



GCSE MARKING SCHEME

MATHEMATICS UNITISED

NOVEMBER 2013

INTRODUCTION

The marking schemes which follow were those used by WJEC for the November 2013 examination in GCSE Mathematics Unitised. 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.

UNIT 1 - FOUNDATION TIER

NOVEMBER 2013 UNIT 1 Foundation	Mark	Final MARK SCHEME (14/11/13) Comments (Page 1)
1. (a) 3 024 756 (b) 63 000 (c) (i) 408 (ii) $\frac{2}{3}$ or equivalent. ISW.	B1 B1 B1 B1 4	Accept if given in words.
2. 200 grams 324m 600m ² 2000m ³	B1 B1 B1 B1 4	Accept any unambiguous indication in each case.
3. (a) Thursday. (b) 43 (c) 13 × (£)12.5(0) = (£)162.5(0) (d) Any indication that the orders taken on Thursday were worth more money. e.g. 'Prices were higher (on Thursday)' 'She gave discounts on Wednesday' 'The size of each order was smaller on Wednesday'.	B1 B1 M1 A1 E1 5	Do not accept 11. SC1 for (£)225 or (£)137.5(0) or (£)300 or (£)237.5(0) For any comment that refers to 'prices' as opposed to number of orders.
4. (a) 12 × 30(p) + (£)5 AND an attempt to multiply '12 by 30' or '12 by 0.3' AND adding 500 or 5. = (£)8.6(0) or 860(p) (b) $\frac{(\pounds)7.4(0) - (\pounds)5}{0.3(0)}$ or equivalent. = 8 (passengers)	M1 A1 M1 A1 4	<i>Penalise consistent attempt in (a) and (b) to differentiate between driver and passengers –once only.</i> Do not penalise 'mixed units' at this stage. Allow £8.60p but £860 or 8.60p is A0. For correct substitution with subtraction and division. Allow division by 30 for M1. Accept an embedded answer.
5. Correct start time for 2 nd programme. First two programmes 'Nature Trails' and either 'Theatre Review' or 'The Comedy Slot'. 3 rd programme starts at 12:10 Correct start time for 4 th programme. Final two programmes 'Your Songs' and remaining one of 'Theatre Review' or 'The Comedy Slot'.	B1 B1 B1 B1 B1 5	<i>a.m. and p.m. not required but penalise once if incorrect</i> F.T. 'their first programme'. In either order. Accept unambiguous indication. F.T. 'their third programme'. In either order. Accept unambiguous indication.
6. (Shop A) (£)20 (Shop B) 6 × 4 × 0.8 or equivalent. = (£)19.2(0) (Difference of) 80p or £0.8(0)	B1 M1 A1 B1 4	F.T. their stated amounts. Units required otherwise B0. Allow £0.80p
7. (a) Accurate drawing with lines of 6cm and 4.5cm meeting at 90°. 'Steel cable' line drawn to top of mast. (b) Actual length of steel cable given (75m)	B2 B1 B2 5	<i>Allow ±0.2cm and ±2°. Use overlay.</i> For all 3. B1 for 2 of them. Must be in correct orientation. B0 for 45m or 60m. Otherwise F.T. an unambiguous line or distance from their drawing that represents the cable × 10. Must give units. B1 if no units or incorrect units given OR length on diagram given (7.5cm). B1 for an incorrect measurement <u>seen</u> to be correctly multiplied by 10 AND correct units given. <i>Ignore sight of 75m + 60m = 135m and allow B2 for the 75m.</i>

NOVEMBER 2013 UNIT 1 Foundation	Mark	Final MARK SCHEME (14/11/13) Comments (Page 3)
10. Sight of (Won) 15, (Drew) 12 and (Lost) 9 Correct pie chart drawn (Angles are 150°, 120° and 90°)	B1 B3 4	May be implied by a correct pie chart. F.T. their amounts. <i>Allow ± 2°. Use overlay.</i> B3 for all correct and labelled. B2 for all correct but not labelled. B1 for one correct and labelled. If no marks awarded for pie chart, then award M1 for equating 1 match to the correct number of degrees (10°).
11. (a) The question is biased or leading. (b) Any two from, e.g. 'No box for those who have never been', '10 times is not exclusive', 'No time period indicated'.	B1 B2 3	Accept any statement that implies question is biased or leading. Do not accept an answer that implies the question is biased because of the location. B1 for each different reason (maximum of 2 marks).
12. (a) Bearing of 040° from Moelfre. Bearing of 335° from Hoylake. Position marked or two lines intersecting. (b) Correct three figure bearing given.	M1 M1 A1 B1 4	± 2° (<i>use overlay</i>). Allow the M marks for dots, crosses or any unambiguous indication that the correct bearings have been offered. F.T. if at least M1 and two intersecting lines. (Lines must originate from Moelfre and Hoylake respectively and intersect at sea.) F.T. their ship's position. Allow ± 2°.
13. (a) (Volume =) $\pi \times 3^2 \times 4$ = 113.1 (m ³) OR 36 π (m ³) (b) Correct strategy. $\frac{113100 (l)}{1800 (l)}$ OR $\frac{113.1 (m^3)}{1.8 (m^3)}$ OR $\frac{113100000 (cm^3)}{1800000 (cm^3)}$ = 62.8(.....) OR 20 π = 62(minutes)	M1 A1 S1 M1 A1 A1 6	Also $\pi \times 300^2 \times 400$ Accept answers in the range 113 m ³ to 113.2 m ³ or equivalent in cm ³ (e.g. 113 000 000) Allow S1 for sight of 'their volume' ÷ 'digits 18' F.T 'their volume' from (a). Incorrect 'compensating' conversion errors that may lead to an answer of 62.8... is M0A0A0. For truncating to nearest whole number of minutes.
14. 17000 <u>2040</u> 14960 <u>1795.2(0)</u> 13164.8(0) <u>1579.77(6)</u> 11585.02(4) (£)11600	B1 M1 A1 A1 4	For the evaluation of a correct 12% OR Sight of 0.88 (6120, 10880 or 23120 implies 3× 2040 and gains B1). For attempting to find and subtract 3 different 12%. OR 17000 × 0.88 ³ . F.T. one error. <i>Treat calculation for 2 or 4 years as a misread.</i> <i>Penalise an appreciation calculation -1.</i>

