

GCSE MARKING SCHEME

MATHEMATICS - UNITISED

NOVEMBER 2012

INTRODUCTION

The marking schemes which follow were those used by WJEC for the November 2012 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

UNIT 1 Foundation Tier	Mark	FINAL MARK SCHEME Comments
1. (a) Wednesday	B1	
(b) 6 (hours)	B1	
(c) $(\pounds)0.8(0) + (\pounds)1.45 \text{ OR } 80(p) + 145(p)$	M1	
$=(\pounds)2.25$ or $225(p)$	A1 4	
2. (a) $24 (m^3)$	B1	
(b) $12 (m^2)$	B1	
(c) 14	B1	
m or metres		
3. $(Cost =) 5 \times (f)60 + (f)120$	4 M1	For intent to multiply $\pounds 60$ by 5 and then add $\pounds 120$.
$=(\pounds) 420$	A1	
(Each pays) $(\pounds)420 \div 4$	M1	F.T. 'their total cost' \div 4.
(£)105		
4	4	Allow lengths to be $\pm 2mm$ and angle $\pm 2^{\circ}$
Correct circle.	B2	B1 if a circle drawn but radius \neq 3cm.
		'Free-hand circle' is B0 unless within overlay tolerance.
Straight line 11cm long.	B1	Allow this B1 even if line does not start at centre of
Mid point of line identified	D1	circle BUT see below.
Angle of 60° drawn (as per sketch)	B1 B1	F.T. their line length.
Augle of oo drawn (as per sketch)	DI	Penalise –1 once only if one end of the rod is not at
		centre of circle OR handle is not at mid-point.
	_	1
5 (Drefit med 1) (f) 1900	5 D1	
5. (FIGHT week $1 = -$) (1)1800 (Profit week $2 = -$) $3 \times (f)2500 = -2 \times (f)700$	M1	
$= (\pounds)6100$	A1	
$6100 \div 1800$ OR 1800×3 OR $6100 \div 3$	M1	For any correct method that enables a conclusion.
(3.3()) (5400) (2033(.33))		
A statement 'Profit has more than trebled'	A1	F.T. their 'profits'. Statement alone gains M1A1 only if
A succedent i font hus more than treored .		there are stated profits to compare.
Look for	QWC2	
• spelling		QWC2. Presents relevant material in a coherent and
 clarity of text explanations, the use of notation (watch for the use of '=' 'f' × 		logical manner, using acceptable mathematical form,
being appropriate)		grammar.
QWC2: Candidates will be expected to		QWC1. Presents relevant material in a coherent and
or steps		logical manner, but with some errors in use of
AND		OR
 make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units 		Evident weakness in organisation of material but using
in their final answer		acceptable mathematical form, and with few if any
QWC1: Candidates will be expected to		errors in spelling, punctuation and grammar.
 present work clearly, with words explaining process or steps 		OWC0 Evident weekness in ensemisation of material
OR		and errors in use of mathematical form spelling
• make few if any mistakes in mathematical form,		punctuation and grammar.
spelling, punctuation and grammar and include units		
	7	

UNIT 1	Mark	FINAL MARK SCHEME
Foundation Tier	IVIAIK	Comments
6. (a) -7 -10	B2 B1	B1 for each.
$\binom{(b)}{(c)}$ $\binom{787}{25}$	B1 B1	ET their table B0 for -25
(C) 25	4	1.1. then table. Do 101 25.
7. 24000×0.02	M1	For any correct method of finding 2% of 24000.
$=(\pounds)480$	A1	
Janet should choose the £500 option.	A1 3	Alternative method $500 / 24000 \times 100$ M1 $= 2.08(\%)$ A1A statement must be made. F.T. their '£480'.Ignore any further statements.
8.	D 4	Use overlay Allow $\pm 2^{\circ}$
3 or 4 angles correct and correctly labelled.	B4 OP	Correct labels (Words NOT the frequency OR angle).
3 or 4 angles correct, labels not fully correct.	(B3)	5 correct labers is enough.
2 angles correct and correctly labelled.	(B3)	
2 angles correct, labels not fully correct.	(B2)	
1 angle correct and correctly labelled.	(B1)	If only B1 is scored for the diagram, and all the angles
OR If 0 OP 1 for their diagram or no diagram		given correctly, then cancel the B1 and award M1, A1
II O OK 1 for their diagram of no diagram,		If BO scored for the diagram, check the angles and the
360/120	(M1)	method to see if the M1 and the A1 can be awarded.
Angles are 54° , 72° , 105° and 129°	(A1)	(1 is) 3° gets the M1.
		OR SC1 for all correct percentages:
	1	$15, 20, 29 \cdot 2 \text{ or } 29, 35 \cdot 8 \text{ or } 36.$
9. (a) (Time taken =) 7(hours) OR $420(min)$	B1	
Use of 'Distance' ÷ 'Time'	M1	
= 39 (mph) OR 62.4 (kph) OR equivalent.	A1	F.T. 'their time'.
		Any other unit of speed must be stated.
(b) $273 \times (\pounds)6.3(0)$	M1	Also allow 280/40 \times 6·3 OR 273/40 taken as 7gallons
40		for M1 leading to $(\pounds)44$ for A1.
(£)43	A1	$(\pounds)42.99()$ is A0.
		= f38 to nearest 'f' $(=0.823)$ taken as $0 \times t0.30$
	5	
10. (a) (i) 53 (cm)	B1	
(ii) $(3/9/) 2006$ and $(3/9/) 2007$	B1	
(111) 103 (cm) (112) 16		Ignora fractions of a year a g 16 m or 16 2 m
(1) 10		ignore machons of a year e.g. toyis 4111 of 10.3yrs
(b) Comment on misleading visual appearance.	B1	
e.g. 'looks as if many more boys'.		Do not accept 'there are more boys'.
Comment on 'Number' scale not starting at zero.	B1	
e.g. only starts at 80.	6	Accept the (distinct) comments in either order.

UNIT 1	Mork	FINAL MAR	RK SCHEME
Foundation Tier	магк	Com	ments
11. (Area =) 2×35	M1		
$=70(m^2)$	A1		
		An area must be indicated	OR if area of wall found
		for a F.T.	Using 5×6 AND 2×6 M1
(Litres required =) $70 \div 6$	M1	F.T. 'their area'.	$= 30(m^2) \text{ AND } 12(m^2) \text{ A1}$
= 11.6() or 12.	A1	A0 for 11 remainder 4	
		unless 12 used later.	
(Need to buy) Two '51 tins' and One '21 tin'.	M1	F.T. 'their required litres'.	F.T. their area.
		Must be for cheapest	
	A 1	combination possible.	
(Cost =) (£)30	AI 6		
$12(a)$ 10×20	0 M1	$A_{22} = (10 \pm 0.2) \times 20$	
12. (a) 10×50		Accept $(10 \pm 0.2) \times 30$.	206 (law) asia M1 A 1
500 (KIII)	AI	Answers in the range 294 to	306 (km) gain MTAT
(b) Bearing of 070° from Valencia	M1	$\pm 2^{\circ}$ (use evenlay) Allow th	M marks for data process
(b) Bearing of 070 from valencia.	1411	± 2 (use overlay). Allow the	on that the correct bearings
Bearing of 200° from Barcelona	M1	baya baan offered	on that the correct bearings
Dowing of 200 Hom Durotiona.		have been offered.	
Position marked OR two lines intersecting.	A1	FT if at least M1 and two i	ntersecting lines
	5		intersecting intes.
13. (a) Q1. A statement regarding e.g.	B1	For any equivalent statemen	t.
'not relevant', 'confidentiality', 'too personal'		Ignore extra comments.	
Q2. 'times not exclusive'	B1	For any one of these, or equ	ivalent statement.
'over what period of time?'		Ignore extra comments.	
		SC1 if <u>both</u> correct but in re	verse order.
(b) A criticism regarding location (biased at library)	B1	For any one of these, or equ	ivalent statement.
OR poor distribution method.		Ignore extra comments.	
OR does not target teenagers.	2		
	3		1: 1: 01
14. Showing strategy of two sets of 3 books $+ 1$ book.	51 D1	Adding five of the prices im	plies this S1.
Best combination found. $(\pounds/.99 \text{ and } \pounds/.50 \text{ free})$	BI	Implied by sight of (£)41.48	
25 × (£)56 07	M1	Allow 0.25×6 the supervised gue	n of the gaven prices'
$\frac{2.5}{100}$ × (t) 50.97	1011	Allow $0.23 \times $ attempted sur	n of the <u>seven</u> prices
-(f)1424()	Δ1	CAO	
$-(\omega)$ 17.27()	711	0.11.0.	
'Buy 3 get cheapest free' a better offer than 25% off.	B1	F.T. their derived amounts (must have considered at
		least one free book to derive	one amount and must have
		used 25% to derive other an	ount).
			, ,
		Alternative methods for M1,	<u>A1.</u>
		·	
		$(7.99 + 7.50) \times 100$	F.Ttheir 'saving'. Ml
		56.97	
		= 27(.18.)(%)	A1
			1.7.1
		OK Comparing prices	MI
		(t)41.40 (r.1their savin (f)42.73 or (f)42.72(IS J AND
	5	$(z)^{42.75} \text{ Or } (z)^{42.72} ()$	AI
	5		

UNIT 2 - FOUNDATION TIER

UNIT 2 (Non calculator)	Mark	FINAL MARK SCHEME
Foundation Tier	Mark	Comments
1. (a) (i) 34205	B1	
(ii) Three million	B1	
	D1	
(b) (1) $37, 43$	BI D1	
(11) 45	D1	
(11) 48	BI	
(c) (i) 2650	B 1	
(i) 2000 (ii) 3000	B1	
(1) 5000	DI	
(d) (i) 35	B1	
(ii) 36	B1	Accept 6 ²
(iii) 31 or 37	B1	L
	10	
2. km	B1	Kilo(s) gets B0
g	B1	
m	B1	
ml OR cm ³ OR cl	B1	
	4	
3. (a) 6, 6, 6, 6, 6	B1	
(b) 3 or 4 6s with 2 or 1 non 6s	B1	
(c) Any 5 numbers other than 6	B1	
(d) Either two 5s and two 6s and another different	B1	
number		
OR one 5 and one 6 and 3 different numbers		
OR 5 numbers all of which are not 5 or 6.	4	
(a) (b) Subtract 7 (from the provided term)	4 D1	Assessed 7 Demotes and m 7
4. (a) (f) Subtract 7 (from the previous term) (ii) Divide (the previous term) by 4	DI D1	Accept -7 . Do not accept $n - 7$
(ii) Divide (the previous term) by 4 (b) $(0) 04$	B1	Accept $\div 4$. Do not accept $n \div 4$
(0) (0).04 (c) $30/100 \times 80$	M1	<u>.04% gets BU</u> Any connect method for finding 200/
-24	Δ1	Any correct method for finding 50%
(d) For the '24' sequence	B1	$\frac{2470}{24} \frac{9}{48} \frac{1}{48} \frac{1}{42}$
For the '32' sequence	B1	32 52 (72) OR 20 40 60
72	B1	52, 52, (72) OR 20, 10, 00
	8	
5. (a) Kite	B1	
(b)		
	B2	B1 for at least 3 correct and no more than 2 incorrect.
A B		
	3	
6. (a) $A(3, -2)$, P(4, -2)	BI	Reverse coordinates get 0.
B(-4, -3)	D1	
(0) (1) 4 (3) 2	DI D1	
(11) 2		
7 (a) $450 - 150 = 300$	M1	For subtracting 150 and dividing by 75
300/75 = 4	A1	A ST SAMMONING TOO WHA AFTIMING DY 10
5 days	B1	
(b) $(\pounds) 90$	B1	OR for (£)540
	4	
8. (a) $9a + 2b$	B2	B1 for either in an expression of the form xa + yb
		OR B1 for both 9a and 2b not in an expression
(b) $(x =) 100$	B1	
(c) 1, -8	B1, B1	F.T. 'their 1' – 9 if answer negative
	5	

