GCSE MARKING SCHEME

MATHEMATICS - LINEAR

NOVEMBER 2013

INTRODUCTION

The marking schemes which follow were those used by WJEC for the November 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

PAPER 1 (Non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
1. (a) (i) (£) 2,025,310	B1	
(ii) twenty three thousand and eight (litres)	B1	B0 for twenty three thousand zero hundreds and eight (litres)
(b) (i) 38 and 32	B1	
(ii) 46	B1	**Accept embedded answers, e.g.37 + 46 = 83.**
(iii) 42	B1	
(c) 119	B1	B0 for −119
(d) 81	B1	Accept 9^2 **OR 9×9**
(e) 1, 2, 4, 7, 14, 28	B2	B1 for at least 4 correct factors with at most 1 incorrect number. Ignore repeats.
	9	
2. (a) 7 thousand(s) OR 7000 OR thousand(s)	B1	
(b) 53 OR 59 OR 151, 251 etc	B1	
(c) 14	B1	
(d) 3/8	B2	B1 for 6/16. Mark their final answer for the B2
(e) (Megan spends) £7.20 on pens	B1	C.A.O.
(Number of pens) = 720/60	M1	For 'their £7.20'/60. B0,M0,A0 for £8/60. Unsupported 12 gets the 3 marks.
= 12 (pens)	A1	F.T.
Look for • spelling • clarity of text explanations • the use of notation (watch for the use of '=', £, p)	QWC	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.
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 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.
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		QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar
	10	
3. (a) Cricket (C) 10, Football (F) 6, Hockey (H) 11 Tennis (T) 8,	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.
Both axes labelled, e.g. frequency along one axis and Tennis (T), Football (F), Cricket (C), Hockey (H) along other axis - anywhere within the base (inc.) of the corresponding bar. AND uniform scale for the frequency axis starting at 0 and labelled 'frequency' OR 'number of pupils'.	B2	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. **Accept 'Number of pupils' but NOT 'pupils'**
Four bars at correct heights (bars must be of equal width)	B2	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)
(b) Hockey (H)	B1	Accept 11 and Hockey (H), but B0 for 11 only F.T. their figures.
(c) 10/35 I.S.W. OR 2/7	B2	B1 for the 10 (in a fraction < 1) OR B1 for a denominator of 35(in a fraction < 1). **F.T. 'their 10' but must be 35.**
	9	Penalise -1 for incorrect notation, e.g. '10 out of 35', '10:35'

PAPER 1 (Non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
4. (a) Speed of stone = 4 × 10 + 15 = 55 ISW	M1 A1	Correctly substituted shown by correct attempt to evaluate.
(b) time = (45 – 20)/10	M1	For correct substitution with subtraction **For example, 45 – 20/10 = 2 gets M0,A0**
= 2.5 OR 2½ ISW	A1 4	Allow embedded references to the correct answer. **2 r5 gets A0**
5. (a) Missing side segments = **(3 and)** 5 Perimeter = 3+8+3+5+3+3+3+8+3+3+8	S1 M1	Attempt to add ALL the correct sides of the shape **Seven 3s, three 8s and a 5 (F.T. the 5 from their diagram but not 3 or 8). Watch out for implied values, e.g. 11**
= 50 (cm)	A1	C.A.O. **50 should imply S1,M1,A1**
(b) Area = 3 × 8 × 2 + 3 × 3 × 2	M1	F.T. their length of square from (a) **Alternatively could be 2×11×3 OR 11×14 – 11×8**
= 66 cm^2	A1 U1 6	Independent of all other marks.
6. any fraction equiv. to 2/5 (0).4 (40%)	B1, B1	First and second values
any fraction equiv. to 3/10 (0.3) **30(%)**	B1, B1 4	First and third values
7. (a) 3 + 3 + 1 – 2 = 5	M1 A1	
(b) 1 win, 1 draw and 2 losses OR WDLL	B1	In any order
3 + 1 – 2– 2 (= 0)	B1	**Allow 'running totals' , e.g. win 3, draw 4, 2 losses =0.**
(c) (0 wins) 2 draws and 3 losses OR DDLLL	B1	In any order
1 + 1 – 2– 2 – 2 (= – 4)	B1 6	**Answers must only use 5 games.**
8. Man 5 to 7 ft OR 1·5 **to 2·2 metres (both inclusive)** (Man 3cm Bus = 7½cm)	B1	**Unsupported answers marked as follows:**
Scale factor = 2.5 **(OR the use of 2.5 in their working)**	B1	feet 10 SC1 12.5 M1, A1 (inc) 17.5 SC1 21 metres 3 **5.5** **6·5**
Estimate height of bus = estimate × factor F.T. their estimates × their SF (2 − 3 inc.)	M1	F.T. their man's height estimate AND scale factors 2–3 inc.
= *correct answer for their figures* SC1 for answers which: (a) only give man's height as3cm and bus's as 7.5cm ± 2mm OR (b) a proper attempt at 'dividing' the bus's height into 'man height' parts	A1 4	Correct units must be seen at least once to get the final A1
9. (a) ∠ABD = 37 (°) OR ∠DBC = 37 (°) ∠A = 106(°) ∠ABD = 37(°) **OR ∠BDC=37(°)** ∠C = *x* = 106 (°) ∠C = *x* = 106 (°)	B1 B1 B1	Look at diagram also C.A.O.
9. (b) 360 – 132 – 126 – 61 = 41 (º)	M1 A1	Angle sum of quadrilateral. Note that 180 – (360 – 126 – 132 – 61) is equivalent, that is 126 + 132 + 61 – 180 For finding 4th angle. Also look in their diagram. 41 on its own gets this A1, even as y = 41
y = 139 (º)	B1 6	F.T. 'their 41'

