



GCSE MARKING SCHEME

MATHEMATICS - WALES PILOT

NOVEMBER 2011

INTRODUCTION

The marking schemes which follow were those used by WJEC for the November 2011 examination in GCSE MATHEMATICS - WALES PILOT. 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.

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PAPER 1 - FOUNDATION TIER

2011 Autumn Paper 1 (Non calculator) Wales Pilot Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME (14/11/2011) Comments (Page 1)
1. (a) (i) (£) 46705 (ii) nine thousand four hundred and seventeen (pounds) (b) 46 64 406 460 604 640 (c) (i) 102 (ii) 28	B1 B1 B1 B1 B1 5	C.A.O. C.A.O. C.A.O. C.A.O. C.A.O. Allow embedded answers e.g. $28 + 85 = 113$
2. (a) Lines Curve (b) Drawing of a rectangle or rhombus Rectangle OR Rhombus (c) Drawing of an isosceles triangle Isosceles	B1 B1 B1 B1 B1 B1 6	C.A.O. C.A.O.
3. (a) (i) 2578 (ii) 8725 (b) (i) 4740 (ii) 4700 (c) $40/5 = 8$	B1 B1 B1 B1 M1 A1 6	C.A.O. C.A.O. C.A.O. C.A.O. OR other correct method MR-1 for misread of two £20 as one £20.
4. 1 litre 60kg 340km 600cm ²	B1 B1 B1 B1 4	C.A.O. C.A.O. C.A.O. C.A.O.
5. (a) 1/50 (b) Harry is correct Because there are 2 tickets with 16 on them, but only 1 ticket with 26 on it.	B1 E2 3	C.A.O. E1 for a good attempt, but does not give full details.
6. (a) 48 (b) 6 (c) $(12 \text{ lots of } 12) + 6 + 3 = 153$ (d) Pupil numbers going down because $Y7 < Y8$ etc	B1 B1 M1 A1 E1 5	C.A.O. C.A.O. For adding 12 wholes and 2 fractions of squares F.T. 'their 6 and 3'. Allow ± 2 pupils Unsupported 151 – 155 inclusive gets M1, A1.
7. (a) (i) 27 (ii) 57 (b) 43 (c) 7h (d) $5 \times 6 + 3 \times 4 = 42$ (e) (10, 40) (a, 4a)	B1 B1 B2 B1 B1 B1 B1 B1 9	C.A.O. C.A.O. B1 for the 48 OR F.T 'their 48' – 5 C.A.O. Must be correctly substituted, $30 + 12$ C.A.O. C.A.O.

2011 Autumn Paper 1 (Non calculator) Wales Pilot Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (14/11/2011) (Page 2)	
8. (a) 21 cm^3 (b) (i) $64^\circ \pm 2^\circ$ (ii) $136 \pm 2^\circ$ (iii) obtuse	B1 U1 B1 B1 B1 5	C.A.O. Must be drawn at Q. C.A.O.	
9. (a) For example, $\begin{array}{r} 7 \\ 32 \overline{)237} \\ \underline{224} \\ 13 \end{array}$ 7 crates and 13 jugs left over (b) (i) $1/8 \text{ of } 56 = 7$ AND $7 \times 3 = 21$ (ii) $1\% \text{ of } 500 = 5$ AND $5 \times 7 = 35$	M1 A1 A1 M1 A1 M1 A1 7	Any complete valid algorithm to find $237 \div 32$ Any valid method. Allow M1 for $3/8 \times 56$ C.A.O. Any valid method. Allow M1 for $7/100 \times 500$ C.A.O.	
10. (a) 30 (miles) (b) 72 (minutes) (c) Before because the line is steeper (d) 1548	B1 B1 B1 B1 4	C.A.O. C.A.O. C.A.O. C.A.O.	
11. (a) $17:23 - 15:29 = 1 \text{ (hour) } 54 \text{ (minutes)}$ (b) Arrives Coventry 16:22 Ready to leave Coventry at $16:22 + 1:20 = 17:42$ Arrives Durham 21:39	M1 A1 B1 M1 A1 B1 6	Accept 1:54, 1:54 Pupils who add 1h 20m to 14:55 get B0 then mark as normal. $14:55 + 1:20 = 16:15$ gets B0 Then 17:11, 18:22, 18:49, 22:30 can get M1, A1, B1.	
12. (a) 2 (is a prime and is even) (b) Explanations that imply multiplying by 4 (c) $3/5$ is $60\% < 65\%$	E1 E1 E1 3	Both properties of 2 not required Along these lines Along these lines	
13. (a) Completed disc numbers 2, 3 and 3, 5 $\begin{array}{c cc} (7) & 10 & 11 & 12 \\ (5) & 8 & (9) & 10 \\ & 3 & 6 & 7 & 8 \\ & 2 & 5 & 6 & 7 \\ \hline & 3 & (4) & 5 \end{array}$ (b) $\frac{7}{12}$ (c) $7/12 \times 240 = 140$	B1 B2 B2 M1 A1 7	B1 any 2 correct rows or columns B1 for $7/x$ ($x > 7$) OR $y/12$ ($y < 12$) F.T. 'their (b) $\times 240$ ' ($\neq \frac{1}{2}$). A0 here if there is incorrect reduction. M1, A0 for 140/240	<u>NOTES</u> Penalise -1 for use of words such as "7 out of 12", "7 in 12" OR "7:12". When fraction and wrong notation seen, DO NOT penalise wrong notation.