UNIT 2 (Non calculator)	Maula	FINAL MARK SCHEME
Foundation Tier	магк	Comments
9. Cost of apples = $\pounds 13.80 - 1.80 \times 5$	M1	
= (£) 4.8(0)	A1	
Cost of 1kg of apples = $4.80/3$	M1	F.T. 'their 4.80° but NOT (£)13.80
= (£) 1.6(0)	AI	Accept rounding, truncating or more than 2 d.p.
OWC		160p gets this A1, but 160 gets A0.
QWC Look for	OWC	OWC2 Presents relevant material in a scherent and logical
• Spelling	$\frac{Q}{2}$	manner using acceptable mathematical form and with few if
 Clarity of text explanations 	2	any errors in spelling, punctuation and grammar.
 The use of notation – watch for '=' kg 'f' 'n' 		and enous in spering, paretantion and graninan
being used appropriately		QWC1 Presents relevant material in a coherent and logical
OWC2: Candidates will be expected to		manner but with some errors in use of mathematical form,
• present work clearly, with words explaining their		spelling, punctuation or grammar.
processes or steps. Use £ and p correctly.		OR
AND		Evident weaknesses in organisation of material but using
• make few if any mistakes in mathematical form,		acceptable mathematical form, with few if any errors in
spelling, punctuation and grammar and include		spelling, punctuation and grammar.
units in their final answer		OWC0 Evident weaknesses in organisation of material and
		errors in use of mathematical form spelling punctuation and
QWC1: Candidates will be expected to		oranmar
• present work clearly, with words explaining their		Sidimidi.
processes or steps. Use £ and p correctly.		
OK		
• make lew II any mistakes in mathematical form,		
units in their final answer	6	
10 (a) 7/12	B2	B1 for idea of $12-5$ (=7) or for sight of $5/12$
(b) Use of all results to inform response, e.g.	M1	Idea of using all data available
'60 throws altogether used'		OR mentions 'results of all children', or 'each person'
20 sixes or $20/60$ (=1/3)(or equivalent) throws sixes	M1	OR should be 10 sixes for fair dice, or 2 sixes each time
		Do not award for fact 'fair dice probability is 1/6', unless
		compared with dice used (P(six) = $\frac{1}{3}$) or to give number of 6s
		expected (2 in 12 throws, or 2/12)
Conclusion based on correct working:	A1	OR similar in reverse statement.
biased with reason that fair dice would expect fewer sixes		Must be based on correct working
recorded or equivalent statement, e.g. biased, because		If all results not referred to then max M0 M1 A1
should expect 10 sixes and there are 20°	5	If no marks in (b), SCI in (b) sight of 20/00 in (a)
11	5	If consistent incorrect goals used in (a) then nonalize MD 1
11. (a) Enlargement scale factor 3	B2	B1 for at least 4 vertices correct
(a) Emargement scale factor 5	B1	bi for at least 4 vertices concer
(b) Correct rotation	B1	(0, 1), $(0, 2)$, $(3, 2)$, $(3, 1)$
(c) Correct reflection	B2	B1 Reflect in any vertical line or in y=1, OR x=1 seen
H2	6	
12.(a) 27 <i>x</i>	B2	B1 for correct but unsimplified expression, e.g. $3x+6\times4x$
		If B2, penalise further working -1
(b) Sight of $54x$ or 54	B1	FT for twice the coefficient of x or twice the term given in (a)
Attempt 54/4 or similar appropriate strategy	S1	FT their $54x \div 4$
		Similar strategy e.g., a multiple of 4 close to 54 divided by 4
2 size A AND 12 size P	DO	$\left(52-4^{\circ}\right)$ ET for their (54x ²)
Accept an embedded answers	D2	B1 for suitable numbers of Δ and B for their '54v' OD
		B1 for 13 size B from correct working OR
		B1 for a correct method towards maximising the number of
		size B but 1 error in working
		Award SC2 (with no other marks) for an answer of 6 size A
		and 12 size B
H4	6	An answer of 2 size A and 13 size B is awarded all 4 marks.

UNIT 3 - FOUNDATION

UNIT 3 (Calculator allowed) Foundation Tier	Mark	FINAL MARK SCHEME Comments
1. (a)(i) 21.65 (meat)	B1	
5.11 (cheese)	B1 P1	
9.84 (drinks)	DI	
(£) 36.6(0)	B1	F.T. their figures for 1 error
		Unsupported 36.6(0) gets B4.
(ii) $10\% = (\pounds) 3.66$	M1	Any valid method for finding 5%
$5\% = (\pounds) \ 1.83$ OR $183 \ (\underline{\mathbf{p}})$	A1	F.T. their total
$P_{0.05}$ (f) 34 77	P 1	<u>Unsupported</u> (£)1.83 gets the M1, A1.
1 ays (2) 57.17	DI	
(b) (i) 256.7	B1	
(ii) 257 (iii) 300	BI B1	
(iii) 500	10	
2. (a)	B1	
	B1	Accept any orientation of the rectangle
	DI	Accept any orientation of the rectangle
	54	
	BI	
	B 1	Accept any orientation of the 3 squares joined together
(b) Summer	B1	B0 for 550, but B1 for Summer and 550
	5	
3. Evidence of square counting	M1	
59 - 65	A1 D1	
590 - 650	BI	F.1. $10 \times \text{ their area}^{\circ}$ Unsupported answers in the range 590 – 650 get all 3 marks
	3	Choupported and wers in the range 575 555 get an 5 marks
<u>Use overlay allow $\pm 2mm$</u>	D 1	
4. (a) $XZ=9.6$ cm Angle ZXY (63°)	B1 B1	Allow ± 2 mm Allow $\pm 2^{\circ}$ as on overlay
Completed triangle	B1	Only if at least one B1 awarded.
		<u>Complete reflection of the triangle gets B2</u>
(b) Arc through both arms of the angle centre B	B1	
Arcs to give bisector and line drawn.	B1	
$(c) = 2 \operatorname{arcs} \operatorname{for} 120^{\circ}$	R1	
Bisecting 60° and 120° arcs	B1 B1	
Drawing the 90°	B1	
	8	
5.	0	
Reading at the end of the period 48576		
Keading at the beginning of the period 48262 Number of units used 314	R1	
$314 \times 24 (\div 100)$	M1	
75.36	A1	Must be in £s for the A1. Pence gets A0.
Charge: 35p per day for 90 days 31.5(0) Total cost 106.86	Bl R1	FT their figures
		1.1. then figures.
	5	

Equadation Tion	IVIALK	Commonta
Foundation Her	M1	Comments
= 54	A1	
cm^2	U1	Independent of other marks
(b) 30 (cm)	B1	
7. (a) 27	B2	B1 for 12 OR 15
(b) 14	B2	B1 for – 3 OR (9 and 8)
	4	
8. (a) 1.17	B2	B1 for 1.174(96423) All places given must be correct rounded or truncated
(b) 40.1	B2	B1 for 40.13(10429) All places given must be correct rounded or truncated
	4	
9. (a) Plotting at (20, 1)	B1	
Horizontal line 10 minutes long	B1	F.T. 'their bus stop' plot
Plotting the point 30 minutes along and 10km	B2	The line must be drawn for the B2.
above the end of their horizontal line OR at (60, 11)		B1 for each OR B1 for a plot at (60,10) and the line drawn.
(b) $10 \text{ km in } \frac{1}{2} \text{ hour} =$	M1	
20 (km/h)	AI	
(c) 3.3 to 3.4 (km)	B 1	F.T. their graph. Difference between distances from 'their school' position and where their line cuts time = 50 secs.
	7	
 a) Tablet A fulls out after 40/(2+2) a) Tablet B runs out after 20 days Tablet C runs out after 30 days Look for Spelling Clarity of text explanations The use of notation – watch for kg, '=', '£', '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 	A1 B1 B1 QWC 2	 QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar. OR Evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation and grammar.
(b) Tablets A and B will run out after 20 days	M1 A1	Working with multiples of 10 and 20
(c) All 3 tablets will run out after 60 days	M1 A1 10	Working with multiples of 10, 20 and 30

UNIT 3 (Calculator allowed)	Mark	FINAL MARK SCHEME
Foundation Tier	магк	Comments
 11. (a) Interpretation of the two extra numbers, e.g. 'the total of the 2 numbers is 76', or 'mean of the two extra numbers is 38' (b) 2 1 2 2 since in any order 	B3	B2 for $7 \times 28 = 196$ and $5 \times 24 = 120$ with difference 76, or "each number is 38", OR B1 for $5 \times 24 = 120$ or $7 \times 28 = 196$ or sight of $7 \times 28 - 5 \times 24$, or statement such as 'mean of the two numbers is greater than 24' B0 if reference in a statement only to one of the extra numbers
(b) -2, 1, 3, 3 given in any order	Б3	B2 for satisfying 3 of the 4 conditions, e.g. greatest number 3 and more than one three with smallest number -2, OR B1 for satisfying 2 of the 4 conditions, e.g. greatest number 3 and more than one three, or for the greatest 3 and smallest -2 <u>Conditions to check for 'their numbers':</u> <u>Mode 3, No number>3, Range 5, Median 2</u> <u>B2 for 3 conditions satisfied</u> B1 for 2 conditions satisfied
12.(a) Accurate rhombus drawn within tolerances with all	B4	B3 for sides all correct lengths (+2mm) and evidence of
appropriate construction arcs shown ($6 \text{ cm} \pm 2\text{mm}, 60^\circ \pm 2^\circ, 120^\circ \pm 2^\circ$)		suitable construction for either a $60^{\circ}\pm2^{\circ}$ or a $120^{\circ}\pm2^{\circ}$ with arcs shown, OR B2 for a least 2 sides shown correct (±2 mm) and either $60^{\circ}\pm2^{\circ}$ or $120^{\circ}\pm2^{\circ}$ constructed correctly with arcs shown, OR B1 for knowing the rhombus has angles 60° , 60° , $120^{\circ}\pm2^{\circ}$ and $120^{\circ}\pm2^{\circ}$ (may be a correct rhombus drawn), or for a construction of $60^{\circ}\pm2^{\circ}$ or $120^{\circ}\pm2^{\circ}$ with appropriate arcs, or a construction of a rhombus with sides 6cm showing arcs
(b)Correct region shaded	В3	Mark intention. B1 for line, B1 for arc, B1 for shading (FT arc centre A and a line crossing AB). Shading needs to be on both sides of AB. Remember arc centre B is MR-1 continue to mark If 2 arcs are drawn, with shading ambiguous then mark the straight line only R0, B1, B0
Н5	7	straight the only, bo, b1, bo
13.(a) Angle 60° ($\pm 2^{\circ}$) or sight of $\frac{1}{6}$ or equivalent $60/360 \times 1620$	B1 M1	Not for 60/360 of 1620, need to see (or imply) "×"
(£)270	A1	FT from their angle, fraction or percentage
b) Complete method, e.g. $2/3 \times 270$	M1	FT from (a). For bus fares accept $20^{\circ}(\pm 2^{\circ})$, or 0.05 to 0.06, or 5% to 6%
(£)180	A1	Mark final answer. If no marks SC1 for (£)90 Errors of premature approximation are penalised -1 in (a) & (b) Do not credit 'spurious correct' answers from incorrect working
(c) Explanation that shows clear understanding that the pie charts are based on different amounts so the angles cannot be directly compared, with a conclusion that Maria is wrong, e.g. 'Maria is wrong as the same angle means that the same proportion of money is spent, not the same amount of money, as Maria has more to spend' H4	E2 7	Accept explanations that imply that Maria is wrong. E1 for statement, e.g, 'Maria is wrong, as Mark has less to start with', or 'Mark has a lower first month salary than Maria, so Maria is wrong', OR E1 for understanding shown but no conclusion Accept errors in calculation if process and idea correct

UNIT 1 - HIGHER TIER

UNIT 1	Mork	FINAL MAI	RK SCHEME
Higher Tier	магк	Com	ments
1. Bearing of 070° from Valencia.	M1	$\pm 2^{\circ}$ (use overlay). Allow th	e M marks for dots, crosses
		or any unambiguous indicat	ion that the correct bearings
Bearing of 200° from Barcelona.	M1	have been offered.	
Position marked OR two lines intersecting.	A1	F.T. if at least M1 and two i	ntersecting lines.
	3		
2. (a)(1) French AND reference to greater spread.	BI	Mark allowed for understand	ding of spread.
(::) C = (1 + 1)	D 1	Ignore extra comments.	
(11)Geography AND reference to more high marks.	BI	Do not accept any explanate	on if based on a calculation.
		(whilst in French most soor	and 4)' unless further
		understanding is shown	tu +) unless further
		Ignore extra comments	
(b) Comment on misleading visual appearance.	B1	ignore entre comments.	
e.g. 'looks as if many more boys'.	21	Do not accept 'there are mo	re bovs'.
Comment on 'Number' scale not starting at zero.	B1	_ · · · · · · · · · · · · · · · · · · ·	
e.g. 'only starts at 80'.		Accept the (distinct) comme	ents in either order.
	4		
3. (Area =) 2×35	M1		
$=70(m^2)$	A1		
		An area must be indicated	OR if area of wall found
		for a F.T.	Using 5×6 AND 2×6 M1
(Litres required =) $70 \div 6$	M1	F.T. 'their area'.	$= 30(m^2) \text{ AND } 12(m^2) \text{ A1}$
= 11.6() or 12.	A1	A0 for 11 remainder 4	
	2.0	unless 12 used later.	
(Need to buy) Two '51 tins' and One '21 tin'.	MI	F.1. 'their required litres'.	F.T. their area.
		Must be for cheapest	
(Cost -) $(C)20$	Δ 1	combination possible.	
(COST -) (L)50	6		
4 (a) (i) $2 \times (100)^3$	M1		I
= 2000000	A1		
200000			
(ii) 2000	B1	OR F.T. 'their (i)' / 1000.	
(b) $\frac{1}{2} \times 4.5 \times 6$	M1		
$= 13.5 (\text{cm}^2)$	A1		
	5		