PAPER 1 (Non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
10. (a) (4) 16 20 (3) 12 15 (2) 8 10 (1) 4 5	B2	B1 for at least 4 correct entries
(b) (i) 5/12	B2	F.T. their table B1 for a numerator of 5 in a fraction less than 1. B1 for a denominator of 12 in a fraction less than 1. **Penalise incorrect notation –1 e.g. 5 out of 12, 5:12** **Do not penalise if correct notation also given.**
(ii) $\frac{5}{12}$ of 60	M1	F.T. their (b)(i) if a fraction less than 1 **(but not ½)**
= 25	A1	This 25 may appear in later working **25 out of 60 gets M1,A1 but 25/60 gets M1,A0.**
(iii) 60 × 80p − 25 × 150 OR £48 − £37.5(0)	M1	F.T. full method of 60 × 80p – 'their 25' × 150p OR Profit = 35 x 80p – 25 x 70p = £28 – £17.5(0)
= £10.50 OR 1050p	A1 8	= £10.50 OR 1050p.
11. (a) –a + 2b	B2	B1 for the –a OR + 2b in an expression with *a* and *b* OR B1 for both correct, but not in an expression.
(b) (i) (x=) 50	B1	Accept embedded answers such as 50/5 = 10
(ii) 3x = 12	B1	F.T. ax = b (a≠1)
x = 4	B1 5	Accept embedded answers such as 3×4 + 7 = 19
12. (a) (i) 2 **(is a prime number)** (and even)	B1	Needs the statement. Ignore true/false.
(ii) For example, halving 18 ends up as 9	B2	SC1 for explanations like '18 divides into 2 to make 9 rather than '18 divided by 2 makes 9' For a correct counter example. *B0 for false only*.
(b) One of 2 consecutive numbers is even so the product will be even.	B2 5	**B2 for 'even × odd = even' AND 'odd × even = even'** B1 for 'even × odd = even'. OR B1 for 'one of 2 consecutive numbers is even' B0 for example(s) only.
13. (a)	M1	For a method that produces 2 prime factors from the set {2, 3, 5, 5} before their second error. If their 2nd prime and 2nd error occurs at the same 'level' then allow M1.
2, 3, 5, 5	A1	C.A.O. for the **four** correct factors. (Ignore 1s).
$2 \times 3 \times 5^2$	B1	F.T. their answer if at least one index form used with at least a square. Ignore prime number requirement for this B mark. Use of brackets $(2)(3)(5^2)$ OR dot $2.3.5^2$ gets the B1. The inclusion of any 1s as factors, for example, $2 \times 3 \times 1 \times 5^2$ in their index form gets B0. Note that $2 \times 3^1 \times 5^2$ gets B1.
(b) 2 × 3 OR 6	B1 4	F.T. their (a) if the M1 awarded.

PAPER 1 (Non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
14. (a) Correct frequency diagram	B2	B1 if translated OR for at least 3 bars correct OR if height correct but slight gaps between the bars **If frequency polygon drawn, or indication of points at correct heights only, B0 in all cases.**
(b)(i) 75	B1	Accept reference to heights.
(ii) Tom AND a reason, e.g. 'more bars on left for Billy', 'more bars right for Tom', 'Tom collected **more** longer logs' 'Tom has higher number 70 – 75cm logs', 'Tom's mode higher than Billy's'	E1	Accept comparison of modal groups Do not accept Tom with statement 'longer logs'. **'Tom has** 10 logs with length 70-75cm', 'Tom has highest frequency (38, Billy has 30)'
H2	4	
15.(a) 230(g) and 460(g) and 690(g)	B1	CAO
2 and 60(ml)	B1	CAO
320(ml)	B1	CAO
172.5(g)	B1	CAO (1oz = 28.75g) If recipe for 4, treat as MR-1 (115, 230, 345: 1, 30: 160: 86.25)
(b) **Use of** 1 litre = 1000 ml or ½ litre = 500ml	B1	May be implied in calculation, e.g. in working towards (2cups) 480 (ml)
8 people needs 320ml so need 320 ÷ 8 ml per person	M1	FT 'their 320'. throughout OR 4 people 2/3 ×240 (ml) so 2/3 ×240 ÷4 OR 500÷320 considered or shown as repeated addition or multiplication trials **towards** 500
40 ml per person or 12.5 people	M1	Allow for an answer of 13 from appropriate working OR if trials or repeated addition has been used, must work to consider 'their 320' can be broken down into a smaller quantity per person
12 portions	A1	(Note: FT from cream 160ml gives 25 people) Unsupported answer of 12 (people) is awarded all 4 marks
H3	8	
16. (a) 55	B2	B1 for evidence of 180 – (75 + 50) **or equivalent, e.g. 360 –(105 + 125+75) incorrectly calculated, accept without brackets as intention, e.g.180 - 75 + 50, OR for sight of 55(°) or 125(°) from appropriate working or on the diagram**
(b) 2z + z + 2z + z = 24 (or 6z = 24 or 3z = 12 or 2z=24/3)	M1	**Must be evidence of a correct equation** , not z = 4 Do not penalise change of letter from z
6z = 24 (or z = 24/6 or z = 12/3)	A1	An answer only of **(z =)** 4 without an introductory equation is M0, A0, B1. Accept answer 4 (metres) without equation *SC1 for z+z+z+z=24 or 4z=24 leading to z=6, or 2z+2z+2z+2z=24 or 8z=24 leading to z=3,* ***or similar***
z=4	B1	**z+2z = 24 leading to z = 8 or similar**
H8	5	
17.Realising that 1/3 of the winnings is given away AND considers equivalent fractions in …/24	S1	Or sight of 1/3 = …/24 or realising ⅔ is 16/24 OR accept appropriate working with an amount of money
8 (close friends)	B2	B1 for an appropriate calculation that could lead to 8 people or 16 (left) OR sight of 16/24 or 8/24 Examples of calculations: 24-16, or 2×24/3 (=16 left) An unsupported correct answer is awarded all 3 marks.
H6	3	

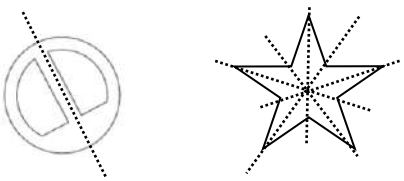
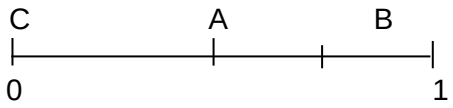
PAPER 1 – HIGHER TIER