UNIT 1 - HIGHER TIER

NOVEMBER 2013 UNIT 1 Higher	Mark	Final MARK SCHEME (14/11/13) Comments (Page 1)
1. (a) The question is biased or leading. (b) Any two from, e.g. 'No box for those who have never been', '10 times is not exclusive', 'No time period indicated'.	B1 B2 3	Accept any statement that implies question is biased or leading. Do not accept an answer that implies the question is biased because of the location. B1 for each different reason (maximum of 2 marks).
2. (a) Bearing of 040° from Moelfre. Bearing of 335° from Hoylake. Position marked or two lines intersecting. (b) Correct three figure bearing given.	M1 M1 A1 B1 4	$\pm 2^\circ$ (use overlay). Allow the M marks for dots, crosses or any unambiguous indication that the correct bearings have been offered. F.T. if at least M1 and two intersecting lines. (Lines must originate from Moelfre and Hoylake respectively and intersect at sea.) F.T. their ship's position. Allow $\pm 2^\circ$.
3. 650×43.2 = 28080 (roubles) (Roubles left) 6840 $6840 \div 49.5$ = (£)138.18	M1 A1 B1 M1 A1 5	F.T. 'their 28080' – 21240. F.T. 'their 6840'. £138.1818.... is A0. Mark final answer.
4. $9C + 32 \times 5 = 140 \times 5$ OR $\frac{9C}{5} = 140 - 32$ $C = \frac{140 \times 5 - 32 \times 5}{9}$ OR $(C =) \frac{140 - 32}{9} \times 5$ = 60(°C)	M1 M1 A1 3	For correct substitution in this form. Accept an embedded answer.
5. Correct method to find area of trapezium. (Trapezium area =) $34(\text{cm}^2)$ (Area of whole shape =) $59(\text{cm}^2)$ $59 \times 600 \div 250 \times (\text{£})6$ = (£)849.6(0) Look for <ul style="list-style-type: none"> • spelling • clarity of text explanations, • the use of notation (watch for the use of '=', £ and cm^2 being appropriate) QWC2: Candidates will be expected to <ul style="list-style-type: none"> • present work clearly, with words explaining process or steps AND <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to <ul style="list-style-type: none"> • present work clearly, with words explaining process or steps OR <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer 	M1 A1 B1 M2 A1 QWC2 8	Area of trapezium OR Area of (rectangle + triangle). C.A.O. F.T. 'their 34' + 25. F.T. 'their 59'. M1 for any one of the operations. Dependent on the M2. 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 weakness in organisation of material but using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC0. Evident weakness in organisation of material and errors in use of mathematical form, spelling, punctuation and grammar

NOVEMBER 2013 UNIT 1 Higher	Mark	Final MARK SCHEME (14/11/13) Comments (Page 2)
6. $37 \times \frac{17}{5}$ $= 125 \frac{4}{5}$ or equivalent 2 hours 5 minutes 48 seconds	M1 A1 B1 3	F.T. only if time in minutes greater than 60 and includes a fraction $\neq \frac{1}{2}$. Accept F.T. answers to nearest second.
7. (a) (Volume =) $\pi \times 3^2 \times 4$ $= 113.1 \text{ (m}^3\text{)}$ OR $36 \pi \text{ (m}^3\text{)}$ (b) Correct strategy. $\frac{113100 \text{ (l)}}{1800 \text{ (l)}}$ OR $\frac{113.1 \text{ (m}^3\text{)}}{1.8 \text{ (m}^3\text{)}}$ OR $\frac{113100000 \text{ (cm}^3\text{)}}{1800000 \text{ (cm}^3\text{)}}$ $= 62.8(\dots)$ OR 20π $= 62(\text{minutes})$	M1 A1 S1 M1 A1 A1 6	Also $\pi \times 300^2 \times 400$ Accept answers in the range 113 m^3 to 113.2 m^3 or equivalent in cm^3 (e.g. 113 000 000) Allow S1 for sight of 'their volume' \div 'digits 18' F.T 'their volume' from (a). Incorrect 'compensating' conversion errors that may lead to an answer of 62.8... is M0A0A0. For truncating to nearest whole number of minutes.
8. Showing 8 sheep with 1 lamb 10 sheep with 2 lambs 6 sheep with 3 lambs $8 \times 1 + 10 \times 2 + 6 \times 3$ (46) $\div 24$ $= 1.9$	B1 M1 m1 A1 4	F.T. their values. Must be to 1 decimal place with no errors in working. <u>Alternative method</u> $1 \times 120 + 2 \times 150 + 3 \times 90$ M1 $\div 360$ m2 $= 1.9$ A1
9. $86\% \equiv 3655$ (Last year) $\frac{3655 \times 100}{86}$ $= 4250$	B1 M1 A1 3	Accept any indication. Or equivalent e.g. $3655 / 0.86$.
10. (a) Sight of 305(cm) or 3.05(m) AND 3.95(cm) or 0.0395(m) $\frac{305}{3.95}$ or $\frac{3.05}{0.0395}$ $= 77$ (b) Sight of 295(cm) or 2.95(m) AND 4.05(cm) or 0.0405(m) $\frac{295}{4.05}$ or $\frac{2.95}{0.0405}$ $= 72.8\dots$ AND NO	B1 M1 A1 B1 M1 A1 6	<i>The B1 may be awarded if these values are seen in (a) or in (b) and need not be of the same units.</i> FT 'their 305', provided it is > 300 and ≤ 310 AND 'their 3.95', provided it is ≥ 3 and < 4 $77.2\dots$ is A0. <i>The B1 may be awarded if these values are seen in (a) or in (b) and need not be of the same units.</i> FT 'their 295', provided it is ≥ 290 and < 300 AND 'their 4.05', provided it is > 4 and ≤ 5 <u>Alternative methods</u> 73×4.05 M1 $= 295.6(5)$ AND 'NO' A1 OR $295/73$ M1 $= 4.04$ AND 'NO' A1