UNIT 1 Higher Tier	Mark	FINAL MARK SCHEME Comments
 5. Showing strategy of two sets of 3 books + 1 book. 'Best' combination found. (£7.99 and £7.50 free) 	S1 B1	Adding five of the prices implies this S1. Implied by the sight of $(\pounds)41.48$.
$\frac{25}{100} \times (\pounds) 56.97$	M1	Allow $0.25 \times$ 'attempted sum of the <u>seven</u> prices'
$= (\pounds)14.24()$	A1	C.A.O.
'Buy 3 get cheapest free' a better offer than 25% off.	B1	F.T. their derived amounts (must have considered at least one free book to derive one amount and must have used 25% to derive other amount).
		Alternative methods for M1, A1.
		$\frac{(7.99 + 7.50)}{56.97} \times 100$ F.Ttheir 'saving'. M1
		= 27(.18.)(%) A1
		OR Comparing prices M1
		$(\pounds)42.73 \text{ or } (\pounds)42.72()$ A1
 Look for spelling clarity of text explanations, the use of notation (watch for the use of '=', £ and % being appropriate) 	QWC2	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		QWC1. Presents relevant material in a coherent and logical manner, but with some errors in use of mathematical form, spelling, punctuation or grammar. OR
 make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer OWC1: Candidates will be expected to 		Evident weakness in organisation of material but using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.
 present work clearly, with words explaining process or steps 		QWC0. Evident weakness in organisation of material
OR • make few if any mistakes in mathematical form		punctuation and grammar
spelling, punctuation and grammar and include units in their final answer		
	7	
$ \begin{array}{cccc} 6. & 9000 \\ & \underline{450} \\ & 9450 \end{array} $	B1	For the evaluation of a correct 5% OR Sight of 1.05 (1350 implies 3×450 and gains B1).
$ \frac{472.5(0)}{9922.5(0)} 496.12(5) $	M1	For attempting to find 3 different 5%. OR 9000×1.05^3 .
$\begin{array}{c} \underline{490.12(5)} \\ 10418.62(5) \text{OR} \ 450, 472.5(0) \text{ and } 496.12(5) \\ (\pounds) \ 1418.62(5) \text{OR} \ (\pounds) \ 1418.63 \end{array}$	A1 A1	Accept 496.13 instead of 496.12(5) F.T. one error.
		SC2 for an answer of (£)922.5(0) Depreciation could gain B1, M1, A0, and A0.
	4	

UNIT 1 Higher Tier	Mark	FINAL MARK SCHEME
7. (a) $1050 = 1.8 \times 900 - F$	B1	For correct substitution.
1.2		
$(F =) 1.8 \times 900 - 1050 \times 1.2$	M1	Accept $1050 \times 1.2 - 1.8 \times 900 \ (= -F)$
(F =) 360 (euros)	A1	A0 for -360
(b) Indicates that point A is linked to the fixed cost or that no plates were sold.	B1	Accept any unambiguous equivalent statements. B0 for e.g. 'making a loss' unless there is some reference to the fixed cost or that no plates were sold.
Indicates that point B shows number of plates that must be sold in order to break even.	B1 5	Accept e.g. 'minimum sold in order to start making a profit'.
8. (a) Least capacity $= 595$	B1	
Greatest capacity $= 605$	B1	Accept 604.999recurring.
(b) Greatest volume = 120×605	M1	F.T. 'their greatest capacity' only if > 600 . Ignore other multiplications seen
= 72600(ml) OR 72.6(litres)	A1	
72500(ml) OR 72.5(litres)	B1	
A statement that there is a possibility of overflowing.	E1	F.T. logical statement. Numerical errors are allowed but <u>must remain consistent</u> with the possibility of overflowing. Note also the correct division arguments '72.5 /0.605 = 119.3() which is less than 120' OR '72.5 /120 = 0.604(1) which is less than 0.605'
	6	
9. <u>Area Time Machines</u>		
	M1	For correctly arriving at a row with (area)1120 OR (time) 4.
	M1	F.T. above row to 'correctly' arrive at a row with (area)1120 AND (time) 4.
1120 4 <u>7</u> (Watch out for compensating errors)	A1	C.A.O. with the answer evaluated. If no marks gained allow SC1 for sight of '40m ² per machine per hour' or equivalent OR sight of 7/3 or equivalent
		$\frac{Alternative method}{3 \times 1120} M1$
	3	600×5 M1
		$4 = 7 (machines) \qquad A1$
$10. 65\% \equiv 1144$	B1	Accept any indication.
(Original number) $\frac{1144}{65} \times 100$	M1	· ·
= 1760	A1	C.A.O.
	3	

UNIT 1 Hickor Tim	Mark	FINAL MARK SCHEME
$\frac{\text{Higher Her}}{11 \text{ (a)}} \frac{310 \times 2 \times \pi \times 3}{310 \times 2 \times \pi \times 3}$	M1	Comments
$\frac{11}{360} \times 2 \times k \times 3$	IVII	
= 16·2()	A1	
(Perimeter =) 22·2()(m)	A1	F.T. 'their $16 \cdot 2' + 6$. SC1 for $2 \cdot 6()$ (using 50° instead of 310°.) SC2 for $8 \cdot 6()$ In part (b) treat finding the volume of the 'metal left' as
(b) (Area of cross section) $\frac{50}{360} \times \pi \times 2^2$	M1	a misreaa ana mark accoraingiy.
= $1.74(5)(\text{cm}^2)$ or $5\pi/9$ or equivalent	A1	
(Volume) $1.74(5) \times 6$ = $10.4(7)(\text{cm}^3)$ or $10.5(\text{cm}^3)$ or $10\pi/3$ or equivalent.	M1 A1	F.T. their derived <u>area.</u> <u>Alternative method</u> (Volume of cylinder) $\pi \times 2^2 \times 6$ M1 $= 75 \cdot 4(cm^3)$ or 24π A1 F.T their derived <u>volume</u> . (Volume removed) $50 \times 75 \cdot 4$ M1 360 $= 10 \cdot 4(7)(cm^3)$ or $10 \cdot 5(cm^3)$ A1 or $10\pi/3$ or equivalent.
	7	
12. Use of 'Distance' / 'Speed'	M1	Ignore units used
(120 / 50) = 2.4 (hrs) or 2(hrs) 24(min) or equivalent.	A1	
$\frac{\text{Second car}}{\frac{60}{40} + \frac{60}{60}}$ = 2.5 (hrs) or 2(hrs) 30(min) or equivalent.	m1 A1	Must show intent to add.
Time difference $= 6 \text{ (min)}$	A1 5	F.T. 'their two times'.
13. (a) Sight of $\frac{1}{3} \times \pi \times 10^2 \times 9$ OR $\frac{1}{3} \times \pi \times 4^2 \times 3.6$ 300π or $942.(47)(\text{cm}^3)$ 19.2π or $60.3(1)(\text{cm}^3)$ (Volume of frustum =) 280.2π or $882.1()(\text{cm}^3)$ (b) $\frac{4}{3} \times \pi \times (\text{radius})^3 = 882.1$	M1 A1 A1 A1 M1	For correct substitution(either cone) Accept 942 to 943 inclusive. Accept 60·2 to 60·4 inclusive. F.T. 'their two derived volumes'. F.T. 'their frustum volume'
$(radius)^{3} = \frac{882 \cdot 1 \times 3}{4 \times \pi}$ (210.6)	AI	
Radius = $5.9(5)(cm)$	A1 7	F.T. 'their (radius) ³ '. Accept an answer of 6 if previous M1, A1 awarded.

UNIT 2 - HIGHER

UNIT 2	Monk	FINAL MARK SCHEME
Higher Tier	магк	Comments
1.(a) 7/12	B2	B1 for idea of 12-5 (=7), or for sight of $5/12$
(b) Use of all results to inform response, e.g.	M1	Idea of using all data available
'60 throws altogether used'		OR mentions 'results of all children', or 'each person'
20 sixes or $20/60$ (=1/3)(or equivalent) throws sixes	M1	OR should be 10 sixes for fair dice, or 2 sixes each time
		Do not award for fact 'fair dice probability is $\frac{1}{2}$, unless
		compared with dice used (P(six) = $\frac{7}{3}$) or to give number of
Conclusion based on correct working:	Δ1	OR similar in reverse statement
biased with reason that fair dice would expect fewer	711	Must be based on correct working
sixes recorded or equivalent statement, e.g. 'biased.		If all results not referred to then max M0 M1 A1
because should expect 10 sixes and there are 20'	5	If no marks in (b), SC1 in (b) sight of 20/60 in (a)
2.(a)		If consistent incorrect scale used in (a) then penalise MR-1
Enlargement scale factor 3	B2	B1 for at least 4 vertices correct.
Correct position	B1	
(b) Correct rotation	B1	
(c) Correct reflection	B2	B1 Reflection in any vertical line or in y=1, OR x=1 seen
	6	
$3.(a) 40^{(6)}$	BI	
(b) $1/^{\circ}$	BI	2 = (260 - 80)/2
(c) $180 - 40$ or equivalent calculation $140^{(0)}$		e.g. $(360 - 80)/2$
140		
4(a) 27r	- - B2	B1 for correct but unsimplified expression $e = 3x+6\times 4x$
1.(4) 27%	02	If B2, penalise further working -1
(b) Sight of $54x$ or 54	B1	FT for twice the coefficient of x or twice the term given in
Attempt 54/4 or similar appropriate strategy towards use	S1	(a)
of as many size B as possible		FT their $54x \div 4$
		Similar strategy e.g., a multiple of 4 close to 54 divided by 4
2 size A AND 13 size B	B2	('52÷4')
Accept embedded answers		FT for their ' $54x$ '
		BI for suitable numbers of A and B for their '54x', OR
For QWC2 the process steps leading to any answer need		B1 for 13 size B from correct working, OR
to be clear		BI for a correct method towards maximising the number of
Allow OWC if working with a value rather than an	0	Award SC2 (with no other marks) for an answer of 6 size A
expression in (b)	Ŵ	and 12 size B
	C	An answer of 2 size A and 13 size B is awarded all 4 marks.
QWC2: Candidates will be expected to	2	QWC2 Presents relevant material in a coherent and
 present work clearly, with words explaining 		logical manner, using acceptable mathematical form,
process or steps		and with few if any errors in spelling, punctuation and
AND		grammar.
 make few if any mistakes in mathematical 		OWC1 Presents relevant material in a coherent and
form, spelling, punctuation and grammar and		logical manner but with some errors in use of
include units in their final answer		mathematical form, spelling, punctuation or grammar.
OWC1: Candidates will be expected to		OR
present work clearly with words explaining		Evident weaknesses in organisation of material but
process or steps		using acceptable mathematical form, with few if any
OR		errors in spelling, punctuation and grammar.
• make few if any mistakes in mathematical		OWC0 Evident weaknesses in organisation of
form, spelling, punctuation and grammar and		material, and errors in use of mathematical form.
include units in their final answer	8	spelling, punctuation and grammar.
$5.(a) v^5 - 2v^2$	B2	B1 for each term. If B2, penalise further incorrect working -
(b) $8(x^3 + 2)$	B2	1
		B1 for correct partially factorised expression,
(c) $5x < 30$ or $x < 30/5$	B1	OR B1 for $8(+2)$ OR $8(x^3 +)$
<i>x</i> < 6	B1	
		SC1 for $x < 3\frac{1}{3}$ or $x < 3.3(33)$ or $x < 3^{3}/_{9}$
(d) $4n + 5$	B2	(Not for $x < 30/9$ nor $x < 10/3$)
	8	P1 for $4n$ (P0 for $n \mid 4$)
6(a) 8.2 × 10 ⁻⁴	D 1	Di 101 4/1. (DU 101 II+4) Denalice incorrect notation 1 only
$(a) 0.5 \times 10$ (b) 4 6 × 10 ⁵	B1 R1	i chanse meoneet notation -1 only
(0) 4.0×10	2	

