 59 = 0$	B1 B1	Including within an equation x(2x + 6) = 59 Must be from of x(2x + 6) = 59 or $2x^2 + 6x = 59$
14(b)(i)Substitution into quadratic formula, allow 1 slip $(x =) \frac{-6 \pm\sqrt{(6^2 - 4\times2\times-59)}}{2\times2}$ $(x =) \frac{-6 \pm\sqrt{508}}{4}$ (x =) 4.13 with -7.13	M1 A1 A1	Must be correct formula Must be 2 d.p. *Only accept a trial & improvement if both solutions are found:* *Correctly evaluated trials that could lead to a positive and a negative solution* *M1* *Refinement of trials to 3 decimals places to confirm both solutions* *A1* *(x=) 4.13 with -7.13* *A1*
14(b)(ii) Volume 4.13(47…)×14.26(94)×1.13(47) or 59× 1.13(47…) Answers in the range 66.5 to 67 **cm^3**	M1 A1 U1	FT 'their derived 4.13(47…)' from a value that must be >3 given in a response in (b)(i) CAO. With no other answer (e.g. negative volume). Unsupported or from appropriate working Mark final answer **Independent mark**
15. ½ × 7.3 × BD × sin42° = 16.2 BD = 6.6(3301...cm) sinC/BD = sin28°/3.6 or BD/sinC = 3.6/sin28° sinC = BD × sin28°/3.6 Ĉ in the range 59.39(°) to 59.88...(°) or 59.9(°)	M1 A2 M1 M1 A1	A1 for BD = 16.2/(½ × 7.3 × sin42°) Must show a substitution for BD FT 'their derived BD', must be from working, not spurious Must show a substitution for BD OR sinC = 0.865…. **CAO**, accepting 59(°) or 60(°) from appropriate working.
16(a) Sin curve, through the origin Correct sketch, with ±1 shown on the vertical axis and clearly y = 0 shown at 0°, 180° & 360° implied correctly	M1 A1	 Accept 180° as mid-way between 0° and 360° if unlabelled Accept 360° as unlabelled provided the sketch does not exceed 360° ±1 must be both shown on the vertical axis

2015 Summer Linear Paper 2 Higher Tier		Comments
16(b) 236° and 304° with no other angles	B2	B1 for a correct angle. Accept unrounded values and embedded answers *If no marks, allow SC1 for answers of 235° and 305° (from truncation of 55.996…° to 55°)*
17. (Volume of cone =) $\frac{1}{3}\times\pi\times r^2\times 4.2$ (Volume of cylinder =) $\pi\times r^2\times(9.6 - 4.2)$	B1 B1	($=7/5\ \pi r^2 = 4.398r^2$ to 3 dp) ($=27/5\ \pi r^2 = 16.965r^2$ to 3 dp)
$\frac{1}{3}\times\pi\times r^2\times 4.2 + \pi\times r^2\times(9.6 - 4.2) = 245$	M1	FT provided both terms on the left are terms in $\pi\times r^2$ and are dimensionally correct ($6.8\pi r^2 = 245$, $245 = 21.363r^2$ to 3 dp)
$r^2 = 245\ /\ (\frac{1}{3}\times\pi\times 4.2\ +\ \pi\times 5.4)$ $(= 245/(4.39.. + 16.9..))$	A1	FT for correct rearrangement for r^2 ($r^2 = 11.46\ldots$ to 11.537 or $245/6.8\pi$)
3.4 (cm)	A1	CAO, however allow answers in the range 3.38 to 3.396 (cm)

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