NOVEMBER 2013 UNIT 1 Higher	Mark	Final MARK SCHEME (14/11/13) Comments (Page 3)
11. $120 \div 3$ = 40 (m.p.h.) $60 \div 30$ (= 2) Total time = 5 (hours)	M1 A1 M1 A1 4	F.T. (180 – ‘their 120’) / (0.75 × ‘their 40’).
12. (a) One correct 70% calculated At least 4 attempts at repeated 70% of different values. 5 correct values 7, 4.9, 3.43, 2.40(1) and 1.68(07) All plotted correctly and not joined. (b) Some indication that the heights indicated between the bounces would not be correct.	B1 M1 A1 P1 E1 5	Allow only arithmetical errors. All five correct (to 1dp) F.T. their values if M1 awarded. Accept plots within ½ a ‘small square’. Plotting (0,10) not required but P0 if incorrect plot. Correct plots imply previous B1,M1,A1. E.g. ‘there is no 1½ bounce’, ‘We don’t know what happens in-between (bounces)’.
13. (a) (Arc AB =) $\frac{70}{360} \times 2 \times \pi \times 12$ = 14.6(6...)(cm) or $\frac{14\pi}{3}$ (b) Use of $\frac{70}{360} \times \pi \times 12^2$ OR $\frac{70}{360} \times \pi \times 8^2$ = 87.9(6...)(m ²) OR 39.0(9...)(m ²) OR 28π OR 112π/9 (Shaded area) $\frac{70}{360} \times \pi \times 12^2 - \frac{70}{360} \times \pi \times 8^2$ = 48.8(7...) (m ²) OR $\frac{140\pi}{9}$	M1 A1 M1 A1 M1 A1 A1 6	Allow M1 for (Major arc AB =) $\frac{290}{360} \times 2 \times \pi \times 12$ Accept answers between 14.65 and 14.7 inclusive. Allow A1 for (Major arc AB=) 60.7(3..) or $\frac{58\pi}{3}$ Accept answers between 60.7 and 60.8 inclusive for the major arc. Accept 87.9 to 88.0 inc. OR 39.0 to 39.15 inc. This implies both M marks. (70/360 × π × 80 is M1M1A1) F.T. their values.
14. $\frac{2}{3} \times \pi \times R^3 + \frac{2}{3} \times \pi \times (R/5)^3 = 456$ $R^3 = \frac{456 \times 125 \times 3}{2 \times \pi \times 126}$ or equivalent = 216 (Radius =) 6(m)	M2 A1 A1 A1 5	M1 if R ³ /5 is used. Allow M1 if 4/3 used instead of 2/3. F.T. if M1 awarded. F.T. ‘their R ³ ’ if at least M1 awarded. Correct to 1dp. SC1 for an answer of 6.(01..) found by using large hemisphere alone. <u>Note use of r for smaller radius</u> $\frac{2}{3} \times \pi \times r^3 + \frac{2}{3} \times \pi \times (5r)^3 = 456$ M2 $r^3 = \frac{456 \times 3}{2 \times \pi \times 126}$ or equivalent A1 = 1.7279... A1 (5 × r) = 6(m) A1 Mark accordingly, but penalise premature approx -1.

UNIT 2 - FOUNDATION

2013 November Unit 2 (non calculator) Foundation Tier	Marks	Mark Scheme (14.11.13) (FINAL VERSION) Comments (Page 1)
1. (a) Three hundred and eighty four thousand, (and) four hundred (km) (b) 960 (c) 517 (d) (i) 29 (ii) 36 (iii) 56 (iv) 8 (e) (Number of girls =) 6 (Total number of pupils = 18 + 6) (=) 24	B1 B1 B1 B1 B1 B1 B1 B1 B1 B1 9	FT 'their 6' if $18 \div 3$ o.e. is seen
2. hexagon cube rhombus cylinder	B1 B1 B1 B1 4	
3. (a) impossible (b) likely	B1 B1 2	
4. (a) (i) multiply the previous term by 3 (ii) subtract 8 from the previous term (b) $20/100 \times (\pounds) 60$ OR 10% of $(\pounds)60 = (\pounds)6$ and $2 \times (\pounds)6$ (\pounds) 12	B1 B1 M1 A1 4	Accept $\times 3$ Accept $- 8$ Any correct method for finding 20% Ignore further working. A0 for 12% SC1 for 48 provided M0.
5. (a) $10/18$ I.S.W. (= $5/9$) (b) 0 or $0/18$	B2 B1 3	B1 for a numerator of 10 in a fraction less than 1. B1 for a denominator of 18 in a fraction less than 1. NB Penalise -1 once only for use of words such as '10 out of 18', '10 in 18'. or '10:18'. When both fraction and wrong notation seen, DO NOT penalise wrong notation. SC1 for an answer of $13/21$. Do not accept 'impossible'. FT $0/21$ from (a) if denominator of 21 used in (a)
6. (a) $13a - 2b$ as an expression (b) (i) $(\pounds) 7n$ (ii) $x - 4$ (m)	B2 B1 B1 4	In all parts, mark final answer. B1 for $ka + mb$ where $k = 13$ or $m = -2$ B1 for $13a + - 2b$ B1 for both $13a$ and $- 2b$ given separately but not as $13a - 2b$ Ignore units. Allow $7 \times n$ or $n \times 7$ or $n7$. Ignore units.
7. (a) 78 (cm) (b) (0.585) (litres) $585/1000$ o.e.	B1 B1 2	
8. Sight of $3/5$ $3/5 \times (\pounds)180$ $(12 \times 9 = \pounds) 108$	B1 M1 A1 3	Alternative methods: $(\pounds)180 - 2/5 \times 180$ M1 $(180 - \pounds) 72$ B1 $(\pounds) 108$ A1 OR $2/5 \times (\pounds)20 (= 8)$ M1 $(20 - 8 = \pounds) 12$ B1 $(12 \times 9 = \pounds) 108$ A1

2013 November Unit 2 (non calculator) Foundation Tier	Marks	Mark Scheme (14.11.13) (FINAL VERSION) Comments (Page 2)
<p>9 If x = number of cartridges, correct evaluation for $x \geq 3$ for Offer A correct evaluation for $x \geq 3$ for Offer B for $x = 3$, correct evaluation for A and B OR working or a statement implying that at least 4 cartridges must be bought for Offer B for $x = 4$, correct evaluation for A and B OR implied correct evaluation for A and B e.g. a comparison between costs for $x = 4$ implied by correct extra amount of £4 for 4th cartridge for Offer B (rather than £7 for A) Conclusion that $x = 4$.</p> <p>QWC: Candidates would be expected to</p> <ul style="list-style-type: none"> show clearly how they arrived at their solution have few errors in mathematical form, spelling, punctuation and grammar <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> 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 working <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> 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 working 	<p>B1 B1 B1</p> <p>Offer A: £14 and Offer B: £21</p> <p>B1</p> <p>Offer A: £21 and Offer B: £18</p> <p>B1</p> <p>SC2 for answer of 4 with no working</p> <p>QWC2</p> <p>7</p>	<p>Offer A: £14 and Offer B: £21</p> <p>Offer A: £21 and Offer B: £18</p> <p>SC2 for answer of 4 with no working</p> <p>QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.</p> <p>QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar.</p> <p>QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. A final unsupported statement only gets QWC0</p>
<p>10. Given points correctly plotted on suitable axes</p> <p>Coordinates are $(-4, -3)$ OR $(6, -7)$ OR $(4, 11)$</p>	<p>B2</p> <p>B1</p> <p>3</p>	<p>B2 for 3 correct plots, B1 for 2 correct plots, B0 if all coordinates reversed. Penalty – 1 for unsuitable labelling of axes FT ‘their plots’, if parallelogram drawn, for final B1 only.</p> <p>Allow B3 if coordinates of 4th vertex given as $(-4, -3)$ or $(6, -7)$ or $(4, 11)$ with no drawing shown.</p>