Higher TierMarkComments7. $bc - bd = e$ B1Collect like termsFT until 2^{ad} error8. $bc = dt = e^{t}(c - d)$ B1Eacorise8. Any two statements equivalent to the equations: TX+ 4y = 180, 7x+17x+3y = 180, 7x+3y-4yS2Method to equate 1 coefficient (accept 1 slip)M1First variable correctA1Method to find second variablem1Second variable correctA1Second variable correctA1Second variable correctA1Second variable correctA1Y = -4x + 5A1Y = -4x + 5A1(b) TR or RT AND reasonB1(c) 360 - 90 - 90 - 92 - 92 or equivalentM11269(°)11 (a)x - 0.4747 & 100x - 47.47 with attempt to SubtractM114 (a)x - 0.4747 & 100x - 47.47 with attempt to Correct assume at all constances trained at all constances trained trained at all constances trained trained trained to find angle in quadrilateral (138°)(c) 360 - 90 - 90 - 92 - 92 or equivalent (b) 1/20 ² or 20 ² M1(d) 511 (a)x - 0.4747 with attempt to SubtractM129/45(c) 58.90)M111 (a)x - 0.4747 & 100x - 47.47 with attempt to SubtractM129/45(c) 58.90)M112(2)0000 or 0.1225 or 49.400M112(2)510000 o	UNIT 2		FINAL MARK SCHEME
7. $bc - bd = c$ $b = c/(c - d)$ B1 ECollect like termsFT until 2 nd error $bc - d) - c$ $b = c/(c - d)$ B1 EFactorias IsolateFor any one standard same level of difficulty Or alternative method leading to evaluation of variable17x + 4y = 180, 7x+17x-3y = 180, 7x+3y=4yM1 M1 M1S2 Accept informal notation (e.g. when trial & improvement used).Method to equate 1 coefficient (accept 1 slip) First variable correctM1 M1 M1Or alternative method leading to evaluation of variable T provided M1 and m1 awarded X = 4 and y = 28 H correct cansvers are see, award all 6 marks9. Gradient = (-)8/2 = -4 y = 4x + 5M1 M1 M2Or equivalent M1 M1 M1 M1 M1 A D or requivalent(b) TR or RT AND reason (c) 360 - 90 - 90 - 42 or equivalent -2 (b) 120 ² or 20 ² 11.(a)x =0.4747 & 100x=47.4, with attempt to soft" (P) 2 (P) 2 (P) 2 (P) 2M1 M1 M1 M1 M2(c) 360 - 90 - 90 - 42 or equivalent -2 (P) 2 (D) 20 or 20 ² M1 11/64000000 ¹² or equivalent $11.(a)x =0.4747 & 100x=47.4, with attempt tosoft" (P) 2(P) 2M1M1M1M1M2(b) 1202 or 202(P) 2(P) 2M112(a) Strategy: Idea 1 - P(RR) - P(RB) - P(YY),(R) equivalent29.45 (= 58:90)M1M1M1M2(b) 35/100 x 35/100(2) 225/10000 or 0.1225 or 49/400(2) 225 or 49/400(2) 225 or 49/400M1M2(b) 35/100 x 35/100(2) 225 or 49/400(2) 225 or 49/400M1M2(c) 35/100 x 35/100(2) 225 or 49/400(2) 225 or 49/400M1M2(b) 35/100 x 35/100(2) 225 or $	Higher Tier	Mark	Comments
b(-d) = e $b = e'(c - d)$ B1 $b = e'(c - d)$ Factorise B1 Isolate8. Any two statements equivalent to the equations: $17x + 4y = 180, 7x + 17x + 3y = 180, 7x + 13y = 180$	7. $bc - bd = e$	B1	Collect like terms FT until 2 nd error
b = $e/(c - d)$ B1 3Lolate8. Any two statements equivalent to the equations: $17x + 4y = 180, 7x + 17x + 3y = 180, 7x + 3y - 4y$ S2 3Accept informal notation (e.g. when trial & improvement used). S1 for any one statement FT providel 1 equation correct at same level of difficulty Or alternative method leading to evaluation of variableMethod to find second variable Second variable correctAll m1Second variable correctAll m1Second variable correctAll m1Second variable correctAll m19. Gradient = (-)8/2M1 m1 m19. Gradient = (-)8/2M1 m1 m1 m19. Gradient = (-)8/2M1 m1 m1 m110.(a) 90(°) AND reasonB1 m1 m1 (2) 360 - 90 - 90 - 42 or equivalent(b) TR or RT AND reasonB1 m1 m1 m1 (2) 69(°)(c) 360 - 90 - 90 - 42 or equivalentM1 m1 m1 m1 (2) 69(°)(b) 1720° or 20°2M1 m1 m1 (2) 0 or 20°2(c) 360 - 90 - 90 - 42 or equivalentM1 m1 m1 m1 m1(b) 1720° or 20°2M1 m1 m1 (2) 0 or 20°2(c) 360 - 90 - 90 - 42 or equivalentM1 m1 m1 m1 m1 (2) 0 or 20°211.(a)x = 0.4747 & 100x=47.47 with attempt to subtractM1 m1 m1 m1 m1(b) 1720° or 20°2M1 m1 (2) 0 or 20°2(c) 35/100 × 35/100M2 m1 (2) 0 or 20.9 or other non replacement product m1 - 1/400 ISW1 - (510 × 4.9 + 4/10 × 3.9 or (P(YY) = 1/10 × 0.9 or other non replacement product m1 - 1/20 × 3.9 or (P(B) = 4/10 × 3.9 or (P(Y) = 1/10 ×	b(c-d) = e	B1	Factorise
338. Any two statements equivalent to the equations: $17x + 4y = 180, 7x + 17x + 3y = 180, 7x + 3y = 4y$ S2Accept informal notation (e.g. when trial & improvement used). S1 for any one statement FT provided 1 equation correct and same level of difficulty Or alternative method leading to evaluation of variable or evaluation of variable or evaluation of variable9. Gradient = (>8/2 $= -4$ $y = 4x + 5$ 6If correct answers are see, award all 6 marks If correct answers are see, award all 6 marks9. Gradient = (>8/2 $= -4$ $y = 4x + 5$ 10Or equivalent A range method leading to evaluation of 4 A range method leading to evaluation of a range method leading to evaluation of a range method leading to evaluation of a range method leading to evaluation	b = e/(c-d)	B1	Isolate
8. Acy two statements equivalent to the equations: 52 Accept informal notation (e.g. when trial & improvement used) 17x + 4y = 180, 7x+17x+3y = 180, 7x+3y=4y FT provided I equation correct and same level of difficulty Method to equate 1 coefficient (accept 1 slip) Mit Depends on first M1 being awarded Second variable correct A1 Depends on first M1 being awarded 9. Gradient = (-)8/2 Mit Or equivalent $= -4$ A1 Award M1 A0 for gradient of 4 $y = -4x + 5$ A1 Award M1 A0 for gradient of 4 $y = -4x + 5$ A1 Award M1 A0 for gradient of 4 $10.(a) 90(°)$ AND reason B1 e.g. 'radius meets tangent', allow a description but must include reference to either the "radus" or the 'tangent' (c) 360 - 90 - 90 - 92 - 42 or equivalent M1 Method to find angle in quadrilateral (138°) (b) 1/20 or 20 ⁻² A1 Mit 1/64000000 ^{1/3} or equivalent (b) 1/20 or 20 ⁻² M1 I/400 ISW A1 1/2(a) Strategy: Idea 1 - P(RR) - P(BB) - P(YY), OR = quivalent S1 For the idea, not notation. Accept missing brackets (b) 35/100 × 35/100 29/45 (= 58/90) A1 For the idea, not adwared Tor answer of 32200 or 29/90 gets the M1 as im		3	
17x + 4y = 180, 7x + 17x + 3y = 180, 7x + 3y = 4yused).SI for any one statementMethod to equate 1 coefficient (accept 1 slip)MIFirst variable correctA1Second variable correctA1Second variable correctA1 $y = -4x + 5$ A1 $y = -4x + 5$ A1 $y = -4x + 5$ A1 $10.(a) 90(°)$ AND reasonB1 $(c) 300 - 90 - 90 - 42 or equivalentA1(c) 300 - 90 - 90 - 42 or equivalentB1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 90 - 90 - 90 - 90 - 90 - $	8. Any two statements equivalent to the equations:	S2	Accept informal notation (e.g. when trial & improvement
Method to equate 1 coefficient (accept 1 slip) First variable correctFT provided 1 equation correct and same level of difficulty Or alternative method leading to evaluation of variable sceond variable correctFT provided 1 equation correct and same level of difficulty Or alternative method leading to evaluation of variable9. Gradient = (-)8/2m1Depends on first M1 being awarded F provided M1 and m1 awarded $\mathbf{x} = 4$ and $\mathbf{y} = 28$ 9. Gradient = (-)8/2M1Or equivalent A1 $= -4$ A1Avard M1 A0 for gradient of 4 FT gradient of 4 provided M1 awarded A1 $= -4$ A1Avard M1 A0 for gradient of 4 FT gradient of 4 provided M1 awarded A1 $= -4$ A1Avard M1 A0 for gradient of 4 FT gradient of 4 provided M1 awarded A1 $= -4$ A1Avard M1 A0 for gradient of 4 FT gradient of 4 provided M1 awarded A1 $= -4$ A1Avard M1 A0 for gradient of 4 FT gradient of 4 provided M1 awarded A1 (b) TR or RT AND reasonB1 e_2 "reatus meets tangent", allow a description but must include reference to either the 'radius' or the 'tangent' e_2 "reacting of tangents to circle', 'tangent' e_2 "reacting of tangents to circle', 'tangent' e_2 "reacting of the 'tangent' e_2 "reacting meets and and escription but must include reference to either the 'radius' or the 'tangent' e_2 "reacting meets and and escription but must include reference to either the 'radius' or the 'tangent' e_2 "reacting meets and and escription but must include reference to either the 'radius' or the 'tangent' e_2 for 00011. (a)x =0.4747 & 100x =47.47 with attempt to subtract $1/400$ ISWM1 A11	17x + 4y = 180, 7x + 17x + 3y = 180, 7x + 3y = 4y		used). S1 for any one statement
Method to equate 1 correctM1 M1 M1 Second variable correctM1 M1 M1 Depends on first M1 being awarded FT provided M1 and m1 awarded $x = 4$ and $y = 28$ f correct awards exent, award all 6 marks9. Gradient = (-)8/2 $= -4$ A1 $y = -4x + 5$ M1 A1 Or equivalent9. Gradient = (-)8/2 $= -4$ M1 $y = -4x + 5$ M1 A1 T gradient of 4 provided M1 and warded H7 gradient of 4 provided M1 awarded H7 gradius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' e.g. 'meeting of tangents to circle', 'angents from same point (to the circle'), allow a description M1 M1 M1 A1 1/400 to f model A1, allow a description M2 Section 1 and a section for a split of 400 411.(a)x = 0.4747 & 100x = 47.47 with attempt to subtract 47/99M1 H1 H64000000 ^{1/3} or equivalent H7 for a split of 400 412.(a) Strategy: Idea 1 - P(RB) - P(BB) - P(YY), COR equivalent P(YY) = 1.10 × 0.9 or other non replacement product 1 - (5/10 × 4.9 + 4/10 × 3.9 + (1/10 × 0.9))M1 A1 H1 H1/64000000 ^{1/3} or equivalent H7 mo marks allow SC1 for sight of 400 A1 H2(b) 35/100 × 35/100 L225/1000 or 0.1225 or 49/400 L225/10000 or 0.1225 or 49/400 L225/10000 or 0.1225 or 49/400 L2			FT provided 1 equation correct and same level of difficulty
First variable correctAIMethod to find second variableandSecond variable correctAIMethod to find second variableAISecond variable correctAI9. Gradient = (-)8/2MI $= -4$ AI $y = -4x + 5$ AI $= -4$ AI $y = -4x + 5$ AI10.(a) 90(°) AND reasonBIe.g. 'radius meets tangent', allow a description but must include reference to either the 'radius' or the 'ingent'(b) TR or RT AND reasonBI(c) 360 - 90 - 90 - 42 or equivalentMI $/2$ $69(°)$ 11.(a) x = 0.4747 & 100x = 47.47 with attempt to subtractubtract 47.99 (b) 1/20² or 20²AI12.(a) Strategy: Idea 1 - P(RR) - P(BB) - P(YY), OR equivalentP(RR) = 5/10 × 4/9 or P(BB) = 4/10 × 3/9 o	Method to equate 1 coefficient (accept 1 slip)	M1	Or alternative method leading to evaluation of variable