PAPER 1 Higher Tier	Marks	FINAL MARK SCHEME Comments
1(a) $\frac{(-3)^2 - 5}{2}$	M1	Evidence of substitution. Answers of -7, ½ , -5.5 or working towards these answers is evidence of substitution (M1)
= 2	A1	
(b) $(2\times5)^3$	M1	Or sight of $2\times5 \times 2\times5 \times 2\times5$ or $10\times10\times10$ or 10^3
= 1000	A1	
(c) $5^1/_5$ (ISW) or 5.2 or 26/5	B2 6	B1 for $5 + {}^1/_5$. SC1 for $-{}^4/_5$ from 2-3+⅕
2(a) Correct frequency diagram	B2	B1 if translated OR for at least 3 bars correct OR if height correct but slight gaps between the bars If frequency polygon drawn or indication of points at correct heights, B0 in all cases
(b)(i) 75	B1	
(ii) Tom AND a reason, e.g. 'more bars on left for Billy', 'more bars right for Tom', 'Tom collected **more** longer logs', 'Tom has higher number 70 – 75cm logs', 'Tom's mode higher than Billy's'	E1 4	Accept reference to heights. Accept comparison of modal groups Do not accept Tom with statement 'longer logs', 'Tom has 10 logs with length 70-75cm', 'Tom has highest frequency (38, Billy has 30)'
3(a) 230(g) and 460(g) and 690(g)	B1	CAO
2 and 60(ml)	B1	CAO
320(ml)	B1	CAO
172.5(g)	B1	CAO If recipe for 4, treat as MR-1 (115, 230, 345: 1, 30: 160: 86.25)
(b) **Use of** 1 litre = 1000 ml or ½ litre = 500ml	B1	May be implied in calculation, e.g. in working towards (2cups) 480(ml)
8 people needs 320ml so need 320 ÷ 8 ml per person	M1	FT 'their 320' throughout OR 4 people 2/3 ×240 (ml) so 2/3 ×240 ÷4 OR 500÷ 'their 320' considered or shown as repeated addition or multiplication trials **towards** 500
40 ml per person or 12.5 people	M1	Allow for an answer of 13 from appropriate working OR if trials or repeated addition has been used, must work to consider how 'their 320' can be broken down into a smaller quantity per person
12 portions	A1 8	(Note: FT from cream 160ml gives 25 people) Unsupported answer of 12 (people) is awarded all 4 marks
4(a) Enlargement scale factor 2	B2	B1 for any 3 lines correct, or consistent incorrect scale
Correct position	B1	
(b) Correct reflection in $y = -x$	B2	B1 for a reflection in $y = x$, OR for sight of the line $y = -x$ *Answer coordinates at (2, 6), (4, 6), (4, 2)*
(c) Correct rotation	B2 7	B1 for a 'near miss' slightly off the grid lines, OR 90° clockwise rotation about (-2, -4) *Answer coordinates at (1, -4), (1, -8), (-1, -8)*
5(a) $y^6 + 3y$ as a single expression	B2	B1 for each term. If B2 penalise further working -1 Do not accept $y\times y^5$ for y^6. Do not accept $3\times y$ for 3y, Allow y3 for 3y
(b) $2x(2x^2 - 1)$	B2 4	B1 for correct but only partially factorised OR $2x(2x^2$ .....) or 2x(..... -1)
6.Realising that 1/3 of the winnings is given away AND considers equivalent fractions in …/24	S1	Or sight of 1/3 = …/24 or realising ⅔ is 16/24 OR accept appropriate working with an amount of money
8 (close friends)	B2 3	B1 for an appropriate calculation that could lead to 8 people or 16 (left) OR sight of 16/24 or 8/24 Examples of calculations: 24-16, or 2×24/3 (=16 left) An unsupported correct answer is awarded all 3 marks.

PAPER 1 Higher Tier	Marks	FINAL MARK SCHEME Comments
7. (Ratio bonus) (1 share) (£)2500÷5 (2 shares is 500 × 2 =) (£)1000 (Percentage option) (6% of £17000 =) 0.06×(£)17000 = (£)1020 Valid reason based on working, e.g. '6% option because it is more money', or '6% option as it is £20 more' Look for • spelling • clarity of text explanations, • the use of notation (watch for the use of '=', £, p) 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 A1 M1 A1 E1 QWC 2 7	Alternative method to find 1% (÷100) then 6% (× 6) FT from their two values provided both M marks awarded, must be based on two values to compare 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.
8(a) 55 (b) 2z + z + 2z + z = 24 (or 6z = 24 or 3z = 12 or 2z=24/3) 6z = 24 (or z = 24/6 or z = 12/3) (z=) 4 (metres)	B2 M1 A1 B1 5	B1 for evidence of 180 – (75+ 50) or equivalent, e.g. 360 –(105 + 125+75) incorrectly calculated, accept without brackets as intention, e.g.180 - 75 + 50, OR for sight of 55(°) or 125(°) from appropriate working or on the diagram **Must be evidence of a correct equation** , not z = 4 Do not penalise change of letter from z An answer only (z =) 4 without an introductory equation is M0, A0, B1. Accept answer 4 (metres) without equation *SC1 for z+z+z+z=24 or 4z=24 leading to z=6, or 2z+2z+2z+2z=24 or 8z=24 leading to z=3, z+2z = 24 leading to z = 8* ***or similar***
9(a) Selecting 8y = -3x + 12 Either shows y = -(1.5/4) x + 1.5 or shows trials, within 8y=-3x+12 knowing that (0, 1.5) or (-4, 3) **and** (4, 0) lie on this line or appropriate elimination of all other equations (b) (2 + -2)/2 or (-4 + 6)/2 (0, 1)	B1 E1 M1 A1 4	SC1 for selection of 8y = 3x + 12 with some attempt at a reason (e.g. elimination of other equations) Do not accept 'the one that works' without saying why? Do not accept 'negative gradient', as this is insufficient OR attempt sketch with reasonable **idea of mid point** (not when giving intersection as a response) *Watch for, and accept the use of (a) graph paper* *(Watch for (0,2) without working or from incorrect working this is M0, A0)*
10(a) 5, 16, 33 (b) -50 (c) n^2 - 10	B2 B1 B2 5	Ignore any further values given B1 for 2 correct terms in the correct position SC1 for 0, 5, 16 or …, 5, 16, 33 CAO Mark final answer B1 for $n^2 \pm$ …, not for n^2 alone, written within an expression of at least 2 terms B0 for $an^2 \pm$ … where $a \neq 1$