2013 November Unit 2 (non calculator) Foundation Tier	Marks	Mark Scheme (14.11.13) (FINAL VERSION) Comments (Page 3)
11. (a) (11) 14 16 17 20 22 21 24 (26) (b) (i) 4/9 (ii) $4/9 \times 54$ $= 24$	B2 B2 M1 A1 6	B1 for at least 4 correct entries FT their table if complete B1 for a numerator of 4 in a fraction less than 1. B1 for a denominator of 9 in a fraction less than 1. NB Penalise –1 for use of words such as ‘4 out of 9’, ‘4 in 9’. or ‘4:9’. When both fraction and wrong notation seen, DO NOT penalise wrong notation. FT their (b)(i) if positive fraction less than 1.
12. Angle ABC = 78 (°) OR sight of correct obtuse angle at B of 102(°) (x =) [180 –78] ÷ 2 (x =) 51(°)	B1 M1 A1 3	Check for answers written on diagram Implies B1 FT ‘their 102’ ÷ 2
13. (a) Correct reflection (b) Correct tessellation of at least 7 additional interlocking kites (not all in one row in one direction)	B2 B2 4	B1 for a reflection in any horizontal line or in $x = -1$ or sight of the line $y = -1$ B1 for 3 additional correct interlocking kites (each sharing at least one common side).
14. (a) $x + 3x + 16x = 1$ $x = 1/20$ or 0.05 or equivalent ISW (b) (Statement that Stephen is incorrect and) a correct explanation e.g. fraction (proportion) of tickets bought would be the same.	M1 A1 E1 3	Use of ‘total probability = 1’ Accept 5% only if specified as a percentage . Accept alternative explanations; e.g. ‘It may decrease his chance of winning a prize as more people may be tempted to buy tickets’.
15. (a) (i) $12t^9$ (ii) p^6 (b) $(x - 2 =) 8x + 12$ $7x = -14$ or $-7x = 14$ $x = -2$ c) Method that produces at least 2 correct prime factors. Sight of correct factors (2, 2, 3, 3, 11) in any order $2^2 \times 3^2 \times 11$	B1 B1 B1 B1 B1 M1 A1 B1 8	Accept $12 \times t^9$ or $t^9 \times 12$ FT until 2 nd error Correct clearing of bracket Collecting terms correctly FT $ax = b$ where $a \neq 1$ and answer must be expressed as integer if fraction can be cancelled to an integer FT until 2 nd error. Ignore 1s seen. FT their factors (with at least one index > 1 used). Do not ignore 1s within this product. B0 for list or sum.

UNIT 2 - HIGHER TIER

Unit 2 GCSE Maths November 2013 Higher Tier Markscheme 14.11.13	Mark	Comment
<p>1. <u>Option A:</u> (Total cost using option A =) $580 + 580 \times 20/100$ or equivalent (Total cost using option A =) (£)696</p> <p><u>Option B:</u> (Total cost using option B =) (£)120 + 12 × (£)49.50 or equivalent (Total cost using option B =) (£)714</p> <p>Conclusion that Option A is cheaper AND by (£)18</p> <p>Look for</p> <ul style="list-style-type: none"> • relevance • spelling in at least 1 statement/sentence • clarity of text explanations, • the use of notation (watch for the use of ‘=’, £, % being appropriate) <p>A clear conclusion statement must be made before QWC2 can be awarded.</p> <p>QWC: Candidates would be expected to</p> <ul style="list-style-type: none"> • clearly show how they arrived at their solution • have few errors in mathematical form, spelling, punctuation and grammar <p>Count incorrect use of ‘=’ in situations such as ‘$580 \times 20/100 = 116 + 580$’ within the ‘few errors in mathematical form’</p> <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, with words explaining process or steps <p>AND</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, with words explaining process or steps <p>OR</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer 	<p>M1 A1</p> <p>M1 A1</p> <p>B1</p> <p>Q W C 2</p>	<p>A complete correct method Correct total for Option A SC1 for sight of (£) 116 if M0A0</p> <p>A complete correct method Correct total for Option B SC1 for sight of (£) 594 if 2nd M0A0 FT only if both M marks were awarded</p> <p>QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.</p> <p>QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar.</p> <p>QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.</p> <p>A final unsupported statement only gets QWC0</p>
<p>2. Angle $ABC = 78^\circ$ OR sight of correct obtuse angle at B of 102° $(x =) [180 - 78] \div 2$ $(x =) 51^\circ$</p>	<p>B1</p> <p>M1 A1 3</p>	<p>Check for answers written on diagram.</p> <p>Implies B1. FT ‘their $102^\circ \div 2$’</p>
<p>3. (a) Correct reflection</p> <p>(b) Correct tessellation of at least 7 additional interlocking kites (not all in one row in one direction)</p>	<p>B2</p> <p>B2</p> <p>4</p>	<p>B1 for a reflection in any horizontal line or in $x = -1$ or sight of the line $y = -1$ B1 for 3 additional correct interlocking kites (each sharing at least one common side with another)</p>