Method to find second variablem1Depends on first M1 being avardedSecond variable correctA1FT provided M1 and m1 avarded9. Gradient = (-)8/2M1Or equivalent $= -4$ A1FT gradient of 4 provided M1 avarded $y = 4x + 5$ A1FT gradient of 4 provided M1 avarded $y = 4x + 5$ A1FT gradient of 4 provided M1 avarded10.(a) 90(°) AND reasonB1c.g. 'radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent'(b) TR or RT AND reasonB1c.g. 'radius meets tangent', allow a description(c) 360 - 90 - 90 - 42 or equivalentM1/2m169(°)A1(b) 1/20 ² or 20 ² M111.(a)x = 0.4747 & 100x= 47.47 with attempt toM1subtract47/99(b) 1/20 ² or 20 ² M112.(a) Strategy: Idea 1 - P(RR) - P(BB) - P(YY), OR equivalentS1P(YY) = 1/10 × 0.99 or the non replacement productM11 - (5/10 × 4.9 + 4/10 × 3.9 + (1/10 × 0.9)]A129/45 (= 58.90)A1(b) 35/100 × 35/10012(.25%)A1Correct sketch with (0, -13) indicated(b) Intention to show reflection in x-axis passing through (2.0)B1A1 avardedTr on marks S01 for an answer of 32.90 or 29.90 gets the M1 as implied, no other marks(b) Intention to show reflection in x-axis passing through (2.0)B1(c) Correct reflection and (0, 8) indicatedB1A1A112(2,0)Correct reflection in x-axis	First variable correct	Al	
Second variable correctA1F1 provided M1 and m1 awrided $\mathbf{x} = 4$ and $\mathbf{y} = 28$ 9. Gradient = (-)8/26If correct answers are seen, award all 6 marks9. Gradient = (-)8/2M1Or equivalent $y = -4x + 5$ A1A1 $y = -4x + 5$ A110.(a) 90(°) AND reasonB1(b) TR or RT AND reasonB1(c) 360 - 90 - 90 - 42 or equivalentB1(c) 360 - 90 - 90 - 42 or equivalentM1(c) 360 - 90 - 90 - 42 or equivalentM1(b) TR or RT AND reasonB1(c) 360 - 90 - 90 - 42 or equivalentM1(b) 120 ² or 20 ² M1(c) 360 - 90 - 90 - 42 or equivalentM1(b) 120 ² or 20 ² M1(b) 120 ² or 02 ² A1(b) 120 ² or 02 ² A112.(a) Strategy: Idea 1 - P(RR) - P(BB) - P(YY), OR equivalentS1P(RR) = 5/10 × 4/9 or P(BB) = 4/10 × 3/9 or P(YY) = 1/10 × 0/9 or other non replacement productM11 - $(5/10 \times 4/9 + 4/10 \times 3/9 + (1/10 \times 0/9))$ A129/45 (= 58/90)A1(b) 35/100 × 35/100M1(c) 35/100 × 35/100M1(b) 35/100 × 0.00 or 0.1225 or 49/400A112.(25%)A113.(a) Sketch (shift down)12(.25%)(b) Intention to show reflection in x-axis passing through (2.0)(c) 0 and (0, 8) indicatedB1Allow rasis gravation of 100-65'F Thore and the y-axis(b) Intention to show reflection in x-axis passing through (2.0)(c) 0 and (0, 8) indicated(c)	Method to find second variable	ml	Depends on first MI being awarded
$X = 4$ and $y = 25$ 9. Gradient = (-)8/2If correct answers are seen, award all 6 marks9. Gradient = (-)8/2M1 $x = -4$ A1 $y = -4x + 5$ A110.(a) 90(°) AND reasonB1(b) TR or RT AND reasonB1(c) 360 - 90 - 90 - 42 or equivalentB1 2 e_2 'nactis meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent'(c) 360 - 90 - 90 - 42 or equivalentM1 2 e_2 'meeting of tangents to circle', 'tangents from same point (to the circle'), allow a description but must include reference to either the 'radius' or the 'tangent' e_2 'meeting of tangents to circle', tangent stom same point (to the circle'), allow a description but must include reference to either the 'radius' or the 'tangent' $f(0) 1/20^2$ or 20^2 M1 $1/400$ ISWM1 $1/400$ ISWM1 $1/400$ ISWM1 $1/400$ ISWM1 $1/5/10 \times 4/9$ or P(BB) = $A/10 \times 3/9$ or P(YP), OR equivalent $P(YY) = 1/10 \times 0/9$ or other non replacement product $1 - (5/10 \times 4/9 + 4/10 \times 3/9 + (1/10 \times 0/9))$ $29/45$ (= 58/90) $12(2,5%)$ $13(a)$ Sketch (shift down) $2125/10000$ or 0.1225 or $49/400$ $12(2,5\%)$ $13(a)$ Sketch (shift down) $Correct sketch with (0, -13) indicated0000000000000$	Second variable correct	AI	F1 provided M1 and m1 awarded
9. Gradient = (-)8/2 = -4 $y = -4x + 5$ MIOf conjunction of the provided MI awarded fro other marks then SCI for $y =x + 5$ or $y = 5x - 4$ H And FT gradient of 4 provided MI awarded if no other marks then SCI for $y =x + 5$ or $y = 5x - 4$ 10. (a) 90(°) AND reasonB1e.g. 'radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' e.g. 'radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' e.g. 'radius meets tangent' allow a description but must include reference to either the 'radius' or the 'tangent' e.g. 'tangents from same point (to the circle), allow a description MI(c) 360 - 90 - 90 - 42 or equivalent /2M1(b) TR or RT AND reasonM1(c) 360 - 90 - 90 - 42 or equivalent /2M1(b) 1/20 ² or 20 ² M1(b) 1/20 ² or 20 ² A11/400 ISWA11/400 ISWA11/5I/64000000 ^{1/3} or equivalent If no marks allow SCI for sight of 400 41/2 (a) Strategy: Idea 1 - P(RR) - P(BB) - P(YY), (YY) = 1/10 × 0/9 or other non replacement product 1 - {5/10 × 4/9 + 4/10 × 3/9 + (1/10 × 0/9)M129/45 (= 58/90)M1(b) 35/100 × 35/100M121225/10000 or 0.1225 or 49/400 12(.25%)M1A1Correct sketch with (0, -13) indicated(b) Intention to show reflection in x-axis passing through (2.0)M1Correct reflection and (0, 8) indicatedB1A1A1B1A1B1A1B1A1B1A1 <t< td=""><td></td><td>6</td><td>x = 4 and $y = 28$</td></t<>		6	x = 4 and $y = 28$
A chain $= -4$ $y = -4x + 5$ AnOr quivalent ward M1 A0 for gradient of 4 FT gradient of 4 provided M1 awarded H no other marks them SCI for $y =x + 5$ or $y=5x - 4$ 10.(a) 90(°) AND reasonB1 (b) TR or RT AND reasonB1 c.g. 'radius meets tangent', allow a description but must include reference to either the 'radius' or the 'rangent' or the 'rangen	9 Gradient $-(-)8/2$	0 M1	Or equivalent
$y = 4x + 5$ AlFT gradient of 4 provided M1 awarded If no other marks then SCI for $y = x + 5$ or $y = 5x - 4$ 10.(a) 90(°) AND reasonB1 ξ radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' e.g. 'meeting of tangents to circle', 'angents from same 	- 4		Award M1 A0 for gradient of 4
1317 <td>y = -4x + 5</td> <td>A1</td> <td>FT gradient of 4 provided M1 awarded</td>	y = -4x + 5	A1	FT gradient of 4 provided M1 awarded
10.(a) 90(°) AND reasonB1c.g. radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' c.g. radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' c.g. radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' c.g. radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' c.g. radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' c.g. radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' c.g. radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' c.g. radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' c.g. radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' c.g. radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' c.g. radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' c.g. radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' c.g. radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' c.g. radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' c.g. radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' the intervent', allow a description but must include reference to either the 'radius' or the 'tangent' the intervent', allow a descri	y = 100 + 5	3	If no other marks then SC1 for $y = x + 5$ or $y=5x - 4$
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	10 (a) 90(°) AND reason	B1	e.g. 'radius meets tangent', allow a description but must
(b) TR or RT AND reasonB1e.g. 'meeting of tangents to circle', 'tangents from same point (to the circle)', allow a description(c) $360 - 90 - 90 - 42$ or equivalentM1/269(°)11.(a)x =0.4747 & $100x = 47.47$ with attempt tosubtractA147/99A1(b) $1/20^2$ or 20^{-2} M11/400 ISWA11/2(a) Strategy: Idea $1 - P(RR) - P(BB) - P(YY)$, OR equivalentS1P(RR) = $5/10 \times 4/9$ or $P(BB) = 4/10 \times 3/9$ or $P(YY) = 1/10 \times 0/9$ or other non replacement productS1P(RY) = $1/10 \times 3/9 + (1/10 \times 0/9)$ A1A1Or alternative full calculation shown Allow missing brackets if intention clear ISW. Ignore incorrect cancelling An answer of $32/90$ or $29/90$ gets the M1 as implied, no other marks(b) $35/100 \times 35/100$ M1(c) $35/100 \times 35/100$ M113.(a) Sketch (shift down) Correct sketch with (0, -13) indicatedB1 A1A1.(a) Sketch (shift down) Correct reflection in x-axis passing through (2,0)B1 Accept 8 on the y-axis. Do not allow if passing through (-3,0) and/or (3,0) SC/1 or a correct translation up with -3 indicated Intention means that reflection of the curve is correct in at least 2 of the 3 quadrants Accept 8 on the y-axis.B1Accept 8 on the y-axis. B1			include reference to either the 'radius' or the 'tangent'
(c) $360 - 90 - 90 - 42$ or equivalentpoint (to the circle)*, allow a description/2MI/269(°)11.(a) x = 0.4747 & 100x = 47.47 with attempt tosubtract47.99(b) $1/20^2$ or 20^2 MI1/400 ISWA11/2.(a) Strategy: Idea $1 - P(RR) - P(BB) - P(YY)$, OR equivalentS1P(RR) = 5/10 × 4/9 or P(BB) = 4/10 × 3/9 or P(YY) = 1/10 × 0/9 or other non replacement productS1For the idea, not notation. Accept missing brackets <i>YY may be omitted as P(YY)=0</i> P(RR) = 5/10 × 4/9 + 4/10 × 3/9 + (1/10 × 0/9)]A1OR equivalent P(YY) = 1/10 × 0/9 or other non replacement product 1 - {5/10 × 4/9 + 4/10 × 3/9 + (1/10 × 0/9)]A1Or alternative full calculation shown Allow missing brackets if intention clear ISW. Ignore incorrect cancelling An answer of 32/90 or 29/90 gets the M1 as implied, no other marks(b) $35/100 × 35/100$ M1(b) $35/100 × 35/100$ M1(c) $32/100 × 35/100$ M1(c) $31.(a)$ Sketch (shift down) Correct sketch with (0, -13) indicatedB1Allow passing through (-3,0) and/or (3,0) SC/1 for a correct translation up with -3 indicated Intention means that reflection of the curve is correct in at least 2 of the 3 quadrants(b) Intention to show reflection in x-axis passing through (2,0)B1Correct reflection and (0, 8) indicatedB1Accept 8 on the y-axis. B1B1Accept 7 8 on the y-axis. Reflection in x-axie passing through (2,0)B1Correct reflection and (0, 8) indicatedB1Accept 7 8 on the y-axis	(b) TR or RT AND reason	B1	e.g. 'meeting of tangents to circle', 'tangents from same
(c) $360 - 90 - 42$ or equivalentM1 m1 m1Method to find angle in quadrilateral (138°) $1/2$ $69(^{\circ})$ A1 5 $11.(a)x = 0.4747 & 100x = 47.47 with attempt tosubtractM1subtract47/99A1(b) 1/20^2 or 20^2M1I /640000001/3 or equivalentI /400 ISW1/400 ISWA1I /640000001/3 or equivalent(RR = 5/10 \times 4/9 or P(BB) = 4/10 \times 3/9 orP(YY) = 1/10 \times 0/9 or other non replacement productFor the idea, not notation. Accept missing bracketsY may be omitted as P(YY)=0P(RR) = 5/10 \times 4/9 or P(BB) = 4/10 \times 3/9 orP(YY) = 1/10 \times 0/9 or other non replacement productA1A11 - \{5/10 \times 4/9 + 4/10 \times 3/9 + (1/10 \times 0/9)\}A1A129/45 (= 58/90)A1I SV. Ignore incorrect cancellingAn answer of 32/90 or 29/90 gets the M1 as implied, noother marks(b) 35/100 \times 35/100A1I 2(.25\%)13.(a) Sketch (shift down)Correct sketch with (0, -13) indicatedB1Allow passing through (-3.0) and/or (3.0)SCI for a answer of 6.25(\%) or 20.25(\%)13.(a) Sketch (shift down)Correct reflection in x-axis passingthrough (2.0)B1Accept +13 on the y-axis.Do not allow if passing through (-3.0) and/or (3.0)SCI for a a quartants(b) Intention to show reflection in x-axis passingthrough (2.0)B1Accept +3 on the y-axis.B1B1Correct reflection and (0, 8) indicatedB1Accept +3 on the y-axisAccept *3 on the y-axisB1Accept *3 on the y-axisB1Accept *3 on the y-axis$			point (to the circle)', allow a description