2011 Autumn Paper 1 (Non calculator) Wales Pilot Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (14/11/2011) (Page 3)
14. (a) 62·64 (b) 62·64 (c) 11·6	B1 B1 B1 3	C.A.O. C.A.O. C.A.O.
15.(a) All points plotted correctly (b) Positive (c) Line of best fit with points above and below (d) Their estimate between 3500 and 4500 H1	B2 B1 B1 B1 5	B1 for at least 3 correct plots, or B1 if plots reversed Ignore line of best fit, <i>Penalise joined point to point -1</i> Do not accept descriptions. OR FT for their incorrect line of best fit
16.(a) Correct enlargement Correct position (b) Correct reflection (c) Correct rotation H4	B2 B1 B2 B2 7	B1 for 2 points correct, or B1 for consistent but incorrect scale factor used. FT their consistent scale factor. Incorrect scale factor –1. B1 reflection in any vertical line OR sight of x=1 OR reflection in y=1 B1 for 90° clockwise rotation about (1,2), OR, 90° anticlockwise rotation about (2,1)
17. -5 and 13 H5	B3 3	B2 for -13 and 5 B1 for 5 and 13 OR -5 and -13
18. (a)(i) Both folds correct (ii) Both folds correct (b) Horizontal line through the centre of the rectangle Arc radius 6cm centre at C Correct region indicated H6	B2 B2 B1 B1 B1 7	B1 for showing first fold correctly B1 for showing first fold correctly Tolerance ± 2 mm Tolerance ± 2 mm FT similar area
19. (a) $3(x - 2)$ (b) $6n - 1$ (c) $5t = r + 7$ OR $r + 7 = 5t$ $t = \frac{r+7}{5}$	B1 B2 B1 B1 5	C.A.O. B1 for 6n Isolating the term in t F.T. equivalent difficulty $(ax+b)/c$

PAPER 2 - FOUNDATION TIER

2011 Autumn Paper 2 Wales Pilot Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (23/11/2011) (Page 1)
1. (a) (i) (85.60) 16.8(0) 26.28 10.32 139.(00) (ii) 10% = (£)13.9(0) 5% = (£) 6.95 (b) (£)6.75 × 5 = (£) 33.75 Change = (£) 16.25 (c) (i) 40(%) (ii) 60 (%)	B1 B1 B1 B1 M1 A1 M1 A1 B1 B1 B1 11	C.A.O. C.A.O. F.T. their figures for one error Any valid method. F.T. from (a) Accept (£) 132.05 as evidence of a correct 5% F.T. 50 – ‘their 33.75’ F.T. 1 – ‘their 40%’
2. 920 (g) 280 (g) 640 (g)	B1 B1 B1 3	C.A.O. C.A.O. F.T the difference of their readings provided at least B1 awarded.
3. Evidence of square counting 53 – 61 inclusive 265 – 305 (cm ²)	M1 A1 B1 3	e.g. dots in the squares F.T. their area × 5
4. (a) diameter tangent (b) pentagon cylinder (triangular) prism (c) (i) (PQ =) 11.5 - 11.9 (cm) (ii) Perpendicular	B1 B1 B1 B1 B1 B1 B1 7	C.A.O. C.A.O. C.A.O. C.A.O. C.A.O. Allow 11.7 ± 2 mm Judgement by eye
5. (a) Value = 5×9 + 6 = 51 (b) Position = (121 – 6)/5 = 23	M1 A1 M1 A1 4	For correct substitution C.A.O. For correct substitution and division Allow embedded references to the correct answer, such as 121= 5×23 + 6 .
6. Man 5 to 7 ft OR 1.5 to 2.5 metres Man 1.5 cm Bus = 13.5 cm Multiplying factor = 9 Estimate length of bus = man estimate × factor F.T. their man estimate × their SF (6 – 12 inc.) = correct answer for their figures <u>SC1 for answers which:</u> (a) only give man’s height as 1.5cm and bus length as 13.5cm ± 2mm OR (b) a proper attempt at ‘dividing’ the bus length into equal parts the size of the man’s height	B1 B1 M1 A1 4	<p style="text-align: center;"><u>Unsupported answers marked as</u></p> <p>F.T. their man’s height estimate AND scale factors 6–12 inc. Correct units must be seen at least once to get the final A1</p>