Unit 2 GCSE Maths November 2013 Higher Tier Markscheme 14.11.13	Mark	Comment
4. (a) (i) $12t^9$ (ii) p^6 (b) $8x < 72$ or $-72 < -8x$ $x < 9$	B1 B1 B1 B1 4	Accept $12 \times t^9$ or $t^9 \times 12$ FT until second error B0 for use of = sign, unless replaced for final answer.
5. (a) Method that produces at least 2 correct prime factors Sight of correct factors (2, 2, 3, 3, 11) in any order $2^2 \times 3^2 \times 11$ (b) 11	M1 A1 B1 B1 4	FT until 2 nd error Ignore 1s seen FT their factors (with at least 1 index >1 used) (provided 'their factors' arise from an attempt to <i>divide</i>). Do not ignore 1s within the product. B0 for a sum or list. FT from (a)
6. (Numerator is) 900×0.1 or appropriate approximations (Denominator is) 0.09 or 0.1 1000	B1 B1 B1 3	Accept 1000 and 0.108 respectively. Accept 9 or 10 if an attempt has been made to multiply numerator by 100. FT for answers from 900 to 1100 inclusive. Unsupported 900 or 1000 gets 3 marks, but do not ignore incorrect working.
7. (a) $x + 3x + 16x = 1$ $x = 1/20$ or 0.05 or equivalent ISW (b) (Statement that Stephen is incorrect and) a correct explanation e.g. fraction (proportion) of tickets bought would be the same.	M1 A1 E1 3	Use of 'total probability = 1' Accept 5% only if specified as a percentage . Accept alternative explanations such as 'It may decrease his chance of winning a prize as more people may be tempted to buy tickets'
8. (a) $\frac{3}{4}$ (b) Correct gradient ($= -\frac{1}{2}$) OR correct y-intercept plotted (0, 3) OR any two other points calculated or plotted correctly (with no incorrect points) Points joined by one correct straight line, no stray points	B1 B1 B1 3	$y = \frac{3}{4}x - 5/4$ is insufficient, unless $\frac{3}{4}$ indicated (e.g. circled). e.g. (1, 2.5) (2, 2) (3, 1.5) (4, 1) (5, 0.5) (6, 0) Single straight line, do not ignore incorrect points joined. CAO. Line should be of 'reasonable' sufficient length (halfway across grid)
9. (a) (i) $8n - 3$ (ii) $(n - 1)^2$ OR $n^2 - 2n + 1$ (b) Strategy of solving an appropriate equation or inequality $130 - 4n < 0$ or $130 - 4n = 0$ or equivalent $130/4$ or equivalent (position number of) 33	B2 B2 S1 M1 A1 7	B1 for $8n$ B1 for $an^2 + b$, with $a \neq 0$ OR $(an + b)^2$, with $a \neq 0$ OR $n^2 - 2n + k$ Accept a 'trial and improvement' approach provided at least two trials (one above and one below 33) Trial and improvement gives rise to -2 SC2 for unsupported '33'. 0 marks for unsupported -2 with no reference to position number.
10. Enlargement Scale factor of 2 Centre of enlargement at (2,3)	B1 B1 B1 3	Accept alternative terminology e.g. 'multiplier is 2' Do not accept an incorrect statement e.g. 'shape B is twice the size of shape A' SC1 for 2 or more 'rays' correctly drawn, intersecting at (2, 3) if B0, B0, B0.

UNIT 3 FOUNDATION

2013 November UNIT 3 (calculator allowed) Foundation Tier Mark Scheme	Mark	Comments (page 1)
<p>1. (a)(£) 3·5(0) or 350(p) (£)1·92 or 192(p) (£)1·7(0) or 170(p) (£) 2·25 or 225(p)</p> <p>(b) 20 – 9·37 or 2000 – 937 (£) 10·63 or 1063(p)</p> <p>(c) 5·49 ÷ 3 or 549 ÷ 3 (£)1·83 or 183(p)</p>	<p>B1 B1 B1 B1</p> <p>M1 A1</p> <p>M1 A1 8</p>	<p>FT one error.</p> <p>Attempt to subtract or find the difference</p>
<p>2. (a) 127 (b) 138 000 (c) 14·2</p>	<p>B1 B1 B1 3</p>	
<p>3. Evidence of square counting 40-50 (squares) Candidate's area × 10 (cm²)</p>	<p>M1 A1 B1 3</p>	<p>E.g. dots or marks in the squares.</p> <p>F.T. 'their area' × 10 Final answer of 400-500 gets 3 marks.</p>
<p>4. (a) Attempt to use 60 minutes = 1 hour in context. e.g. $4 \times 60 + 50$ OR $310 / 60$ (Delay =) 20 (minutes)</p> <p>(b) 13:50 + 3 hours 15 minutes. 17:05 or 5:05 (pm)</p> <p>(c) Attempt to find time between 6:30 a.m. and 5:55 p.m. with correct interpretation of a.m. and p.m. 11 hours and 25 minutes.</p>	<p>M1 A1</p> <p>M1 A1</p> <p>M1 A1 6</p>	<p>Sight of 290 (minutes) or 5.16(66...) or 5.17 (hours) or 5 hours 10 minutes C.A.O.</p> <p>Attempt to add time</p> <p>Accept 11:25 or 11·25</p>
<p>5. (a) Drawing showing 2 and a half circles (b) Mon-36, Tues-16, Wed-18, Thur-22 (c) Ordering data 16, 18, 22, 30, 36 Median 22</p> <p>(d) Mon, Tues, Wed, Thur, Fri (or equivalent) along one axis Uniform scale and label for frequency or equivalent. Five bars at correct heights</p>	<p>B1 B2 M1 A1</p> <p>B1 B1 B2 9</p>	<p>B1 for any 2 or 3 correct answers.</p> <p>FT candidate's values from table. Or indicated on the bars themselves.</p> <p>FT from their table values. B1 for at least 3 correct bars on FT. B1 for unequal width bars.</p>
<p>6. Correct rectangle or square with sum of two sides equal to 12 and product of two sides greater than 32. e.g. 6 by 6 or 7 by 5</p>	<p>B3 3</p>	<p>Any orientation. B2 for perimeter= 24 cm but area<32cm² eg. 3 by 9 or 2 by 10 B1 for area >32 cm² but perimeter ≠24 cm B1 for stating area = 32 (cm^s) and Perimeter = 24(cm) B0 for 4 by 8 or 8 by 4</p>