$/2$ m1 A1 5 $11.(a)x = 0.4747 & 100x = 47.47 with attempt tosubtractM14147/99A11/400 ISWM1411/20^2 or 20^2M11/400 ISW1/64000000^{1/3} or equivalentIf no marks allow SC1 for sight of 400412.(a) Strategy: Idea 1 - P(RR) - P(BB) - P(YY),OR equivalentP(RR) = 5/10 \times 4/9 or P(BB) = 4/10 \times 3/9 orP(YY) = 1/10 \times 0/9 or other non replacement product1 - (5/10 \times 4/9 + 4/10 \times 3/9 + (1/10 \times 0/9))S1A1A1A129/45 (= 58/90)A1A1B1Or alternative full calculation shownAllow missing brackets if intention clearISW. Ignore incorrect cancellingAn answer of 32/90 or 29/90 gets the M1 as implied, noother marksS1Do not FT from error in miscalculation of '100-65'FT provided M1 awardedT from arras S01 for an answer of 6.25(%) or 20.25(%)13.(a) Sketch (shift down)Correct sketch with (0, -13) indicatedB1Allow passing through (-3,0) and/or (3,0)SC1 for a correct translation up with -3 indicatedB1Alcept + 3 on the y-axis.B1B1B1Correct reflection in x-axis passingthrough (2,0)(b) Intention to show reflection in x-axis passingthrough (2,0)B1Correct reflection in x-axis passingthrough (2,0)B1Correct reflection and (0, 8) indicatedB1Accept 8 on the y-axis.B1B1Accept 8 on the y-axis.Correct reflection in x = axis passingthrough (2,0)B1Accept 8 on the y-axis.B1B1Correct reflection in x = axis passingthrough (2,0)B1Accept 8 on the y-axis.B1$	(c) $360 - 90 - 90 - 42$ or equivalent	M1	Method to find angle in quadrilateral (138°)
69(°)A1 511.(a) x =0.4747 & 100x= 47.47 with attempt to subtract 47/99M1 5(b) 1/20 ² or 20 ² A1 1/400 ISWI/64000000 ^{1/3} or equivalent If no marks allow SC1 for sight of 40012.(a) Strategy: Idea 1 – P(RR) – P(BB) – P(YY), OR equivalentS1 For the idea, not notation. Accept missing brackets Y may be omitted as $P(YY)=0$ P(RR) = 5/10 × 4/9 or P(BB) = 4/10 × 3/9 or P(YY) = 1/10 × 0/9 or other non replacement product 1 - {5/10 × 4/9 + 4/10 × 3/9 + (1/10 × 0/9)}M1 A1 Or alternative full calculation shown Allow missing brackets if intention clear ISW. Ignore incorrect cancelling An answer of 32/90 or 29/90 gets the M1 as implied, no other marks(b) 35/100 × 35/100M1 12(.25%)OR for intention (100-65)/100 × (100-65)/100 Allow 35%.35%, do not allow 35x35 Do not FT from error in miscalculation of '100-65' FT provided M1 awarded T for a correct translation of '100-65' FT provided M1 awarded If no marks SCI for an answer of 6.25(%) or 20.25(%)13.(a) Sketch (shift down) Correct sketch with (0, -13) indicatedB1 Allow passing through (-3,0) and/or (3,0) SCI for a correct translation up with -3 indicated Intention means(b) Intention to show reflection in x-axis passing through (2,0)B1 Accept 18 on the y-axis. Do not allow if passing through (-3,0) and/or (3,0) SCI for a correct translation up with -3 indicatedB1 Low 2,0)B1 Accept 18 on the y-axis. Do not allow if passing through (-3,0) and/or (3,0) SCI for a correct translation of the curve is correct in at least 2 of the 3 quadrants(b) Intention to show reflection in x-axis passing through (2,0)B1 A ccept 18 on the y-axis. Accept 18	/2	m1	
5511.(a) $x = 0.4747$ & $100x = 47.47$ with attempt to subtract $47/99$ M1(b) $1/20^2$ or 20^2 A11/400 ISWA11/400 ISWA11/2.(a) Strategy: Idea $1 - P(RR) - P(BB) - P(YY)$, OR equivalentS1P(RR) = $5/10 \times 4/9$ or $P(BB) = 4/10 \times 3/9$ or $P(YY) = 1/10 \times 0/9$ or other non replacement productS1 $1 - \{5/10 \times 4/9 + 4/10 \times 3/9 + (1/10 \times 0/9)\}$ A1A1Or alternative full calculation shown Allow missing brackets if intention clear ISW Ignore incorrect cancelling An answer of $32/90$ or $29/90$ gets the M1 as implied, no other marks(b) $35/100 \times 35/100$ M1(b) $35/100 \times 35/100$ M1(c) $35/100 \times 35/100$ M1 $12(25\%)$ A1A1OR for intention (100-65)/100 \times (100-65)/100 Allow 35% $\times 35\%$, do not allow 35×35 D on to FT from error in miscalculation of `100-65' FT provided M1 awarded If no marks SC1 for an answer of $6.25(\%)$ or $20.25(\%)$ 13.(a) Sketch (shift down) Correct sketch with (0, -13) indicatedB1B1Allow passing through (-3,0) and/or (3,0) SC1 for a correct translation up with -3 indicatedb) Intention to show reflection in x-axis passing through (2,0)B1Correct reflection and (0, 8) indicatedB1A1Accept 4 3 on the y-axis Least 2 of the 3 quadrantsA1Accept 4 3 on the y-axis Least 2 of the 3 quadrants	69(°)	A1	
11. $(a) x = 0.4747 & 100x = 47.47 with attempt tosubtract47/99MIA1(b) 1/20^2 or 20^{-2}A11/400 ISWA1H1/400 ISWA1HI/640000001/3 or equivalentIf no marks allow SC1 for sight of 40012. (a) Strategy: Idea 1 - P(RR) - P(BB) - P(YY),OR equivalentP(RR) = 5/10 × 4/9 or P(BB) = 4/10 × 3/9 orP(YY) = 1/10 × 0/9 or other non replacement product1 - \{5/10 \times 4/9 + 4/10 \times 3/9 + (1/10 \times 0/9)\}S1Or alternative full calculation shownAllow missing brackets if intention clearISW. Ignore incorrect cancellingAn answer of 32/90 or 29/90 gets the M1 as implied, noother marks(b) 35/100 \times 35/100M1(b) 35/100 \times 35/100M112(25\%)A112(.25\%)13. (a) Sketch (shift down)Correct sketch with (0, -13) indicated(b) Intention to show reflection in x-axis passingthrough (2,0)B1Correct reflection and (0, 8) indicated(b) Intention to show reflection in x-axis passingthrough (2,0)B1Reflection in x-axis passingthrough (2,0)(b) Intention to show reflection in x-axis passingthrough (2,0)B1Reflection in x-axis passingthrough (2,0)(c) Treet sketch with (0, 8) indicatedB1Reflection in x-axis passingthrough (2,0)(b) Intention to show reflection in x-axis passingthrough (2,0)B1Reflection in x-axis passingthrough (2,0)(c) Treet sketch with (0, 8) indicatedB1Reflection in x-axis passingthrough (2,0)(b) Intention to show reflection in x-axis passingthrough (2,0)B1Reflection in x-axis passingthrough (2,0)(c) Treet sketch with (0, 8) indicated$		5	
subtract $47/99$ A1 $1/400 ISW$ A1 A1 $1/6400000^{1/3}$ or equivalent $If no marks allow SC1 for sight of 400$ 12.(a) Strategy: Idea 1 – P(RR) – P(BB) = P(YY), OR equivalentS1 For the idea, not notation. Accept missing brackets $YY may be omitted as P(YY)=0$ P(RR) = $5/10 \times 4/9$ or P(BB) = $4/10 \times 3/9$ or P(YY) = $1/10 \times 0/9$ or other non replacement product $1 - \{5/10 \times 4/9 + 4/10 \times 3/9 + (1/10 \times 0/9)\}$ A1 A1Or alternative full calculation shown Allow missing brackets if intention clear ISW. Ignore incorrect cancelling An answer of $32/90$ or $29/90$ gets the M1 as implied, no other marks(b) $35/100 \times 35/100$ M1(b) $35/100 \times 35/100$ M113.(a) Sketch (shift down) Correct sketch with (0, -13) indicatedB1 B1 B1A1.B1 Allow passing through (-3,0) and/or (3,0) SC1 for a correct translation up with -3 indicated Intention means that reflection of the curve is correct in at least 2 of the 3 quadrants(b) Intention to show reflection in x-axis passing through (2,0)B1 Accept 8 on the y-axis Reflection in x-axisB1 Accept 8 on the y-axis Reflection in x-axisB1 Accept 8 on the y-axis Reflection of the curve is correct in at least 2 of the 3 quadrants	11.(a)x = 0.4747 & 100x = 47.47 with attempt to	M1	
$4/799$ A1 M1 $1/6400000^{1/3}$ or equivalent $1/400$ ISW $1/64000000^{1/3}$ or equivalent 1 in marks allow SC1 for sight of 40012.(a) Strategy: Idea $1 - P(RR) - P(BB) - P(YY)$, OR equivalent $P(RR) = 5/10 \times 4/9$ or $P(BB) = 4/10 \times 3/9$ or $P(YY) = 1/10 \times 0/9$ or other non replacement product $1 - \{5/10 \times 4/9 + 4/10 \times 3/9 + (1/10 \times 0/9)\}$ S1 A1For the idea, not notation. Accept missing brackets YY may be omitted as $P(YY) = 0$ P(RR) = $5/10 \times 4/9$ or $P(BB) = 4/10 \times 3/9$ or $29/45$ (= 58/90)M1Or alternative full calculation shown Allow missing brackets if intention clear ISW. Ignore incorrect cancelling An answer of $32/90$ or $29/90$ gets the M1 as implied, no other marks(b) $35/100 \times 35/100$ M1OR for intention (100-65)/100 \times (100-65)/100 A10w $35\% \times 35\%$, do not allow $35\% \times 35\%$ Do not FT from error in miscalculation of $100-65^{\circ}$ FT provided M1 awarded If no marks SC1 for an answer of $6.25(\%)$ or $20.25(\%)$ 13.(a) Sketch (shift down)B1 Correct sketch with (0, -13) indicatedA1 B1(b) Intention to show reflection in x-axis passing through (2,0)B1 Correct reflection and (0, 8) indicatedB1 B1 Accept 8 on the y-axis. B1 B1 Accept 8 on the y-axisB1 Correct reflection and (0, 8) indicatedB1 Accept 8 on the y-axisB1 Accept 8 on the y-axis	subtract	A 1	
(b) 1/20 of 20Mil1/6400000or equivalent1/400 ISWA1If no marks allow SCI for sight of 40012.(a) Strategy: Idea $1 - P(RR) - P(BB) - P(YY)$, OR equivalentS1For the idea, not notation. Accept missing brackets $P(RR) = 5/10 \times 4/9$ or $P(BB) = 4/10 \times 3/9$ or $P(YY) = 1/10 \times 0/9$ or other non replacement productM1 $1 - \{5/10 \times 4/9 + 4/10 \times 3/9 + (1/10 \times 0/9)\}$ A1Or alternative full calculation shown Allow missing brackets if intention clear $29/45$ (= 58/90)A1ISW. Ignore incorrect cancelling An answer of 32/90 or 29/90 gets the M1 as implied, no other marks(b) $35/100 \times 35/100$ M1OR for intention (100-65)/100 \times (100-65)/100 Allow $35\% \times 35\%$, do not allow 35×35 Do not FT from error in miscalculation of '100-65' FT provided M1 awarded If no marks SCI for an answer of 6.25(%) or 20.25(%)13.(a) Sketch (shift down)B1 Correct sketch with (0, -13) indicatedA1 B1(b) Intention to show reflection in x-axis passing through (2.0)B1 Allow passing through (-3,0) and/or (3,0) SCI for a correct translation up with -3 indicated Intention means that reflection of the curve is correct in at least 2 of the 3 quadrants(b) Intention to show reflection in x-axis passing through (2.0)B1 Allow passing through (-3,0) and/or (3,0) SCI for a correct translation up with -3 indicated Intention means that reflection of the curve is correct in at least 2 of the 3 quadrants(c) rect reflection and (0, 8) indicatedB1 Accept 8 on the y-axis. Do not allow if passing through (-3,0) and/or (3,0) SCI for a curve translation up with -3 indicated Intention means that reflection of the curve is corr	4//99	AI M1	$1/(4000000^{1/3} - 1) = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 $