2011 Autumn Paper 2 Wales Pilot Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (23/11/2011) (Page 2)
7. A (-3, 5) B (5, -2) C (-4, -5)	B1 B1 B1 3	Unambiguous plotted points or letters only are enough. Reversed coordinates get 0 every time.
8. Correct use of the £37 for the first day's hire. $92.5/18.5 = 5$ Hired for 6 days	B1 M1 A1 B1 4	(£)92.5(0) left after day 1 (129.50 – 37) For a correct method for finding the extra days F.T. if rounded up to a whole number F.T. 'their 5' + 1 rounded up to a whole number
9. (a) (i) $t + 6$ (ii) $10w$ (iii) $x - 5$ (b) $V = 20 + 10 \times 9 = 110$	B1 B1 B1 B1 B1 5	C.A.O. Ignore cm Accept $10 \times w$, $w10$. Ignore kg Correct substitution C.A.O.
10. (a) $1300 \times 1.55 = (\$)$ 2015 (b) $363/1.65 = (£)$ 220	M1 A1 M1 A1 4	C.A.O. C.A.O.
11. (a) 21 23 24 $\frac{27+33}{2}$ 34 41 45 $= 30$ (b) 24 (c) (i) Sum of the numbers (248) Sum/8 $= 31$ (ii) $248 - 7 \times 29 = 45$	M1 A1 B1 M1 m1 A1 M1 A1 8	For a list (of 7 or 8 correct numbers) in ascending or descending order OR for averaging the middle 2 numbers C.A.O. C.A.O. For attempt to add the numbers For dividing a number in the range 200 – 300 inc by 8. C.A.O. F.T. 'their 248'
12. (a) $10x - 4$ (b) (i) 6 (ii) Correct line	B2 B1 B2 5	B1 for $10x$ OR -4 in an expression of the form $ax \pm b$ ($a \neq 0$) $10x + -4$ gets B1 only B1 for any 2 correct plots (within the 2mm square) (F.T. their (b)(i)) Must be the correct line for B2.
13. Strategy e.g. trying 6 ones and realising other number is 11 which is not single digit. Equal numbers are 2 Other number = 5	S1 B1 B1 3	C.A.O. C.A.O.
14. Length = $18/2 = 9$ Breadth = $18/3 = 6$ Area of rectangle = $9 \times 6 = 54$ OR 18×15 Area of shape $54 \times 5 = 270 \text{ cm}^2$	M1 A1 B1 B1 B1 U1 6	For either length or breadth method C.A.O. C.A.O. F.T. their length and breadth if M1 awarded F.T. their length and breadth if M1 awarded