2013 November UNIT 3 (calculator allowed) Foundation Tier Mark Scheme	Mark	Comments (page 2)
<p>7. Set dinner discount (£)2.34 Set dinner cost after discount (£)23.40-(£)2.34=(£)21.06 (Set dinner cost for each person £7.02)</p> <p>Total general Menu cost $3 \times (£)4.50 + 3 \times (£)1.85 + (£)1.59$ (£)20.64 General menu cost for each person $(£)20.64 \div 3$ =(£) 6.88 (cheaper option) Look for</p> <ul style="list-style-type: none"> • Spelling • Clarity of text explanations, • Consistent use of £ or p <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> • Present work clearly, with words explaining process and steps <p>AND</p> <ul style="list-style-type: none"> • Make few, if any, mistakes in mathematical form, spelling, punctuation and grammar in their final answer. <p>QWC1 : Candidates will be expected to</p> <ul style="list-style-type: none"> • Present work clearly, with words explaining process or steps <p>OR</p> <ul style="list-style-type: none"> • Make few, if any, mistakes in mathematical form, spelling, punctuation and grammar in their final answer. 	<p>B1 B1</p> <p>M1 A1</p> <p>M1 A1</p> <p>QWC 2</p> <p>8</p>	<p>Alternative $0.9 \times 23.40 = 21.06$ for B2 FT 'their £2.34' from appropriate working. Total price or price per person may be seen. Ignore incorrect division if (£)21.06 seen. Treat multiplication of price of set meal by 3 as misread. Alternative method if total cost not shown: $(£)1.59 \div 3 = (£)0.53$ for M1A1</p> <p>$(£)4.50 + (£)1.85 + (£)0.53 = (£)6.88$ for M1A1</p> <p>FT their costs so that correct division of their lower total by 3 gets M1 A1.</p> <p>QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.</p> <p>QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar. OR Evident weakness in organisation of material but using acceptable mathematical form, with few, if any, errors in spelling, punctuation and grammar.</p> <p>QWC0 Evident weakness in organisation of material, and errors in use of mathematical form, spelling, punctuation and grammar.</p>
<p>8. Calculation A 3.46 Calculation B 2.(051828453....) Calculation C 3.65 Order B, A ,C</p>	<p>B1 B1 B1 B1</p> <p>4</p>	<p>CAO Rounded or truncated CAO FT candidate's values in ascending order.</p>
<p>9.(a) $a=8$ (b) $2y=16$ $y=8$ (c) $x/3 = 10$ or $x+ 15 = 45$ $x=30$</p>	<p>B1 B1 B1 B1 B1 5</p>	<p>Accept embedded answers throughout.</p>
<p>10. Cubing whole numbers. Trial and improvement shown. Answer of $(13 \times 13 \times 13 =) 2197(\text{cm}^3)$</p>	<p>S1 B2 3</p>	<p>Alternative method. Cube root of 2500 with appropriate rounding. B1 for $13 \times 13 \times 13$ or 13 cubed without 2197</p>
<p>11. A triangle with at least two correct lengths ($\pm 2\text{mm}$) One line drawn correctly AND two intersecting arcs drawn from the ends of this line. Triangle correctly constructed using intersecting arcs with all 3 sides of the correct length ($\pm 2\text{mm}$).</p>	<p>B1 M1 A1</p> <p>3</p>	<p>Any orientation.</p>

2013 November UNIT 3 (calculator allowed) Foundation Tier Mark Scheme	Mark	Comments (page 3)																																																
12. Both heart rates correct AND Bethan identified as higher Alan 188.(8) Bethan 201.(8)	B2 2	B1 for sight of one of 188.(8) or 201.(8)																																																
13. (a) All points plotted correctly (b) Line of best fit with positive gradient and points above and below. (c) (i) Identify worker C (ii) Appropriate reading for 40 year old from candidate's line of best fit.	B2 B1 B1 B1 5	B1 for at least 5 correct plots. Ignore line of best fit at this stage. Penalise -1 if joined point to point. Worker C, named, described or identified on the graph. Consistent with candidate's positive gradient line of best fit. FT 'their (c)(i)'.																																																
14. a) Michael with reason, e.g. "Michael because he took less time", "Michael finished in 40 sec", "Michael, his line is steeper" b) $50 \div 40$ or equivalent OR $25 \times 60/20$ 1.25 or equivalent OR 75 m/s OR m/min c) 8 (seconds)	E1 M1 A1 U1 B1 5	Allow "Michael because he was faster" M1A0 for use of e.g. $26 \div 20$ (misread from graph) If no marks awarded, SC1 for answers of 1.04 or 62.5 (Jordan's speed in m/s or m/min) or 0.9...(speed for whole race) Must be appropriate.																																																
15. One correct evaluation $4 \leq x \leq 5$ 2 correct evaluations $4.2 \leq x \leq 4.35$ One either side of 90 2 correct evaluations $4.25 \leq x \leq 4.35$ One either side of 90 <i>If evaluations not seen, accept 'too high' or 'too low'.</i> $x = 4.3$	B1 B1 M1 A1 4	<table border="0"> <tr> <td>x</td> <td>$x^3 + 3x$</td> <td>x</td> <td>$x^3 + 3x$</td> </tr> <tr> <td>4</td> <td>76</td> <td>4.21</td> <td>87.24...</td> </tr> <tr> <td>5</td> <td>140</td> <td>4.22</td> <td>87.81...</td> </tr> <tr> <td>4.1</td> <td>81.221</td> <td>4.23</td> <td>88.37...</td> </tr> <tr> <td>4.2</td> <td>86.688</td> <td>4.24</td> <td>88.94...</td> </tr> <tr> <td>4.3</td> <td>92.407</td> <td>4.25</td> <td>89.51...</td> </tr> <tr> <td>4.4</td> <td>98.384</td> <td>4.26</td> <td>90.08...</td> </tr> <tr> <td>4.5</td> <td>104.625</td> <td>4.27</td> <td>90.66...</td> </tr> <tr> <td>4.6</td> <td>111.136</td> <td>4.28</td> <td>91.24...</td> </tr> <tr> <td>4.7</td> <td>117.923</td> <td>4.29</td> <td>91.82...</td> </tr> <tr> <td>4.8</td> <td>124.992</td> <td></td> <td></td> </tr> <tr> <td>4.9</td> <td>132.349</td> <td>4.35</td> <td>95.36.....</td> </tr> </table> <p>Watch for comparison to 0</p>	x	$x^3 + 3x$	x	$x^3 + 3x$	4	76	4.21	87.24...	5	140	4.22	87.81...	4.1	81.221	4.23	88.37...	4.2	86.688	4.24	88.94...	4.3	92.407	4.25	89.51...	4.4	98.384	4.26	90.08...	4.5	104.625	4.27	90.66...	4.6	111.136	4.28	91.24...	4.7	117.923	4.29	91.82...	4.8	124.992			4.9	132.349	4.35	95.36.....
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16. $(AB^2 =) 3 \cdot 3^2 + 5 \cdot 6^2$ $AB^2 = 42.25$ OR $(AB =) \sqrt{42.25}$ OR $(AB =) 6.5(\text{cm})$	M1 A1 A1 3	Addition of squares seen or implied $(AB =) \sqrt{(3 \cdot 3^2 + 5 \cdot 6^2)}$ alone gets M1A0A0																																																
17. a) Points plotted at mid-points of groups and straight lines connecting the points b) Sight of the mid-points 125, 135, 145, 155, 165 $125 \times 2 + 135 \times 8 + 145 \times 13 + 155 \times 22 + 165 \times 10$ $(250 + 1080 + 1885 + 3410 + 1650 = 8275)$ $'\text{Their } 8275' \div 55$ $= 150(.45)$	B2 B1 M1 m1 A1 6	B1 at least 4 points plotted and joined correctly OR for all points plotted correctly but not joined, OR consistent horizontal translation within the limits of the groups. Accept intention of straight lines. Ignore any lines outside the first and last points FT their mid-points from within or at the bounds of the groups																																																