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12.(a) Strategy: Idea $P(RR) - P(BR) - P(YY),$ OR equivalentSI SI OR equivalentFor the idea, not notation. Accept missing brackets $YY may be omitted as P(YY)=0$ $P(RR) = 5/10 \times 4/9$ or $P(BB) = 4/10 \times 3/9$ or $P(YY) = 1/10 \times 0/9$ or other non replacement product $1 - \{5/10 \times 4/9 + 4/10 \times 3/9 + (1/10 \times 0/9)\}$ M1 $29/45$ (= 58/90)A1Or alternative full calculation shown Allow missing brackets if intention clear ISW. Ignore incorrect cancelling An answer of 32/90 or 29/90 gets the M1 as implied, no other marks(b) $35/100 \times 35/100$ M1OR for intention (100-65)/100 $\times (100-65)/100$ Allow $35\% \times 35\%$, do not allow 35×35 Do not FT from error in miscalculation of '100-65' FT provided M1 awarded 713.(a) Sketch (shift down) Correct sketch with (0, -13) indicatedB1 B1 Allow passing through (-3,0) and/or (3,0) SC1 for a correct translation up with -3 indicated Intention means that reflection of the curve is correct in at least 2 of the 3 quadrants(b) Intention to show reflection in x-axis passing through (2,0)B1 Accept 8 on the y-axis Reflection in y-8 or x = 0 is awarded 80 B0	1/400 IS W		If no marks allow SCI for signi of 400
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P(RR) = $5/10 \times 4/9$ or P(BB) = $4/10 \times 3/9$ or P(YY) = $1/10 \times 0/9$ or other non replacement product $1 - \{5/10 \times 4/9 + 4/10 \times 3/9 + (1/10 \times 0/9)\}$ M1A1Or alternative full calculation shown Allow missing brackets if intention clear ISW. Ignore incorrect cancelling An answer of $32/90$ or $29/90$ gets the M1 as implied, no other marks(b) $35/100 \times 35/100$ M1OR for intention $(100-65)/100 \times (100-65)/100$ Allow $35\% \times 35\%$, do not allow 35×35 Do not FT from error in miscalculation of '100-65' FT provided M1 awarded T fn om marks SC1 for an answer of $6.25(\%)$ or $20.25(\%)$ 13.(a) Sketch (shift down) Correct sketch with $(0, -13)$ indicatedB1 B1 Allow passing through (-3,0) and/or (3,0) SC1 for a correct translation up with -3 indicated Intention means that reflection of the curve is correct in at least 2 of the 3 quadrants(b) Intention to show reflection in x-axis passing through $(2,0)$ B1 Correct reflection and $(0, 8)$ indicatedB1 Correct reflection and $(0, 8)$ indicatedB1 Accept 8 on the y-axisB1 Reflection in $y = -8$ or $x = 0$ is awarded B0 B0	OR equivalent	~ -	<i>YY may be omitted as</i> $P(YY)=0$
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$1 - \{5/10 \times 4/9 + 4/10 \times 3/9 + (1/10 \times 0/9)\}$ A1Or alternative full calculation shown Allow missing brackets if intention clear ISW. Ignore incorrect cancelling An answer of 32/90 or 29/90 gets the M1 as implied, no other marks(b) $35/100 \times 35/100$ M1OR for intention $(100-65)/100 \times (100-65)/100$ Allow $35\% \times 35\%$, do not allow 35×35 Do not FT from error in miscalculation of '100-65' FT provided M1 awarded If no marks SC1 for an answer of 6.25(%) or 20.25(%)13.(a) Sketch (shift down)B1Allow passing through (-3,0) and/or (3,0) SC1 for a correct translation up with -3 indicated(b) Intention to show reflection in x-axis passing through (2,0)B1Allow passing through (-3,0) and/or (3,0) SC1 for a quartsB1Allow passing through (-3,0) and/or (3,0) SC1 for a correct translation up with -3 indicatedB1Accept 8 on the y-axis. B1B1Accept 8 on the y-axisB1Accept 8 on the y-axis	$P(YY) = 1/10 \times 0/9$ or other non replacement product		
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(b) $35/100 \times 35/100$ M1An answer of $32/90$ or $29/90$ gets the M1 as implied, no other marks(b) $35/100 \times 35/100$ M1OR for intention $(100-65)/100 \times (100-65)/100$ Allow $35\% \times 35\%$, do not allow 35×35 Do not FT from error in miscalculation of '100-65' FT provided M1 awarded If no marks SC1 for an answer of $6.25(\%)$ or $20.25(\%)$ 13.(a) Sketch (shift down)B1Allow passing through (-3,0) and/or (3,0) SC1 for a correct translation up with -3 indicated(b) Intention to show reflection in x-axis passing through (2,0)B1Allow passing through (-3,0) and/or (3,0) SC1 for a correct translation up with -3 indicatedB1B1Accept 8 on the y-axisB1Accept 8 on the y-axisB1Accept 8 on the y-axis	29/45 (= 58/90)	A1	ISW. Ignore incorrect cancelling
(b) $35/100 \times 35/100$ M1other marks(b) $35/100 \times 35/100$ M1OR for intention $(100-65)/100 \times (100-65)/100$ Allow $35\% \times 35\%$, do not allow 35×35 Do not FT from error in miscalculation of '100-65' FT provided M1 awarded If no marks SC1 for an answer of $6.25(\%)$ or $20.25(\%)$ 13.(a) Sketch (shift down)B1Allow passing through (-3,0) and/or (3,0) SC1 for a correct translation up with -3 indicated(b) Intention to show reflection in x-axis passing through (2,0)B1Allow passing through (-3,0) and/or (3,0) SC1 for a correct translation up with -3 indicatedB1B1Accept 8 on the y-axisB1B1Accept 8 on the y-axisCorrect reflection and (0, 8) indicatedB1Accept 8 on the y-axis			An answer of 32/90 or 29/90 gets the M1 as implied, no
(b) $35/100 \times 35/100$ M1OR for intention $(100-65)/100 \times (100-65)/100$ Allow $35\% \times 35\%$, do not allow 35×35 Do not FT from error in miscalculation of '100-65' FT provided M1 awarded If no marks SC1 for an answer of $6.25(\%)$ or $20.25(\%)$ 13.(a) Sketch (shift down)B1 Correct sketch with $(0, -13)$ indicatedAllow passing through $(-3,0)$ and/or $(3,0)$ SC1 for a correct translation up with -3 indicated(b) Intention to show reflection in x-axis passing through $(2,0)$ B1 Correct reflection and $(0, 8)$ indicatedB1 B1 B1Allow passing through $(-3,0)$ and/or $(3,0)$ SC1 for a correct translation up with -3 indicatedB1 Least 2 of the 3 quadrantsB1 Accept 8 on the y-axisB1 Least 2 of the 3 quadrantsB1 Accept 8 on the y-axis			other marks
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1225/10000 or 0.1225 or 49/400A1Do not FT from error in miscalculation of '100-65'12(.25%)12(.25%)A1FT provided M1 awarded7If no marks SC1 for an answer of 6.25(%) or 20.25(%)13.(a) Sketch (shift down)B1Allow passing through (-3,0) and/or (3,0)Correct sketch with (0, -13) indicatedB1Allow passing through (-3,0) and/or (3,0)(b) Intention to show reflection in x-axis passing through (2,0)B1Intention means that reflection of the curve is correct in at least 2 of the 3 quadrantsB1Accept 8 on the y-axisB1Accept 8 on the y-axis			Allow $35\% \times 35\%$, do not allow 35×35
12(.25%)A1FT provided M1 awarded7If no marks SC1 for an answer of 6.25(%) or 20.25(%)13.(a) Sketch (shift down)B1Correct sketch with (0, -13) indicatedB1Allow passing through (-3,0) and/or (3,0)B1Allow passing through (-3,0) and/or (3,0)B1B1(b) Intention to show reflection in x-axis passing through (2,0)Correct reflection and (0, 8) indicatedB1B1Accept 8 on the y-axisB1Accept 8 on the y-axisB1Accept 8 on the y-axisB1Accept 8 on the y-axis	1225/10000 or 0.1225 or 49/400	A1	Do not FT from error in miscalculation of '100-65'
7If no marks SC1 for an answer of 6.25(%) or 20.25(%)13.(a) Sketch (shift down)B1Allow passing through (-3,0) and/or (3,0)Correct sketch with (0, -13) indicatedB1Alcept -13 on the y-axis.Do not allow if passing through (-3,0) and/or (3,0)SC1 for a correct translation up with -3 indicated(b) Intention to show reflection in x-axis passing through (2,0)B1Intention means that reflection of the curve is correct in at least 2 of the 3 quadrantsB1Accept 8 on the y-axis4Reflection in y=-8 or x = 0 is awarded B0	12(.25%)	A1	FT provided M1 awarded
13.(a) Sketch (shift down)B1Allow passing through (-3,0) and/or (3,0)Correct sketch with (0, -13) indicatedB1Alcept -13 on the y-axis.(b) Intention to show reflection in x-axis passing through (2,0)B1B1Correct reflection and (0, 8) indicatedB1Allow passing through (-3,0) and/or (3,0)B1B2B1 <td></td> <td>7</td> <td>If no marks SC1 for an answer of 6.25(%) or 20.25(%)</td>		7	If no marks SC1 for an answer of 6.25(%) or 20.25(%)
Correct sketch with (0, -13) indicatedB1Accept -13 on the y-axis. Do not allow if passing through (-3,0) and/or (3,0) SC1 for a correct translation up with -3 indicated(b) Intention to show reflection in x-axis passing through (2,0)B1B1Intention means that reflection of the curve is correct in at least 2 of the 3 quadrantsB1B1Accept 8 on the y-axisB1B1Accept 8 on the y-axis	13.(a) Sketch (shift down)	B1	Allow passing through $(-3,0)$ and/or $(3,0)$
(b) Intention to show reflection in x-axis passing through (2,0)Do not allow if passing through (-5,0) and/or (3,0) SC1 for a correct translation up with -3 indicatedB1B1Intention means that reflection of the curve is correct in at least 2 of the 3 quadrantsB1B1Accept 8 on the y-axis4Reflection in y=-8 or x = 0 is awarded B0 B0	Correct sketch with $(0, -13)$ indicated	BI	Accept -13 on the y-axis.
(b) Intention to show reflection in x-axis passing through (2,0)SC1 for a correct translation up with -5 indicatedB1Intention means that reflection of the curve is correct in at least 2 of the 3 quadrantsB1B1Accept 8 on the y-axis4Reflection in y=-8 or x = 0 is awarded B0 B0			Do not allow if passing through $(-3,0)$ and/or $(3,0)$
(b) Intention to show reflection in x-axis passing through (2,0)(b) Intention means that reflection of the curve is correct in at least 2 of the 3 quadrantsCorrect reflection and (0, 8) indicatedB1Accept 8 on the y-axis Reflection in y=-8 or x = 0 is awarded B0 B0	(b) Intention to show reflection in r avis passing	D 1	SC1 for a correct translation up with -5 indicated
Correct reflection and $(0, 8)$ indicated B1 Accept 8 on the y-axis Reflection in y=-8 or x = 0 is awarded B0 B0	(b) intention to show reflection in x-axis passing through (2.0)	DI	least 2 of the 3 quadrants
4 Reflection in $v = -8$ or $x = 0$ is awarded B0 B0	Correct reflection and (0, 8) indicated	B1	Accept 8 on the y-axis
	Contect reneerion and (0, 0) indicated	4	Reflection in $y = -8$ or $x = 0$ is awarded B0. B0