2011 Autumn Paper 2 Wales Pilot Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (23/11/2011) (Page 3)																								
15. (a) $6x - 7 = 8$ OR $24x - 28 = 32$ $6x = 15$ $24x = 60$ $x = 15/6$ ISW $x = 60/24$ ISW ($=2\frac{1}{2}$) (b) $4x < 12$ $x < 12/4$ ISW ($= 3$) (c) m^7	B1 B1 B1 B1 B1 B1 6	F.T. until 2 nd error C.A.O.																								
16.(a) (i) 30/200 ISW or 0.15 or 15% (ii) 50 + 78 128/200 or equivalent fraction, or 0.64 or 64% (c) 77 to 95 (d) Suitable uniform scales (with axes labelled) Correct frequency polygon H2	B1 M1 A1 B1 B1 B2 7	Need not be a fraction. (Accept 58/200 + 78/200 as M1) ISW. Do not penalise poor notation a 2 nd time Do not accept 78 Accept mid-points uniformly spaced, irrespective of (0,0) <i>FT their scales if possible</i> B1 for frequency polygon with one error in plotting, or for a translated polygon, or correct points plotted but not joined with straight lines. <i>Ignore frequency diagram if polygon seen.</i>																								
17.(a) <table border="1"> <thead> <tr> <th>B Line</th><th></th><th>Domestic</th></tr> </thead> <tbody> <tr> <td>11.51×2400</td><td></td><td>11.32×2400</td></tr> <tr> <td>(£)276.24</td><td></td><td>(£)271.68</td></tr> <tr> <td>$15.07 \times (365 \pm 1)$</td><td></td><td>$15.82 \times (365 \pm 1)$</td></tr> <tr> <td>(£)55.00/01</td><td></td><td>(£)57.74(3)</td></tr> <tr> <td></td><td></td><td></td></tr> <tr> <td>$276.24 + 55.0(1)$</td><td></td><td>$271.68 + 57.74$</td></tr> <tr> <td>(£)331.24/5</td><td></td><td>(£)329.42</td></tr> </tbody> </table> Choice with reason, e.g. Domestic because cheaper, or Either as not much difference (b) Realising that VAT is not going to alter which is more expensive, both still similar H3	B Line		Domestic	11.51×2400		11.32×2400	(£)276.24		(£)271.68	$15.07 \times (365 \pm 1)$		$15.82 \times (365 \pm 1)$	(£)55.00/01		(£)57.74(3)				$276.24 + 55.0(1)$		$271.68 + 57.74$	(£)331.24/5		(£)329.42	M1 A1 M1 A1 M1 A1 E1 E1 8	M1 for idea $\times 2400$ ignoring place value OR in pence. If units are given they must be correct Allow as a method for their number of days [364] (£)54.85 (£)57.58 [366] (£)55.15/16 (£)57.90 If units are given they must be correct [364] (£)331.09 (£)334.26 [366] (£)331.39/40 (£)334.58 Must be consistent place value. FT provided M2 awarded Or equivalent, but place value must be correct
B Line		Domestic																								
11.51×2400		11.32×2400																								
(£)276.24		(£)271.68																								
$15.07 \times (365 \pm 1)$		$15.82 \times (365 \pm 1)$																								
(£)55.00/01		(£)57.74(3)																								
$276.24 + 55.0(1)$		$271.68 + 57.74$																								
(£)331.24/5		(£)329.42																								
18. Any correct 12% of a value used in workings $600 - 12\% \text{ of } 600 (= 600 - 72)$ $528 - 12\% \text{ of } 528 (= 528 - 63.36)$ (£) 464.64 H1c	B1 M1 M1 A1 4	OR M2 for 600×0.88^2 (M1 for 600×0.88) FT their 72 CAO. Penalise extra working –1 <i>Appreciate: Possible B1 and SC1 for (£)752.64</i> <i>Simple depreciate: Possible B1 and M1</i>																								
19. Area photo = $\pi \times 4^2$ $= 50(.265... \text{ cm}^2)$ Area frame = $8 \times 8 (= 64 \text{ cm}^2)$ Strategy, area frame – area photo $13.7(... \text{ cm}^2)$ or $14 (\text{ cm}^2)$ H6	M1 A1 B1 M1 A1 5	Allow 50.24 – 50.27 For the idea, FT their areas for M1 only CAO , allow 13.73 – 13.76																								