PAPER 1 Higher Tier	Marks	FINAL MARK SCHEME Comments
11(a) (£)220 (b) 220×1.03 (£)226.6(0)	B1 M1 A1 3	 FT 'their 220' from (a) Alternatively finding 3% and adding to 220 CAO. ISW
12(a) (x + 3)(x - 7) x = -3 and x = 7 (b) 2(2x + 3) + 3(4x + 1) = 129 16x + 9 = 129 x = 120/16 (=7.5) (c) 2d + de = 15 – 3e de + 3e = 15 – 2d e(d + 3) = 15 – 2d e = $\frac{15 - 2d}{d + 3}$	B2 B1 M2 A1 A1 B1 B1 B1 B1 11	B1 for (x -3)(x +7) or x(x-7)+3(x-7) or equivalent FT from their pair of brackets, or from previous B1 Do not accept answer only, must FT from factorising For correctly clearing all 3 fractions, OR M1 for clearing 2 fractions FT from M1 Accept 240/32. Ignore incorrect cancelling SC1 provided no other marks awarded for $\frac{16x+9}{6}$ (= $\frac{129}{6}$) FT until 2nd error for equivalent level of difficulty Mark final answer
13. Shows understanding of the distance PQ around the cylinder, as straight line PQ^2 = circumference^2 + h^2 $PQ^2 = (2\Pi r)^2 + h^2$ (PQ =) $\sqrt{((2\Pi r)^2 + h^2)}$ or $\sqrt{(4\Pi^2 r^2 + h^2)}$	S1 M1 A1 A1 4	E.g. shows a rectangle with PQ as the diagonal Allow split into 2 diagonals straight lines Allow application of Pythagoras' Theorem as FT from a split into 2 diagonals Accept $PQ^2 = 2\Pi r^2 + h^2$ as idea for method No further FT from split diagonals
14. 12.5(kg)	B2 2	B1 for sight of 2.5(kg)
15(a) – 16 and -8 (b) At least 4 points plotted accurately All **9** points plotted accurately and joined with a curve (c) (0, 0) (2, -16) or follow through from their graph (d) y = 8 – 8x drawn accurately and intersecting the curve Coordinates of the point of intersection	B1 M1 A1 B1 M1 A1 6	 FT from (a) Plots reasonable for the scale and the intention for the curve to pass through all of the points plotted Need both points where gradient is zero FT from consistent misread of the scale if possible FT from their curve if possible Reasonable for their graphs, reading accurate to gridlines Accept with missing brackets Accept unsupported answers (2.5, -12.5) to (2.5, -12)
16(a) Attempt to find the difference between 100x=34.2727… and x = 0.342727… 3393/9900 (b) Any 3 correct responses, e.g. 0, ¼ , 1/9, 1, 4, 9, 16, 25,.. (c)(i) Correct response, e.g. √2, √3, √½ , √5, √21, .. (ii) Correct response, e.g. Π, √Π, $_3\sqrt{2}$, $_5\sqrt{7}$, … (d) $(\sqrt{(2\times16)} + \sqrt{2})^2$ $(4\sqrt{2} + \sqrt{2})^2$ $(= (5\sqrt{2})^2)$ 50	M1 A1 B2 B1 B1 M1 A1 A1 9	Or differences with correct values for 10000x and 100x, or 1000x and 10x, or alternative full method, or sight of 33.93/99, 339.3/990 ISW Accept if consistently written with index 3/2 Accept if more than 3 responses offered if all are correct B1 for any 2 correct responses with no more than 1 incorrect response If an incorrect response offered with a correct response, B0 Do not accept √Π OR M1 32 + √32√2 + √32√2 + 2 any 3 terms correct A1 32 + 8 + 8 + 2 CAO A1 50
17(a) Strategy, finding area 0.2×30 + 0.4×10 + 0.8×10 + 1.2×10+ 1.0×10+ 0.1×30 43 (people) (b) 6+4+8+ 12 + ½×10 OR 43 – 3 – ½×10 35 (people)	M1 M1 A1 M1 A1 5	Any single area is sufficient (Note for markers: 6+4+8+12+10+3) CAO FT 'their 43'

PAPER 1 Higher Tier	Marks	FINAL MARK SCHEME Comments
18(a) P(not purple, not purple) with sight of 6/8 OR sight of an alternative full strategy	B1	Not for sight of 6/8 alone, i.e. as 6 non purple shoes out of 8 shoes Allow B1 for sight of 6/8 × 5/8
6/8 × 5/7 or alternative full calculation shown	M1	
30/56 ISW (15/28)	A1	
(b) P(RR)+P(PP)+P(BB)+P(WW)	B1	OR 1 – P(2 different colours) OR P(any shoe) × P(its matching shoe)
Sight of 2/8 × 1/7 in appropriate working	B1	OR 8/8 × 1/7
4 × (2/8 × 1/7) or equivalent	M1	OR 8/8 × 1/7
1/7	A1	OR equivalent fraction
	7	

PAPER 2 (Calculator allowed) **Foundation Tier**	**Marks**	**FINAL MARK SCHEME** **Comments**
1. (a) (59.96) 32.7(0) (socks) 55.38 (shirts) 65.36 (shoes) (£) 213.4(0) (b) 10% = 21.34 5% = 10.67 OR (0).05 × 213.4(0) Discount = (£) 10.67	 B1 B1 B1 B1 M1 A1 6	 F.T. their figures for 1 error If cost of shirts is £110.76 then total would be (£)268.78 and discount is (£)13.439 OR (£)13.44 **OR (£)13.43** For any correct method for finding 5% F.T. their total. Allow M1,A1 for (£)202.73 OR **(£)255.34** **Also FT 95% of their total.** **1% = 2.13 then 5% = 10.65 M1 A1 PA-1**
2. Distance 160mm 160cm 160m **160km** Weight **35kg** 350kg 35mg 35g Capacity 35 litres 350litres **350 ml** 35 mm^3 Height 1900cm **190cm** 19cm 190mm	 B1 B1 B1 B1 4	
3. (a) Evidence of square counting 59 – 65 3. (b) 	M1 A1 B1 B1 4	 **Condone square notation, e.g. 60^2, but $60^2 = 3600$ gets A0** Circles: for the 1 correct line and no other Star: for all 5 correct lines
4. (a)  (b) likely	 B1 B1 B1 B1 4	 A should be at ½. Condone use of W(hite) B should be between ¾ and 1 exclusive. **(3/4 is to the right of the 'e' in 'red'. Welsh scripts: To the right of the final 'o' in 'stopio')** Condone use of Y(ellow) C should be at 0. Condone use of R(ed) **Letters must be seen on scale (i.e. not 0.5, 0.875 and 0)** **C.A.O.**
5. (a) (i) cylinder (ii) cuboid (b) tangent (c) Perpendicular through C	B1 B1 B1 B1 4	**Accept 'circular based cylinder', 'cylindrical prism', 'cylinder prism', but not 'circular prism'** **Accept 'rectangular cuboid', but not 'rectangular prism'** Tolerance: Between a line to the right of 'B' in AB and a line to left of the 'p' in passes (inclusive) On Welsh script between a line to the right of 'l' in perpendicwlar and a line to left of the 's' in sy'n (inclusive)