UNIT 3 - HIGHER TIER

Unitised Unit 3 – Nov 2013 Higher Tier Mark scheme – Post Conference		
1. a) $x(x - 6)$ b) $7x - 3x = 5 - 13$ $4x = -8$ $x = -2$	B1 B1 B1 B1 4	FT until 2 nd error
2. Suitable arcs drawn for 60° angle 60° angle drawn with line 8cm long Arcs drawn 5.5cm from the ends of the 8cm lines 2 lines of length 5.5cm joining to complete the kite	M1 A1 B1 B1 4	Use overlay. Allow $\pm 2^\circ$. Allow ± 2 mm for all lengths.
3. a) Michael with reason, e.g. “Michael because he took less time”, “Michael finished in 40 sec”, “Michael, his line is steeper” b) $50 \div 40$ or equivalent OR $25 \times 60/20$ 1.25 or equivalent OR 75 m/s OR m/min c) 8 (seconds)	E1 M1 A1 U1 B1 5	Allow “Michael because he was faster” M1A0 for use of e.g. $26 \div 20$ (misread from graph) If no marks awarded, SC1 for answers of 1.04 or 62.5 (Jordan’s speed in m/s or m/min) or 0.9... (speed for whole race) Must be appropriate.
4. a) $(6.5 \times 7) + (\frac{1}{2} \times 7 \times 3)$ OR $2 \times \frac{1}{2} (9.5 + 6.5) \times 3.5$ $= 56(\text{m}^2)$ b) $56/15 (= 3.73\dots)$ 4 (tins needed)	M2 A1 M1 A1 5	M1 for $(6.5 \times 7) + \dots$ OR $\dots + (\frac{1}{2} \times 7 \times 3)$ CAO FT ‘their 56’ Award provided rounding up required
5. a) $\pi \times 6^2$ Answers in the range 113 to 113.14(...sq inches) b) (Area of small pizza =) 38.4 to 38.5 Perform calculations that allow comparison e.g. Large $113 \div 10 = 11.3$ to $11.314(\dots)$ (sq inch per £) <i>or $10 \div 113 = (\pounds)0.08(8)$ (per sq inch)</i> Small $38.4 \div 4 = 9.6$ to 9.625 (sq inch per £) <i>or $4 \div 38.4 = (\pounds)0.10$ (per sq inch)</i> Statement implying that large pizza is better value	M1 A1 B1 M2 A1 6	Sight of area of small pizza FT <i>their</i> areas provided not 7 and 12. M1 for each calculation. <i>Alternative method to get £10 worth of small pizza or £4 worth of large pizza</i> <i>B1 sight of 2.5 as a multiplier or divisor</i> <i>M1 for $2.5 \times 38.4 (= 96)$ OR $113 \div 2.5 (= 45.2)$</i> <i>Alternative method to get comparable price for large or small pizza using similar areas:</i> <i>B1 for $(12/7)^2$ or $2.9(38\dots)$ OR $(7/12)^2$ or $0.3(40\dots)$</i> <i>M1 for $2.9(38\dots) \times 4$ OR $0.3(40\dots) \times 10$</i> <i>A1 for $\pounds 11.75(5\dots)$ OR $\pounds 3.40(2\dots)$</i> SC2 for convincing argument e.g. 3 small pizzas give nearly the same area for £2 more If no marks awarded, SC1 for convincing statement after comparing costs or areas