PAPER 1 - HIGHER TIER

GCSE Higher Tier Wales November 2011. Paper 1	Mark	Comments	FINAL 18/11/11
1.(a) All points plotted correctly (e) Positive (f) Line of best fit with points above and below (g) Their estimate between 3500 and 4500	B2 B1 B1 B1 5	B1 for at least 3 correct plots, or B1 if plots reversed Ignore line of best fit, <i>Penalise joined point to point -1</i> Do not accept descriptions. OR FT for their incorrect line of best fit	
2.(a) 360/6 or equivalent full method 60 ⁽⁰⁾ (b) p = 128° q = 52°	M1 A1 B1 B1 4	SC1 if reversed	
3.(a) $\frac{1}{2} \times 12 \times 5$ = 30 cm ² (b) 10 × 4 = 40 (cm ²)	M1 A1 U1 M1 A1 5	Attempt $\frac{1}{2}$ base x height seen, e.g. 6 × 5	
4.(a) Correct enlargement Correct position (b) Correct reflection (c) Correct rotation	B2 B1 B2 B2 7	B1 for 2 points correct, or B1 for consistent but incorrect scale factor used. (<i>Incorrect scale loses 1 mark only throughout</i>) FT their consistent scale factor. B1 reflection in any vertical line OR sight of x=1 OR reflection in y=1 B1 for 90° clockwise rotation about (1,2), OR, 90° anticlockwise rotation about (2,1)	
5. -5 and 13	B3 3	B2 for -13 and 5 B1 for 5 and 13 OR -5 and -13	
6.(a)(i) Both folds correct (ii) Both folds correct (b) Horizontal line through the centre of the rectangle Arc radius 6cm centre at C Correct region indicated	B2 B2 B1 B1 B1 7	B1 for showing first fold correctly B1 for showing first fold correctly. SC1 if done in 3 folds Tolerance ± 2 mm Tolerance ± 2 mm FT similar area	
7.(a) 600000/600000 × 100 or equivalent 100 (%) (b) 40/100 × 120 (£)48	M1 A1 M1 A1 4	Method which could lead to a correct answer CAO. A final answer of 168 is M1, A0	
8.(a) 3 values which could lead to simple calculations Correct evaluation for their figures (b) 340 (c) 5/16 (d)(i) Method of finding primes 2,2,2,3,3,5 $2^3 \times 3^2 \times 5$ (ii) 10 or 2 × 5 (e) 1/0.9 or 1/ (9/10) 10/9	M1 A1 B1 B1 M1 A1 B1 B1 M1 A1 10	Not all 3 need to be different to those given (<i>Common responses include 12 here</i>) Or 0.3125 or equivalent, not fraction/fraction At least two correct primes before 2 nd error FT “their” primes, needs to have at least 1 index >1 FT for equivalent level of difficulty ISW. Accept 1.1	
9.(a) y= (any value)x (b) Strategy, e.g. a sketch with some values marked Realising c = 4 Method to find gradient, e.g. sight of 4/2 or diff.y/diff.x y = 2x + 4	B1 M1 M1 M1 A1 5	Accept y=mx, x= 0, y = 0x + 0, y = 0 Accept alternate methods	
10. 4.6 × 10 ⁴ , 8.1 × 10 ⁴ , 9(.0) × 10 ⁴ , 9(.0) × 10 ⁴ , 1.5 × 10 ⁵ All lengths 1000 (feet) Valid comment on length and weight, <u>accuracy</u>	B3 B1 E2 6	B2 for any 4, B1 for any 2 or 3 correct Accept 1 × 10 ³ E1 comment on length or weight, or looks at rounded comparisons length & weight (Yes)	
11. (a) 1/6 × 1/6 = 1/36 (b) (i) 2/6 or 4/6 correctly placed (Red) 1/6 or 5/6 correctly placed (Black) 2/6, 4/6; 1/6, 5/6; 1/6, 5/6 all correct (ii) 2/6 × 1/6 = 2/36 (or 1/18)	M1 A1 B1 B1 B1 M1 A1 7	Ignore incorrect cancelling throughout (a). FT their probabilities, not $\frac{1}{2}$ and <1	

GCSE Higher Tier Wales November 2011. Paper 1	Mark	Comments	FINAL 18/11/11
12.(a) A, C, D and B All 4 reasons correct (b) Three lines $3x+y=12$, $x=1$ and $y=2$ Correct region	B3 E3 B2 B1 9	B2 for any two correct, B1 for any one correct E2 for any two correct, E1 for any one correct B1 for any two correct CAO	
13.(a) 31 to 35 (b) (8), 34, 44, 58, 60 (c) Correct cumulative frequency diagram, points plotted and joined with a curve or straight lines (d) (i) Approximately 25 (ii) Intention to subtract horiz. readings for vert. 45 & 15 Interquartile range from their diagram	B1 B1 B2 B1 M1 A1 7	FT from cumulative (c). B1 points plotted but not joined, correct diagram with 1 point incorrectly plotted, or correct apart from being a 0.5 horizontal translation. FT their cumulative frequency diagram in (d) (Approximately $31 - 22 = 9$)	
14.(a) $y = k/x^2$ OR $y \propto 1/x^2$ $2 = k / 5^2$ OR $k = 50$ $y = 50/x^2$ seen or implied in further work (b)(i) $50/4$ (= 12.5) (ii) $x^2 = 50/0.5$ OR $x^2 = 100$ $x = (\pm) 10$	B1 M1 A1 B1 M1 A1 6	FT non linear only throughout this question CAO, not FT	
15.(a)(i) $27x^{15}y^6$ (ii) $3y^{-2}$ OR $3/y^2$ (b) $(2x + 9)(2x - 9)$ $x = -9/2$ and $x = 9/2$	B2 B2 B2 B1 7	B1 for any two of the three parts B1 for one stage of correct algebra manipulation with y terms <i>Penalise -1 only if B2 but 'x' remains in the expression</i> B1 for $(2x \dots 9)(2x \dots 9)$ CAO	
16.(a) 142° Cyclic quadrilateral (b) 76° Angle at the centre is twice angle at circumference (c) 49° (Angle semi circle and) alternate segment theorem	B1 E1 B1 E1 B1 E1 6	Depends on B1 Depends on B1. OR Isosceles triangle and straight line Depends on B1. OR equivalent	
17.(a) Strategy, finding area $1 \times 20 + 2.2 \times 10 + 2.4 \times 10 + 1.7 \times 20$ 100 (b) 30 (metres)	M1 M1 A1 B1 4	Any single area is sufficient	
18. Attempt to multiply by $(x+2)(2x+3)$ OR as common denominator $2(x+2) + 1(2x+3) = 3(2x+3)(x+2)$ $2x + 4 + 2x + 3$ $= 3(2x^2 + 7x + 6)$ $6x^2 + 17x + 11 = 0$ $(6x + 11)(x + 1) (=0)$ or simplified from substitution into quadratic formula $x = -1$ and $x = -11/6$	M1 A1 M1 M1 A1 M2 A1 8	Common denominator needs brackets unless they are implied in future working FT equivalent level of difficulty. Does not depend on previous Must equate to zero (maybe implied later) FT equivalent level of difficulty M1 for reasonable attempt to factorise, e.g. $6x$, x , 1 , 11 found but misplaced, or correct substitution into quadratic formula	