PAPER 2 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
6. (a) (£)3.16 (b) (£)9.2(0)	B1 B1	
6. (c) 5 (£)1.28 × 5 (6.40) + (£)27.46 = (£)33.86 **(Change =)** (£)6.14 QWC Look for • Spelling • Clarity of text explanations • The use of notation – watch for '=','£', 'p' being used appropriately. QWC2: Candidates will be expected to • present work clearly, with words explaining their processes 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 their processes or steps OR make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	B1 M2 A1 A1 QWC 2 9	M1 for 27.46 +..... OR 1.28 × 5 + ... F.T. (£)32.58 from (£)1.28 × 4 (5.12) + (£)27.46 FT provided M1 awarded Penalise –1 for consistent use of incorrect column. **UK and Europe: (£)13.82 + 5×60(p) (16.82) (£)23.18** **World Zone 1 : (£)26.28 + 5×1.22 (32.38) ((£)7.62** 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) 101 (b) 2×60 + 1 OR **60+61** = 121 (c) (81 – 1)/2 = 40	B1 M1 A1 M1 A1 5	**C.A.O. 40+41; 40,41; 40 unshaded get M1, A0.**
8. (a) (i) Add 12 to the previous term (ii) Multiply the previous term by –3 (b) F = 6(12) + 10(3) OR 72 + 30 = 102 (c) (i) 8m (ii) (£) 8m/100 OR (£)(0).08m	B1 B1 M1 A1 B1 B1 6	Accept +12, **goes up in 12s, but 12n–8 is B0** Accept ×–3. **Multiply by 3 and alternate (or change) sign gets B1.** For correct substitution **and correct interpretation** C.A.O. Accept 8×m, m×8, m8 F.T. 'their (c)(i) **if algebraic** **Penalise –1 once for use of different letter but allow M** **Use of the letter p gets B0 every time.**
9. (a) Sum of the numbers (476) Sum/8 59·5**(0)** I.S.W. (b) 27 (c) 45 45 55 59 65 66 69 72 Median = 62	M1 M1 A1 B1 M1 A1 6	For attempt to add the numbers For dividing a number in the range 400 – 550 by 8. C.A.O. **–27 gets B0.** For identifying the correct TWO middle numbers OR for arranging the 8 numbers in ascending or descending order. C.A.O. Unsupported 62 gets M1, A1.

PAPER 2 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
10. (a) 114 (miles) (b) 64 (miles) (c) 42 (minutes) (d) Line drawn from end of stopping to (13:39, 0)	B1 B1 B1 B1 4	 F.T. 'their 114' – 50 Three 2mm squares beyond 13:30 on the time axis. **(Accuracy of ½ small square)**
11. (a) $\frac{95}{250}\times 100$ 38 (%) (b) ((£) 163.60 – (£) 35.60) = (£) 128 Number of extra days = **'their(£)128'**/(£)16 = 8 Total number of days = 10	M1 A1 B1 M1 A1 B1 6	 **For the (£)128** F.T. except for (£)163.60/(£)16 Unsupported 10 gets all 4 marks. F.T. number of extra days + 2 **Answers like '2 days and a further 8 days' get B0** **Subtracting two lots of £35.60 gets B0 for first B mark. But can then get M1,A1 on correct F.T. even if their answer is not a whole number. In such cases the final B1 is only awarded if their number of days is rounded up to the next whole number.** **Watch out for 163.60/16 = 10.2 = 10 (days) which gets 0.**
12. Either He spends (£)100 on rent and (£)160 on food leaving (£)140 **F.T. for second M1,A1** Frac. remaining 140/400 7/20 **I.S.W.** OR ¼ + 2/5 = 13/20 **F.T. for second M1,A1** Frac. remaining = 1– 13/20 =7/20 **I.S.W.**	M1 A1 M1 A1 4	**Subtracting at each stage :** **Spends (£)100 on rent** **Leaving £300. 2/5 of £300 = 120 leaving (£)180** **F.T. for second M1,A1** **Frac. remaining 180/400 = 9/20** **Possible 4 marks then –1 if any A marks awarded** **Decimals or % equivalents** **.25 + .4(0) = .65.** **1- .65 = .35** **First M1, A1 possible** **F.T. for second M1,A1 but must be fractions for second M1,A1.** **35/100 M1** **= 7/20 A1**
13. (a) $P\hat{Q}R = 48°$ $P\hat{R}Q = 67°$. Completed triangle (b) First arc**(s)** Final arcs and line (c) First arc**(s)** Final arc**(s)** and line	B1 B1 B1 B1 B1 B1 B1 7	**If triangle is 'flipped' then mark as if correct then –1** Provided at least B1 awarded If no arcs then B0, B0 **Arc must be big enough so that the 2nd arc could cut it** **B2 for correct construction at A** **B1 maximum for a correct construction elsewhere on the line.**
14. **Accept angles shown on their diagram** $B\hat{C}E = 60°$ OR $H\hat{C}G = 60°$ $E\hat{C}G = 90°$ OR $D\hat{C}B = 90°$ **Accept the 'box' notation** $D\hat{C}H = 360° – 60° – 60° – 90° – 90°$ = 60° DC = CH **(OR marked as equal on the diagram with $D\hat{C}H$ = 60°)**	B1 B1 M1 A1 E1 5	For at least one correct 60° **(Anywhere in either triangle)** For at least one correct 90° **(Anywhere in either square)** Angles at a point make 360 $D\hat{C}H$ = **60 on its own gets no marks.** **Needs to show having the 60° and DC = CH.**