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<p>6. (1 part =) 500/10 (Composite steel) = 350(kg) (Chromium) = 100(kg) (Nickel) = 50(kg) (Cost of Composite Steel =) (£) $(0.)50 \times 350$ (Cost Of Chromium needed =) 1.90×100 (Cost of Nickel needed =) 12.70×50 (Total cost =) $(0.)50 \times 350 + 1.90 \times 100 + 12.70 \times 50$ (Total Cost =) £1000</p> <p>QWC: Look for</p> <ul style="list-style-type: none"> • correct units used i.e. kg, £, p • spelling in at least 1 statement/sentence • clarity of text explanations <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, with words or quantities shown for clarity of process or steps <p>AND</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> • present work clearly, with words or quantities shown for clarity of process or steps <p>OR</p> <ul style="list-style-type: none"> • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer 	<p>M1 A2</p> <p>M1 A1</p> <p>QWC 2</p> <p>7</p>	<p>A1 for any 2 correct</p> <p>FT their weights provided first M1 awarded</p> <p>CAO</p> <p><i>Alternative method:</i> <i>Price of 10kg:</i> <i>M4 for $7 \times 50p \times 50 + 2 \times £1.90 \times 50 + 1 \times £12.70 \times 50$</i> <i>OR M3 for any 2 correct with intention to add</i> <i>OR M2 for any 1 correct with intention to add</i> <i>OR M1 for $7 \times 50p + 2 \times £1.90 + 1 \times £12.70 (=£20)$</i> <i>A1 for £1000 CAO</i></p> <p>QWC2 Presents material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.</p> <p>QWC1 Presents material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar.</p> <p>QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.</p>																																																
<p>7. One correct evaluation $4 \leq x \leq 5$</p> <p>2 correct evaluations $4.2 \leq x \leq 4.35$ one either side of 90</p> <p>2 correct evaluations $4.25 \leq x \leq 4.35$ one either side of 90</p> <p><i>If evaluations not seen, accept 'too high' or 'too low'.</i> $x = 4.3$</p>	<p>B1 B1 M1 A1 4</p>	<table border="1"> <thead> <tr> <th>x</th> <th>$x^3 + 3x$</th> <th>x</th> <th>$x^3 + 3x$</th> </tr> </thead> <tbody> <tr><td>4</td><td>76</td><td>4.21</td><td>87.24...</td></tr> <tr><td>5</td><td>140</td><td>4.22</td><td>87.81...</td></tr> <tr><td>4.1</td><td>81.221</td><td>4.23</td><td>88.37...</td></tr> <tr><td>4.2</td><td>86.688</td><td>4.24</td><td>88.94...</td></tr> <tr><td>4.3</td><td>92.407</td><td>4.25</td><td>89.51...</td></tr> <tr><td>4.4</td><td>98.384</td><td>4.26</td><td>90.08...</td></tr> <tr><td>4.5</td><td>104.625</td><td>4.27</td><td>90.66...</td></tr> <tr><td>4.6</td><td>111.136</td><td>4.28</td><td>91.24...</td></tr> <tr><td>4.7</td><td>117.923</td><td>4.29</td><td>91.82...</td></tr> <tr><td>4.8</td><td>124.992</td><td></td><td></td></tr> <tr><td>4.9</td><td>132.349</td><td>4.35</td><td>95.36...</td></tr> </tbody> </table> <p>Watch for comparison to 0.</p>	x	$x^3 + 3x$	x	$x^3 + 3x$	4	76	4.21	87.24...	5	140	4.22	87.81...	4.1	81.221	4.23	88.37...	4.2	86.688	4.24	88.94...	4.3	92.407	4.25	89.51...	4.4	98.384	4.26	90.08...	4.5	104.625	4.27	90.66...	4.6	111.136	4.28	91.24...	4.7	117.923	4.29	91.82...	4.8	124.992			4.9	132.349	4.35	95.36...
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9. a) 1.5×10^9 b) 9.6×10^{-2} (mm)	B2 B2 4	B1 for 1.4×10^9 or 1.49×10^9 or 15×10^8 or 1.488×10^9 B1 for 0.096(mm) or 9.6×10^{-3} (cm)
10. a) $12 \times \cos 37^\circ$ 9.6 (cm) or 9.5(83..cm) b) $(\text{length}^2 =) 9^2 + 6.5^2$ $\text{length}^2 = 123.25$ OR $(\text{length} =) \sqrt{123.25}$ $(\text{length} =) 11(.101\dots)$ (Perimeter =) 44(.407\dots cm)	M2 A1 M1 A1 A1 A1 7	M1 for $\cos 37 = AC/12$ Accept an answer of 10 from correct working FT 'their length' $\times 4$
11. a) 4, 6, 7, 11, 23, 30 b) Idea, plotting the upper class boundary consistently with the corresponding cumulative frequency. At least 3 points plotted correctly. All points correct and joined by straight lines or a curve. c) Median = Answers in the range 63 to 64 inclusive Interquartile range: (69 to 70) – (51 to 53) Answers in the range 16 to 19 inclusive d) valid comment e.g. more young people would use the bus at 4p.m.. fewer old people	B1 M1 A1 A1 B1 M1 A1 E1 8	FT, for all marks, provided frequencies are cumulative. SC1 if points plotted at mid-points. FT their diagram provided frequencies are cumulative. Intention to subtract must be clear Must FT from their calculation if shown. Allow a consistent misread of the horizontal scale. CAO
12. $6(x - 1) + 4(4x - 6) = 3 \times 1$ or equivalent $22x - 30 = 3$ or equivalent $x = 1.5$	M2 A1 A1 4	For correctly clearing all 3 fractions M1 for clearing 2 fractions FT from M1 Mark their final answer. <i>If no marks awarded SC1 for sight of $(11x - 15)/6$ or $(22x - 30)/12$</i>
13. a) Frequency densities of 1.8, 2.6, 6, 2.2, 2 Histogram of their frequency densities drawn b) An attempt to add the areas of the bars $(5 + 4 + 5 + 14 + 8 + 6) = 42$ Search for the median within the 30-35 group $= 32.5$	M2 A1 M1 A1 M1 A1 7	M1 for any 3 or 4 correct. Provided M1 awarded. CAO FT their 42 provided a clear attempt made to add the areas of the bars
14. $(3x - 1)(x - 12)$ $x = 1/3$ (or 0.33) or $x = 12$	M2 A1 3	M1 for $(3x \dots 1)(x \dots 12)$ FT provided at least M1 awarded. Do not accept solutions from use of the quadratic formula only.
15. Use of $\frac{1}{2}ab \sin C$ followed by cosine rule $18.25 = \frac{1}{2} \times 9.5 \times GH \times \sin 125^\circ$ $GH = (2 \times 18.25) / (9.5 \times \sin 125^\circ)$ $GH = 4.69(\dots)$ or 4.7 $FH^2 = 9.5^2 + GH^2 - 2 \times 9.5 \times GH \times \cos 125$ $FH^2 = 163.35$ to 164 $FH = 12.7(8)$ or 12.8(cm)	S1 M1 m1 A1 M1 A1 A1 7	<i>Alternative strategy – Calculate the height, then base, then cosine rule</i> FT provided M1 awarded

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16. a) Tangent drawn Idea of increase in y /increase in x Gradient from a reasonable tangent b) Split into 3 areas and attempt to sum (Area \Rightarrow) $\frac{1}{2} \times 10(0 + 2 \times 17 + 2 \times 23 + 25)$ $\qquad\qquad\qquad = 525$ c) (Total distance travelled \Rightarrow) $525 + (10 \times 25) + (\frac{1}{2} \times 20 \times 25)$ $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad (=1025)$ (Average speed \Rightarrow) 'their 1025'/60 $\qquad\qquad\qquad = 17.(08\dots)$ (m/s)	S1 M1 A1 M1 M1 A1 M1 M1 A1 A1 9	About $0.4 \text{ (ms}^{-2}\text{)}$ Or equivalent. Award for up to 1 error in reading scale. CAO FT 'their 525' CAO for 'their 525'



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