PAPER 2 - HIGHER TIER

GCSE Higher Tier Wales November 2011. Paper 2	Mark	Comments Final 28/11/11																								
<p>1.(a) $24 \times 60 \times 60$ $= 86400$</p> <p>(b) $(350 \times 1.78 =) 623$ (Australian dollars) $(623 - 320 =) 303$ (Australian dollars) $(303/1.82 =) (\pounds)166.48(35..)$</p> <p>(c) Any correct 12% of a value used in workings $600 - 12\% \text{ of } 600 (= 600 - 72)$ $528 - 12\% \text{ of } 528 (= 528 - 63.36)$ $(\pounds) 464.64$</p>	<p>M1 A1 B1 B1 B1 M1 M1 A1 9</p>	<p>In (b) FT until 2nd error</p> <p>OR M2 for 600×0.88^2 (M1 for 600×0.88) FT their 72 CAO. Penalise extra working -1 <i>Appreciate: Possible B1 and SC1 for $(\pounds)752.64$</i> <i>Simple depreciate: Possible B1 and M1(456)</i></p>																								
<p>2.(a) (i) $30/200$ or 0.15 or 15% (ii) $50 + 78$ $128/200$ or equivalent fraction, or 0.64 or 64%</p> <p>(b) Mid points 29, 48, 67, 86 $\frac{29 \times 30 + 48 \times 42 + 67 \times 50 + 86 \times 78}{200}$ (OR 12944) 64.72</p> <p>(c) 77 to 95</p> <p>(d) Suitable uniform scales with axes labelled Correct frequency polygon</p>	<p>B1 M1 A1 B1 M1 m1 A1 B1 B1 B2 11</p>	<p>ISW Need not be a fraction. (Accept $58/200 + 78/200$ as M1) ISW. Do not penalise poor notation a 2nd time Two shown is sufficient if no error Attempt $\sum fx$ for their mid-points, must be within intervals Attempt their $\sum fx$ divided by 200. CAO. Accept rounded to 65 from working Do not accept 78 Accept mid-points uniformly spaced, irrespective of (0,0) <i>FT their scales if possible. FT from (b)</i> B1 for frequency polygon with one error in plotting, or for a translated polygon, or correct points plotted but not joined with straight lines. <i>Ignore frequency diagram if polygon seen.</i></p>																								
<p>3.(a)</p> <table border="1"> <thead> <tr> <th>B Line</th><th></th><th>Domestic</th></tr> </thead> <tbody> <tr> <td>11.51×2400</td><td></td><td>11.32×2400</td></tr> <tr> <td>$(\pounds)276.24$</td><td></td><td>$(\pounds)271.68$</td></tr> <tr> <td>$15.07 \times (365 \pm 1)$</td><td></td><td>$15.82 \times (365 \pm 1)$</td></tr> <tr> <td>$(\pounds)55.00/01$</td><td></td><td>$(\pounds)57.74(3)$</td></tr> <tr> <td></td><td></td><td></td></tr> <tr> <td>$276.24 + 55.0(1)$</td><td></td><td>$271.68 + 57.74$</td></tr> <tr> <td>$(\pounds)331.24/5$</td><td></td><td>$(\pounds)329.42$</td></tr> </tbody> </table> <p>Choice with reason, e.g. Domestic because cheaper, or Either as not much difference</p> <p>(b) Realising that VAT is not going to alter which is more expensive, both still similar.</p>	B Line		Domestic	11.51×2400		11.32×2400	$(\pounds)276.24$		$(\pounds)271.68$	$15.07 \times (365 \pm 1)$		$15.82 \times (365 \pm 1)$	$(\pounds)55.00/01$		$(\pounds)57.74(3)$				$276.24 + 55.0(1)$		$271.68 + 57.74$	$(\pounds)331.24/5$		$(\pounds)329.42$	<p>M1 A1 M1 A1 M1 A1 E1 E1 8</p>	<p>M1 for idea $\times 2400$ ignoring place value OR in pence. If units are given they must be correct</p> <p>Allow as a method for their number of days [364] $(\pounds)54.85$ $(\pounds)57.58$ [366] $(\pounds)55.15/16$ $(\pounds)57.90$ If units are given they must be correct</p> <p>[364] $(\pounds)331.09$ $(\pounds)334.26$ [366] $(\pounds)331.39/40$ $(\pounds)334.58$ Must be consistent place value. FT provided M2 awarded Or equivalent, but place value must be correct</p>
B Line		Domestic																								
11.51×2400		11.32×2400																								
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<p>4.(a) $6n - 2$ (b) $20^2 + 7$ OR $20 \times 20 + 7$ $= 407$</p> <p>(c) $9x + 36 - 4x + 20$ $= 5x + 56$</p> <p>(d) $35 - x = 7 \times 6$ $-x = 42 - 35$ OR $35 - 42 = x$ $x = -7$ or $-7 = x$</p>	<p>B2 M1 A1 B1 B1 M1 M1 A1 9</p>	<p>B1 for $6 \times n$ seen, (not $n+6$) MR-1 for finding 12th term (No marks for 47) FT until 2nd error</p> <p>FT 'their 42' only</p>																								
<p>5.(a) 114 156 194 $(114)/600$ $(156)/800$ $(194)/1000$ 0.19 0.195 0.194</p> <p>(b) $194/1000$ or 0.194 or equivalent</p> <p>(c) No AND with reason, e.g. lower than 20%, OR Yes with a reasoned explanation, e.g. very close to 20%</p>	<p>B1 B1 B1 B1 B1 5</p>	<p>FT their cumulative totals expressed as fractions FT from 1 error only in totals, other than FT total from cumulative FT from their entries only if .../1000 unambiguous</p>																								
<p>6. Area photo $= \pi \times 4^2$ $= 50(.265... \text{ cm}^2)$ Area frame $= 8 \times 8 (= 64 \text{ cm}^2)$ Strategy, area frame – area photo $13.7(...\text{cm}^2)$ or $14 (\text{cm}^2)$</p>	<p>M1 A1 B1 M1 A1 5</p>	<p>50.3</p> <p>For the idea, FT their areas for M1 only. Must be areas CAO</p>																								