PAPER 2 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
15.(Agatha) 220, 440, 660, (880, 1100, 1320, ...) (p) (Ben) 140, 280, 420, (560, 700, 840, 980 ,…) (p) **4** × 2(.)20 = 8(.)80 AND **3** × 1(.)40 = 4(.)20 (£ or p) 7 (pens) **OR** **3.60, 7.20, 10.80, (14.40 …) + 2.20** **4 + 3** **7** **H1**	M1 M1 A1 A1 **M1M1** **A1** **A1** 4	In £ or p or mixed. M1 for the any 3 correct multiples In £ or p or mixed. M1 for the any 3 correct multiples Identifying the correct number of each CAO. Must state total number of pens altogether *Alternative, Trial & improvement:* *2 trials, correctly evaluated showing **improvement*** *M1* *2 trials, correctly evaluated between £10 & £16 incl.* *M1* *4×2(.)20 and 3×1(.)40 = (£)13* *A1* *7(pens) CAO* *A1* **Award all 4 marks for an unsupported answer of 7 (pens)**
16. (a) 3.8 (cm) or states 'the same' Reason, e.g. 'they even out', 'the mean of these is zero', 'totals are the same each week', 'taking away 3 and adding 3 so it stays the same', 'same amount of rainfall in both weeks' (b)(i) Mid-points 1, 2, 3, 4 1×5 + 2×11 + 3×13 + 4×1 Intention their ∑fx / 30 2.3(33…cm) (ii) Modal class 2.5 ≤ r < 3.5 **(13)** (iii) Median 1.5 ≤ r < 2.5 **H4**	B1 E1 B1 M1 m1 A1 B1 B1 8	Mark final answer. Award independently from E mark Accept a correct method as a reason, e.g. (3.8×7 + 3 – 3)÷7 or equivalent Allow '3.8+3 = 6.8, and 6.8-3 = 3.8', or '4.8×3+2.8×3 + 3.8 = 26.6 with 26.6÷7=3.8 i.e. showing by calculation that +3 and -3 means no change. Allow indication of + 1 -1 bringing 3.8 or 7×3.8 back to original FT their mid points, including bounds, provided they fall within the classes. 5 + 22 + 39 + 4 (= 70) (70/30) Following correct working, however accept unsupported 2.3(3..cm) for all 4 marks. Accept 7/3 or 2⅓ as a final answer Accept '2.5 to 3.5' **(with/without '13')** Accept '1.5 to 2.5' *If neither B1 awarded in (ii) or (iii), then award SC1 for answers of 3 and 2 respectively.*
17. (a)(i) 200 × 1.09137 **OR 200 ÷ 0.916279** 218(.274) (ii) 250× 1.4789 OR 250 ÷ 0.676175 369(.72...) (b) 1 ÷ 133.5 or 1 ÷ 0.090147 **11.09**…… **0.0074**…… **H5**	M1 A1 M1 A1 M1 A1 A1 7	Accept 200×1.09(..) **and same with other calculations** Accept rounded or truncated **Accept unambiguous truncation** Accept rounded or truncated, also accept 370 Sight of either calculation Either answer correctly placed in the table also implies M1 Accept 0.0075. Only allow 0.01 if correct working seen If answers reversed in the table award M1, A0, A1 If 2 correct answers seen in working award M1, A1, A0 If 1 correct answer seen in working award M1, A0, A0 If only 1 answer given misplaced in table award M1, A0, A0
18. (a) 6 × … = 54 or 54 ÷ 6 = … (Area each face on small cube =) 9(cm^2) 18 (small faces on cuboid) (18 × 9 =) 162(cm^2) (b) (Length side of small cube =) √9 (= 3) Volume = **(4 ×)** 3 × 3 × 3 108 (cm^3) **H8**	M1 A1 B1 B1 M1 m1 A1 7	ISW. Watch for an embedded answer. FT 'their 54÷6' × 'their 18' evaluated correctly from a consistent misconception of the number of faces. ***Alternative:*** *Single cube has 6 faces* *B1* *Cuboid has 18 faces* *B1* *Total surface area 3 ×54* *M1* *= 162 (cm^2)* *A1* ***OR*** *6 hidden faces* *B1* *Equivalent to 3 cubes at 6 faces each* *B1* *Total surface area 3 ×54* *M1* *= 162 (cm^2)* *A1* ***OR*** *Area 4 cubes 4×54 = 216* *B1* *6 hidden faces* *B1* *Area of cuboid 216 – 54* *M1* *= 162 (cm^2)* *A1* FT 'their 9' provided M1 awarded in (a) **Method to calculate volume of 1 or 4 cubes. FT 'their 3' provided M1 awarded** **These alternatives are only marked AS COMPLETE SOLUTIONS. You must not award credit for any of the individual lines. For example, *Area 4 cubes 4×54 = 216.* On its own this gets B0. It only gets B1 as a part of a complete solution with all the other lines for that alternative**