UNIT 3 - HIGHER

UNIT 3	Mark	FINAL MARK SCHEME
Higher Tier		Comments
1.(a) All points plotted correctly $(1)(1) = (2 + 2) (1) (1) (1) (2 + 2) (1) (1) (1) (2 + 2) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1$	B2	B1 for 5 correct, or reverse correct for 7 or 8
(b)(1) (26+38+56+64+46+36+62+48+14+20)/10	MI	points
41	A 1	For intention to add y values and divide by 10
(ii) Line of best fit through means	B2	CAO
(ii) Ente of best in unough means	52	Tolerance within half square, excluding 40 and
		42. B1 for a straight line of best fit, with points
		above and below, OR for straight line of best fit
(c) Positive	B1	through the means but skewed
(d) From their line of best fit (reading to 1 small	B1	
square)	8	FT from straight lines or curves. If no line, B0
2.(a) 5×6.2 - 2×-3.1	M1	31 + 6.2
37.2	AI M1	If no mark SCI for 24.8
(b) $1/4 + 7\times 3/4$	IVI I	² 2 needs to be squared within a correct substitution with an attempt to add
$\frac{22}{4}$ or equivalent (5.5)	Δ1	Mark final answer if 22/4 incorrectly simplified
22/4 of equivalent (5.5)	4	A0
3 (a) Interpretation of the two extra numbers $e \sigma$ 'the	B3	B2 for $7 \times 28 = 196$ and $5 \times 24 = 120$ with
total of the 2 numbers is 76', or 'mean of the two	15	difference 76 or 'each number is 38 ' or they
extra numbers is 38'		state two numbers with a sum of 76. OR
		B1 for $5 \times 24 = 120$ or $7 \times 28 = 196$ or sight of 7×28
		- 5×24 , or statement such as 'mean of the two
		numbers is greater than 24'
		B0 if reference in a statement only to one of the
		extra numbers
(b) -2 1 3 3 given in any order		D2 for activity 2 of the 4 carditions of
(b) 2, 1, 5, 5 given in any order	B3	B2 for satisfying 5 of the 4 conditions, e.g.
		smallest number -2 OR
		B1 for satisfying 2 of the 4 conditions, e.g.
		greatest number 3 and more than one three, or
		for the greatest 3 and smallest -2
		Conditions to check for 'their numbers':
		Mode 3, No number>3, Range 5, Median 2
		<u>B2 for 3 conditions satisfied</u>
	6 D1	<u>B1 for 2 conditions satisfied</u>
4.(a) Angle 60° ($\pm 2^\circ$) or signt of $\frac{1}{6}$ or equivalent	M1	Not for $60/360$ of 1620 , need to see (or imply)
00/300 × 1020	1411	"x"
(£)270	A1	FT from their angle, fraction or percentage
(b) Complete method, e.g. $2/3 \times 270$	M1	
		FT from (a). For bus fares accept $20^{\circ}(\pm 2^{\circ})$, or
(£)180	A1	0.05 to 0.06, or 5% to 6%
		Mark final answer. If no marks SC1 for $(\pounds)90$
		Errors of premature approximation are
		penalised -1 in (a) & (b) $D_{a} = a_{a} + b_{a} + b$
(a) Earlandian that above also understanding that	E2	Do not creat spurious correct answers from
(c) Explanation that shows clear understanding that the pie charts are based on different amounts so the	1.2	Accept explanations that imply that Maria is
angles cannot be directly compared with a		wrong.
conclusion that Maria is wrong. e.g. 'Maria is wrong		E1 for statement, e.g, 'Maria is wrong, as Mark
as the same angle means that the same proportion of		has less to start with', or 'Mark has a lower first
money is spent, not the same amount of money, as		month salary than Maria, so Maria is wrong',
Maria has more to spend'	7	OR
		E1 for understanding shown but no conclusion
		Accept errors in calculation if process and idea
		correct

UNIT 3		FINAL MARK SCHEME
Higher Tier	Mark	Comments
5.(a) Accurate rhombus drawn within tolerances	B4	B3 for sides all correct lengths (± 2 mm) and
with all appropriate construction arcs shown		evidence of suitable construction for either a
$(6 \text{ cm} \pm 2\text{mm}, 60^{\circ}\pm 2^{\circ}, 120^{\circ}\pm 2^{\circ})$		$60^{\circ} \pm 2^{\circ}$ or a $120^{\circ} \pm 2^{\circ}$ with arcs shown, OR
		B2 for a least 2 sides shown correct (\pm 2mm) and
		either $60^{\circ} \pm 2^{\circ}$ or $120^{\circ} \pm 2^{\circ}$ constructed correctly
		with arcs shown, OR
		B1 for knowing the rhombus has angles 60° , 60° ,
		$120^{\circ}\pm2^{\circ}$ and $120^{\circ}\pm2^{\circ}$ (may be a correct rhombus
		drawn), or for a construction of $60^{\circ}\pm2^{\circ}$ or 120°+2° with appropriate area or a construction
		of a rhombus with sides for showing arcs
		or a monious with sides bein showing ares
(b)Correct region shaded	B3	Mark intention. B1 for line, B1 for arc, B1 for
	-	shading (FT arc centre A and a line crossing AB).
		Shading needs to be on both sides of AB.
		Remember arc centre B is MR-1 continue to
		mark
	7	If 2 arcs are drawn, with shading ambiguous then mark the straight line only B0 B1 B0
6 (a) Mid points 124 133 142 151	R1	Two shown is sufficient if no error
$124 \times 8 + 133 \times 26 + 142 \times 48 + 151 \times 18$	M1	Attempt Σ fx for their mid-points. FT provided
(OR13984)		their mid points are within interval including
	m1	bounds
100	A1	Attempt their \sum fx divided by 100. Depends on
= 139.8(4) or 140	B1	M1
(b) 138 to 146	B1	Allow 139 and accept 140 from correct working
(c) Suitable uniform scales with axes labelled	B2	Do not accept 142 alone
Correct frequency polygon		Number of boxes vertical, Raisins horizontal
		(0.0)
		(0,0) FT their scales if possible
		FT reversed axes for appropriate plots
		B1 for frequency polygon with one error in
	8	plotting, or for a translated polygon, or correct
		points plotted (but not joined with straight lines
		(curves or not joined))
		Ignore frequency diagram if polygon seen.
7. Correct statement of Pythagoras' Theorem with $24.7^2 - 26.1^2$	M1	1204.09 - 681.21
values given, e.g. $34.7 - 26.1^{-1}$	A 1	
$x = 322.86$ of $x = \sqrt{322.86}$ x = 22.866569 or 22.9 or 22.87 (cm)		$\Delta ccent 22.8, 22.86 (cm)$
x 22.000505 01 22.5 01 22.07 (em)	711	Alternative:
		Full method using trigonometry and/or
		Pythagoras' Theorem
		MI
	3	Accurate intermediate answer A1
	DA	Correct response Al
8.(a) $5x(x - 2)$	B 2	B1 for 5x(x) or 5x(2) or correct partially
(b) $y(y = 6) (-0)$	M	lacionsed
x = 0 AND $x = 6$		
	4	
9.(a) 5×10^5	B2	B1 for 500 000
(b) 3.1×10^{-5}	B2	B1 for 3.08×10^{-5} or 0.0000308 or 0.000031
	4	Penalise incorrect notation only once, -1

UNIT 3	Mark	FINAL MARK SCHEME
Higher Tier		Comments
10. $(x =) (24.5/7) \times 9$ (OR 3.5×9)	MI	Or alternative full method to find x, x not
(=) 31.5(cm)	AI M1	implicit
$(y =) 15.4 \div (24.3/7)$ (OK 15.4/5.5)	A1	Or alternative full method to find v v not
(-) 4.4(CIII)		implicit
		I · · ·
		Alternatively candidates may refer to scale factor
Look for:		3.5 throughout
QWC1: Calculations shown in full	OWC	If no marks SCI for sight of scale factor 3.5 or
QWC2: Labelled calculations shown in full with		equivalent
units and labelled (x and y) in final answers with correct use of $=$	2	OWC2 Presents relevant material in a coherent
		and logical manner, using acceptable
QWC2: Candidates will be expected to		mathematical form, and with few if any errors in
• present work clearly, use of '=' and cm		spelling, punctuation and grammar.
AND		
• make few if any mistakes in mathematical		QWC1 Presents relevant material in a coherent
form, spelling, punctuation and grammar		mathematical form spelling punctuation or
and include units in their final answer		grammar.
OWC1: Candidates will be expected to		ÖR
• present work clearly, use of '=' and cm		Evident weaknesses in organisation of material
OR		but using acceptable mathematical form, with
• make few if any mistakes in mathematical		few if any errors in spelling, punctuation and
form, spelling, punctuation and grammar	6	grannar.
and include units in their final answer	0	OWC0 Evident weaknesses in organisation of
		material, and errors in use of mathematical form,
		spelling, punctuation and grammar.
11.(a) $(x-7)(x+2)$	B2	B1 for $(x \dots 7)(x \dots 2)$
(b) $2(y+2) + 3(y-2) - 3y^2y^2$ OP equivalent	M2	'solve')
2x + 4 + 3x - 6 = 18 OR $5x = 20$ OR equivalent	A1	M1 for 2 of the 3 terms correct
x = 4	A1	FT from M1 for both A marks equivalent
		difficulty
(c) $x = \{ -3 \pm \sqrt{3^2 - 4 \cdot 2 \cdot -3} \} / 2 \times 2$	M1	Depends on previous A1 and must be simplified
$= [-3 \pm \sqrt{33}]/4$	AI	form
0.69 and -2.19	9 AI	Anow one sup
		CAO. Must be correct to 2 decimal places
12.Attempt Volume = $4/3 \pi 3.4^3$ (OR $4/3 \pi$	M1	Accept incorrect place value for digits 3 4 for M1
0.034 ³)	A1	FT incorrect place value 3 4, correct evaluation
$164(.636 \text{ cm}^3)$ (OR	D 1	
$(0.000164(m^3))$	BI	OR for sight of 0.034° , not for $3.4 \text{ cm} = 0.034 \text{m}$
Use of conversion $1m^3 = 1,000,000 cm^3$	M1	'Their volume' i.e. must have attempted use of
3509.6g converted to 3.5096(kg), or implied		formula dimensionally correct
Use of mass / their volume	A1	Do not award A1 for correct response from
	6	compensating errors in place value
Answers when rounded to 3sig.figs give 21200 d		
21300 (Kg/ m)	<u>S1</u>	
$\sin P = (36 \times \sin 48)/42$ (=0.636981)	M2	M1 for $\sin P/36 = (\sin 48)/42$ or equivalent
Angle at $P = 39.567(^{\circ})$	A1	
062.5(67°) to 063°	B1	Answers from 39.5 to 39.6 or 40. Do not accept
	5	39
		F1 "23 + their P" provided leading zero given
	1	for the bearing and that at least MT awarded

UNIT 3	Mark	FINAL MARK SCHEME
Higher Tier		Comments
14.(a) Reasonable tangent drawn	S1	
Gradient = difference v / difference t	M1	With or without tangent
Calculated gradient for their tangent	A1	(Answers may be in the range 25 to 37)
Units given m/s ² or ms ⁻²	U1	Independent of other marks
(b)(i) Attempt to find area by splitting up or	S1	
trapezium rule		
Suitable area sections with at least 2 correct areas	M2	M1 Suitable area sections with at least 1 correct
OR using trapezium rule correct substitution for the		area OR an attempt to use the trapezium rule
majority of areas		(correct rule, but with a slip). Allow tolerance in
		reading the velocity, as estimation required.
Answers in the range 134 to 158 from correct	A1	Units not required
working	B1	FT irrespective of their answer not being within
(ii) FT from their answer in (b)		the range required in (a)
		If an incorrect unit is given, then B0
		e.g. 5 areas of width 1 seconds, heights are 26,
		46 to 47, 46 to 48, 32 to 33, min area 150, max
	9	area 154
		2 areas split at 2.5 seconds gives 97.5
15.(a) Sin curve, through the origin	M1	
± 1 shown, and $\pm 180^{\circ}$ shown or implied	A1	
(b) -27° and -153° with no other angles	B2	B1 for a correct angle. Accept unrounded
	4	values and embedded answers

GCSE Mathematics - Unitised MS - November 2012



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