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<p>7.(a) One correct evaluation $3 \leq x \leq 4$</p> <p>2 correct evaluations, $3.6 \leq x \leq 3.7$, or 3.55 and 3.65, one either side of 0</p> <p>2 correct evaluations, $3.6 \leq x \leq 3.65$, one either side of 0</p> <p>OR correct evaluation of 3.65 if previous B1 awarded</p> <p>3.6</p> <p><i>No calculations shown: accept "too high", ">", etc.</i></p> <p>(b) Overall correct <u>complete</u> method First variable's value Second variable's value</p>	<p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>7</p>	<p>x $2x^3 + x - 100$</p> <p>3 -43</p> <p>3.1 -37.318</p> <p>3.2 -31.264</p> <p>3.3 -24.826</p> <p>3.4 -17.992</p> <p>3.5 -10.75</p> <p>3.55 -6.97225</p> <p>3.6 -3.088</p> <p>3.7 5.006</p> <p>3.8 13.544</p> <p>3.9 22.538</p> <p>4 32</p> <p>FT their first variable $x = 8$ or $y = -3$</p>	<p>3.65 0.90425</p>
<p>8.(a) $2, \text{mm}^2$ $3, \text{cm}^3$</p> <p>(b) $4\pi 2.8^3/3$ $= 91.9(523 \dots \text{cm}^3)$ or $92(\text{cm}^3)$</p>	<p>B2</p> <p>M1</p> <p>A1</p> <p>4</p>	<p>B1 for any 2 correct entries</p>	
<p>9.(a) $d^2 = 4g/3$ $d = (\pm) \sqrt{(4g/3)}$</p> <p>(b) $y(5x+2) = 3x+4$ $5xy + 2y = 3x + 4$ $5xy - 3x = 4 - 2y$ $x(5y - 3) = 4 - 2y$ $x = \frac{4 - 2y}{5y - 3}$</p>	<p>M1</p> <p>A1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>7</p>	<p>Clearly square root of the entire right hand side</p> <p>Expand brackets FT until 2nd error for equivalent level of difficulty</p> <p>Collect terms</p> <p>Factorise</p>	
<p>10.(a) $x^2 - 3x + 6x - 18$ $= x^2 + 3x - 18$</p> <p>(b) $3(x+4)$ OR $3x + 12$</p> <p>(c) $(x-10)(x-1)$</p> <p>(d) $2(x+2)\{2(x+2) + 1\}$ OR $(x+2)\{4(x+2) + 2\}$ $= 2(x+2)(2x+5)$</p> <p>(e) $x = \{4 \pm \sqrt{4^2 - 4 \times 7 \times -17}\} / (2 \times 7)$ $x = (4 \pm \sqrt{492})/14$ 1.9 and -1.3</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B2</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>10</p>	<p>$(x^2 - 18)$ gets B0) FT until 2nd error</p> <p>Mark final answer</p> <p>B1 for $(x \dots 10)(x \dots 1)$. If B2 penalise -1 further inappropriate work</p> <p>FT til 2nd error OR correct full expansion with attempt to factorise</p> <p>$(x+2)(4x+10)$ gets first B1 only</p> <p>Allow 1 slip in substitution</p> <p>CAO</p>	
<p>11. $4s + 3m = 622$ OR $690 - 622 (= 2 \text{ square tiles})$ $6s + 3m = 690$ OR $68/2 (= 1 \text{ square tile})$</p> <p>Length rectangle 162 (mm)</p>	<p>B1</p> <p>B1</p> <p>B2</p> <p>4</p>	<p>B1 for square tile 34 with attempt to calculate length of the rectangular tile, or</p> <p>B1 for 1 numerical error in correct method provided previous B2 a</p>	
<p>12.(a) Sight of tangent at $t = 12$ Difference vertical / difference horizontal Reasonable gradient for their <u>tangent</u></p> <p>(b) Using trapezium rule or evidence of sum of areas. Correct expression for total area. 470</p> <p>(c) Distance (as (b)) metres (or m)</p>	<p>B1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>B1</p> <p>7</p>	<p>At least one correct area 40+160+270</p> <p>FT from (b). Units must be given</p>	
<p>13. 35.15 and 35.25 299.7 and 300.3</p> <p>Greatest av. Speed = Greatest dist. / Least time $= 8.54(3385 \dots \text{m/s})$</p> <p>Least av. Speed = Least dist. / Greatest time $= 8.5(021 \dots \text{m/s})$</p> <p>Explanation</p>	<p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>E1</p> <p>7</p>	<p>300.3/35.15, FT their bounds but not 35.2 and 300</p> <p>299.7/35.25, FT their bounds but not 35.2 and 300</p> <p>Award E1 if only the two relevant calculations shown and no other</p> <p><i>If the 2 relevant calculations shown (amongst others), but not indicated as least and greatest then award M1 A0 M1 A0 E0</i></p>	