PAPER 2 HIGHER TIER

PAPER 2 Higher Tier	Marks	FINAL MARK SCHEME Comments
1.(Agatha) 220, 440, 660, (880, 1100, 1320, ...) (p) (Bryn) 140, 280, 420, (560, 700, 840, 980 ,…) (p) **4** × 2(.)20 = 8(.)80 AND **3** × 1(.)40 = 4(.)20 (£ or p) 7 (pens)	M1 M1 A1 A1 4	In £ or p or mixed. M1 for any 3 correct multiples In £ or p or mixed. M1 for any 3 correct multiples Identifying the correct number of each CAO. Must state total number of pens altogether *Alternative, Trial & improvement:* *2 trials, correctly evaluated showing* ***improvement*** *M1* *2 trials, correctly evaluated between £10 & £16 inclusive M1* ***4****×2(.)20 and* ***3****×1(.)40 = (£)13 A1* *7(pens) CAO A1* Award all 4 marks for an unsupported answer of 7 (pens)
2(a) (12 – 2) ×180 ÷ 12 150(°) (b) No AND a reason, e.g. '150 not a factor or 360', '150+150 = 300 not enough', '3 lots of 150 is 450 too much'	M1 m1 A1 E1 4	Alternative: Sum of exterior angles 360(°) **Exterior** 360/12 (not as a final answer) Interior (180 – exterior) 150(°) ***If final answer 360/12 or 30, then allow M1, m0, A0*** *OR* *Sum interior((2 ×12–4) rt angles)* ***20 ×90****(°) (= 1800(°)) M1* *Each interior angle (1800)* ***÷12*** *m1* ***150(°)*** *A1* No FT from working with exterior angle in (a), FT from M1, m1 in (a) only
3(a)(i) -13g + 4h (ii) $15p^{11}$ (iii) $2y^4$ (b) 3×x + 4 ×2x or equivalent 11x	B2 B1 B1 B1 B1 6	Must be written as an expression. B1 for either term correct Mark final answer ISW ISW (ii) &(iii) penalise change of variable once only -1 Mark final answer. FT for equivalent level of difficulty, provided either pencils or pens is correct
4(a) 3.8 (cm) or states 'the same' Reason, e.g. 'they even out', 'the mean of these is zero', 'totals are the same each week', 'taking away 3 and adding 3 so it stays the same', 'same amount of rainfall in both weeks' (b)(i) Mid-points 1, 2, 3, 4 1×5 + 2×11 + 3×13 + 4×1 Intention their ∑fx / 30 2.3(33…cm) (ii) Modal class 2.5 ≤ r < 3.5 (iii) Median 1.5 ≤ r < 2.5	B1 E1 B1 M1 m1 A1 B1 B1 8	Mark final answer. Award independently from E mark Accept a correct method as a reason, e.g. (3.8×7 + 3 – 3)÷7 or equivalent Allow '3.8+3 = 6.8, and 6.8-3 = 3.8', or '4.8×3+2.8×3 + 3.8 = 26.6 with 26.6÷7=3.8 i.e. showing by calculation that +3 and -3 means no change. Allow indication of + 1 -1 bringing 3.8 or 7×3.8 back to original FT their mid points, including bounds, provided they fall within the classes. 5 + 22 + 39 + 4 (= 70) (70/30) Following correct working, however accept unsupported 2.3(3..cm) for all 4 marks. Accept 7/3 or 2⅓ as a final answer Accept '2.5 to 3.5' Accept '1.5 to 2.5' *If neither B1 awarded in (ii) or (iii), then award SC1 for answers of 3 and 2 respectively.*

PAPER 2 Higher Tier	Marks	FINAL MARK SCHEME Comments
5(a)(i) 200 × 1.09137 OR 200 ÷ 0.916279 218(.274) (ii) 250× 1.4789 OR 250 ÷ 0.676175 369(.72...) (b) 1 ÷ 0.090147 or 1 ÷ 133.5 11.09…… 0.00749……	M1 A1 M1 A1 M1 A1 A1 7	Accept 200×1.09(..) Accept rounded or truncated Accept rounded or truncated, also accept 370 Sight of either calculation Either answer correctly placed in the table also implies M1 Accept 0.0075. Only allow 0.01 if correct working seen If answers reversed in the table award M1, A0, A1 If 2 correct answers seen in working award M1, A1, A0 If 1 correct answer seen in working award M1, A0, A0 If only 1 answer given misplaced in table award M1, A0, A0
6(a) x/3 = 53 - 42 OR x/3 = 11 OR x + 126 = 159 x = 33 (b) 40 – x = 11×4 -x = 44 – 40 OR –x= 4 OR 40 – 44 = x x = -4	M1 A1 B1 B1 B1 5	 Award both marks for an embedded answer FT until 2nd error in (b) Award all marks for an embedded answer. Do not accept –x = 4 for this final B1 *Award B1, B0, B1 for 40-x=44, leading to x=44-40 and x=4*
7. One correct evaluation, 1.2 ≤ *x* ≤ 1.3 2 correct evaluations, 1.235 ≤*x* ≤1.25, one either side of 4.5 2 correct evaluations, 1.235 ≤ *x* ≤1.245, one either side of 4.5 OR correct evaluation of 1.245 if previous B1 awarded 1.24 *No calculations shown: accept "too high",">", etc.*	B1 B1 M1 A1 4	x $3x^3 - x$ 1.2 3.984 1.21 4.104683 1.22 4.227544 1.23 4.352601 1.24 4.479872 1.241 4.49272156 1.242 4.50559346 1.243 4.51848772 1.244 4.53140435 1.245 4.54434338 1.246 4.55730481 1.247 4.57028867 1.248 4.58329498 1.249 4.59632375 1.25 4.609375 1.26 4.741128 1.27 4.875149 1.28 5.011456 1.29 5.150067 1.3 5.291 1.235 gives 4.41595

PAPER 2 Higher Tier	Marks	FINAL MARK SCHEME Comments
8(a) $6 \times \ldots = 54$ or $54 \div 6 = \ldots$ (Area each face on small cube =) 9(cm^2) 18 (small faces on cuboid) (18×9 =) 162(cm^2) Look for • spelling • clarity of text explanations, • the use of notation (watch for the use of '=', cm^2) 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 B1 B1 QWC 2	ISW. Watch for an embedded answer. FT 'their 54÷6' × 'their 18' evaluated correctly from a consistent misconception of the number of faces. *Alternative:* *Single cube has 6 faces* *Cuboid has 18 faces* *Total surface area* 3×54 $= 162\ (cm^2)$ *OR* *6 hidden faces* *Equivalent to 3 cubes at 6 faces each* *Total surface area* 3×54 $= 162\ (cm^2)$ *OR* *Area 4 cubes* $4 \times 54 = 216$ *6 hidden faces* *Area of cuboid* $216 - 54$ $= 162\ (cm^2)$ 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 or grammar.
(b) (Length side of small cube =) $\sqrt{9}$ (= 3) Volume = $(4 \times) 3 \times 3 \times 3$ 108 (cm^3)	M1 m1 A1 9	FT 'their 9' provided M1 awarded in (a) Method to calculate volume of 1 or 4 cubes. FT 'their 3' provided M1 awarded
9(a) 1.26×120 OR $0.26 \times 120 + 120$ (£)151.2(0) (b) $43.55/0.65$ OR $(43.55/65) \times 100$ 67 (m)	M2 A1 M1 A1 5	M1 for 0.26×120 (=31.2(0)) Mark final answer ISW (e.g. attempt to change units)
10.Any 2 of the lines x+y=4, y=2x + 4 and y= 1 correct Correct region shaded	B2 B1 3	B1 for any 1 correct line CAO

PAPER 2 Higher Tier	Marks	FINAL MARK SCHEME Comments
11(a) Intention to subtract reading from horizontal scale for cumulative values 90 & 30 32 or 33 (b) 45 / 120 (×100) 37.5(%) rounded or truncated (c) 75 seconds means ≈ 100 × 97/120 (80.833..%), OR 90% calls means (0.9 × 120 =) 108 calls (≈80 seconds) AND interpretation 'No' (target not met stated or implied)	M1 A1 M1 A1 M1 A1 6	(72 – 40 or 73 – 40) Accept values between 44 to 46 inclusive leading to 36.66.. to 38.33..(%) rounded or truncated (OR 100×96/120 = 80%). 75 seconds gives 96 to 98 inclusive so accept 80 % to 81.666…%
12. Appropriate sight or use of 42º or 48º sin42 = distance/3.2 OR cos48 = distance/3.2 Distance = 3.2 × sin42 OR Distance = 3.2 × cos48 2.1(4… km)	B1 M1 A1 A1 4	 Ignore further working to add 3.2 (to give an answer 5.3(4..km)) *(Note: sin42 =sin138 = 0.669… hence watch for a correct answer from incorrect working, M0, A0, A0, possible B1 for sight of appropriate 42° or 48°)*
13(a) Method to eliminate variable, e.g. equal coefficients First variable Substitute to find second variable Second variable (b) $x = \{ -3 \pm\sqrt{(3^2 - 4 \times 5 \times -7)}\} / (2 \times 5)$ $= \{ -3 \pm\sqrt{149} \} / 10$ $x = 0.92$ and $x = -1.52$ (Answer to 2dp)	M1 A1 M1 A1 M1 A1 A1 7	Allow 1 error in one term, not one with equal coefficients x = -3 or y = 5 FT their first variable Allow one error in sign or substitution, not in the formula CAO CAO
14. Length scale factor $\times_3\sqrt{0.5}$ or $\div_3\sqrt{2}$ New dimensions $55 \times_3\sqrt{0.5}$, $40 \times_3\sqrt{0.5}$, $20 \times_3\sqrt{0.5}$ or $55 \div_3\sqrt{2}$, $40 \div_3\sqrt{2}$, $20 \div_3\sqrt{2}$ 43.7 or 44, 31.7 or 32, 15.9 or 16	B1 M1 A2 4	 FT their scale factor including need for root, must be equivalent level of difficulty for M1 only A1 if correct but to >1dp or incorrectly rounded (truncated): 43.6535…, 31.748…, 15.874… *Alternative method* B1 20 : 40 : 55 is 1 : 2 : 2.75 M1 So x : 2x : 2.75x giving $x \times 2x \times 2.75x = 5.5x^3$ M1 $x^3 = 22000 \div 5.5$ (=4000) or $x = \sqrt[3]{4000} = 15.9$ A1 15.9, 31.7, 43.7
15(a) 0.4 indicated for no apple Idea 0.6 ×… = 0.18 P(buys a bottle of water) = 0.3 Second branches 0.3 0.7 0.3 0.7 (b) 0.4 × 0.7 = 0.28	B1 M1 A1 B1 M1 A1 6	In working or on tree Accept evidence such as '18÷6', i.e. with incorrect place value In working or on tree FT 'their 0.4' and 'their 0.7' provided values >0 and <1 *(Note: 0.4×0.82 = 0.328, 0.4×0.18= 0.72)*
16(a) 180 – 125 a = 55° b = 110° (b) c = 85° Alternate segment theorem	M1 A1 B1 B1 E1 5	Or statement that opposite angle cyclic quad 180° FT 2 × 'their a' correctly evaluated Depends on B1 awarded. Accept a description

PAPER 2 Higher Tier	Marks	FINAL MARK SCHEME Comments
17. Strategy, information transferred to the diagram with D marked on BC, AND deciding need to find AB using sine rule then need to find AD using cosine rule AB/sin60° = 10.6/sin35° AB = sin60° × 10.6/sin35° *(Rearranged form implies M1)* AB = 16(.0046… cm) *(FT their AB within cosine rule, not use of 10.6)* $AD^2 = 14.2^2 + AB^2 – 2 \times 14.2 \times AB \times \cos35°$ $AD^2 = 85.4(576…)$ AD = 9.2(443…cm) rounded or truncated from correct working	 S1 M1 A1 A1 M1 A1 A1 7	*Alternative example:* *Strategy, information transferred to the diagram with D marked on BC, AND deciding need to find BC using sine rule, then DC=BC-BD, then need to find AD using cosine rule* *BC/sin85° = 10.6/sin35°* *BC = sin85° × 10.6/sin35° (Rearranged form implies M1)* *BC = 18.4(102…cm) AND DC(BDC – 14.2)= 4.2(102…cm)* *(FT their DC within cosine rule, not use of 14.2)* $AD^2 = 10.6^2 + DC^2 – 2 \times 10.6 \times DC \times \cos60°$ $AD^2 = 85.4(576…)$ *AD = 9.2(443…cm) rounded or truncated from correct working*
18. $\Pi \times 4.6^2 \times 93/360$ Answers between 17.16 and 17.18 or 17.2 (cm^2) Appropriate use of ½ abSinC **OR** cos46.5 = h/4.6 with sin46.5 = b/4.6 ½ × 4.6 × 4.6 × sin 93 **OR** h = 3.16643.. and b = 3.3367.. (Triangle area) 10.5655…(cm^2) Approximately 6.6 (cm^2)	**M1** A1 **M1** M1 A1 B1 6	 Method to find base & height of right angled triangle Needs to be height and ½ base or base evaluated Do not accept 10.5 (cm^2) Depends on at least M1 from attempt to find each area, then FT their difference in areas

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