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14. Strategy, e.g. Appropriate use of Pythagoras' Theorem or appropriate trial and improvement or trigonometry $37^2 = (16x)^2 + (9x)^2$ (no brackets M1) $(x^2 =) 1369/337 (=4.0623...)$ $(x =) 2(.0155...)$ Length 32(.25.. inches) and Width 18.(14..inches) OR Strategy S1 $\tan x = 16/9$ or $\tan y = 9/16$ M1 $x = 60.6(42...^\circ)$ $y = 29.3(57...^\circ)$ A1 Appropriate trig to find length M1 Appropriate trig to find width M1 L 32(.25.. inches) and W 18.(14..inches) A1	S1 M2 A1 A1 A1 6	Accept sight of 16^2+9^2 2 trials, ratio l : w correct (M1 for 1 trial) Interpretation of trial above or below Interpretation of trial above AND below 32(inches) and 18(inches) Answers 32, 18 no working SC2 Answers 32.25, 18.14 no working B6 Angles are 60.6... and 29.357...
15.(a) $(0.50+0.35) \times (0.50+0.35)$ $= 0.72(25)$ or $72(.25)\%$ (b) $1 - P(\text{no cumin})$ OR $P(CC') + P(C'C) + P(CC)$ $1 - 0.65 \times 0.65$ OR $0.35 \times 0.65 + 0.65 \times 0.35 + 0.35 \times 0.35$ 0.5775 or 57.75%	M1 A1 S1 M1 A1 5	OR equivalent full list Accept rounded or truncated from correct working
16. Overall strategy (1/2absinC & cos rule) $44.6 = \frac{1}{2} \times 6.4 \times AC \times \sin 74$ $AC = 14.499173....$ (cm) $BC^2 = 6.4^2 + AC^2 - 2 \times 6.4 \times AC \times \cos 74$ $BC^2 = 200.(05...)$ $BC = 14(.14... \text{ cm})$	B1 M1 A1 M1 A1 A1 6	FT their AC



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