WJEC
CBAC

MS3
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GCSE MARKING SCHEME

MATHEMATICS (TWO TIER)

SUMMER 2009

INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2009 examination in GCSE MATHEMATICS (TWO TIER). They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

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

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

Paper 1 - Foundation Tier

2009 Summer Paper 1 (Non calculator) Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME (23/05/2009) Comments (Page 1)
1. (a) (i) 8204	B1	C.A.O. **Ignore any units such as £8204.**
(ii) Four million six hundred thousand **OR Four point six million**	B1	C.A.O. **B0 for 'Forty six hundred thousand' and other forms of words not commonly used**.
(b) 174	B1	C.A.O.
(c) (i) 8730	B1	C.A.O.
(ii) 8700	B1	C.A.O.
(d) 600 **OR six hundred**	B1	C.A.O.
(e) 1, 15, 3, 5	B2	B1 for any 2 **or 3** factors and no incorrect numbers. **OR the 4 correct factors and 1 incorrect number.**
(f) 20/2.95 OR 20/3	M1	**Using a repeated addition method (or multiplication) only**
= 6	A1	**gets M1 if it shows trying to get the most for £20.** Award SC1 for unsupported 6·6(66..)
	10	
2. (a) (i) 32	B1	C.A.O.
(ii) 66	B1	C.A.O.
(b) (0)·78	B1	C.A.O.
(0)·75	B1	C.A.O.
·73 ·75 or ¾ ·78 or 78%	B1	**Correct answer OR** F.T. their values.
	5	
3. (a) 5, 10, 7, 8 **If the 4 (or more) becomes 4, 5, 6 in their table then penalise −1.**	B2	**B1 for any two/three correct frequencies** **If frequencies score 0, then give B1 for all 4 correct tallies.**
	B1	F.T. their table of frequencies
(b) 2		**Accept 2 and 10 but not 10 alone.**
(c) 1, 2, 3, 4 (or more) along one axis	B1	F.T. their table of frequencies
Uniform scale for the frequency axis starting at 0	B1	If no scale then allow one square to represent 1
Four bars at correct heights **(ignore widths of bars)** **If the 4 (or more) is 4, 5, 6 in their table then F.T. in their bar chart without penalty.**	B2	B1 for any 2 **or 3** correct bars on F.T. **If 4 (or more) is correct in their table but becomes 4, 5, 6 in their bar chart, then penalise −1 here. Do not penalise twice.**
	7	
4. (a) 8·7	B1	Allow ±2mm
(b) AE	B1	**Allow A,E A to E but NOT A and E Do NOT penalise**
(c) BC	B1	**Allow B,C B to C but NOT B and C. the 'and' twice.**
(d) (i) 69	B1	Allow ±2º **Look in the diagram if no answer on dotted lines**
(ii) 111	B1	Allow ±2º **Look in the diagram if no answer on dotted lines**
(e) obtuse indicated	B1	C.A.O.
	6	
5. (a) 2 correct lines of symmetry	B2	B1 for 1 or 2 correct lines and no more than 1 incorrect line
(b) All 4 correct squares	B2	**IF more than 4 extra squares altogether then B0. Otherwise, B1 for 2 or 3 correct squares.**
	4	
6.	M1	For attempting to count squares
39 – 49	A1	Within the range inclusive
cm^2	U1	Independent of the other marks
	3	**Answers like 42^2 , 42^{cm^2} get M1, A1, U0.**
7. (a) Correct diagram for 4th pattern	B1	C.A.O.
(b) **18**	**B1**	**C.A.O**.
25	**B1**	**OR for 'their 18' + (1 more than what they added to get 'their 18') OR 'their 18' + 7.**
(c) 33	M1	**For 'their 25' + (1 more than what they added to get 'their**
	A1	**25') OR 'their 25' + 8.**
	5	

2009 Summer Paper 1 (Non calculator) Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME (23/05/2009) Comments (Page 2)	
		ISW in cancelling fractions, but do not ignore extra incorrect algebra.	
8. (a) (i) (x =) 24/4 (=6)	B1	C.A.O. **Accept embedded answers such as 4 × 6 = 24**	
(ii) (x =) 8	B1	C.A.O. **Accept embedded answers such as 8 + 6 = 14**	
(b) 9a	B1	C.A.O.	
(c) W = 23	B2	**B1 for sight of 15 or 8, but 15P + 8R gets B0**	
	5		
9.		**Place value errors get M0, A0**	
(a) 76 **OR** **54**	M1	Any correct method for the multiplication of 76 by 54	
× 54 **× 76**			
304 **324**	A1	**For either 304 (324) OR 3800 (3780)**	
3800 **3780**		**(Apply 'half the calculation correct' in other methods)**	
4104 **4104**			
(£)4104	A1	C.A.O.	
(b) 1/8 of 48 = 6 AND 'their 6' × 3	M1		
= 18	A1	Any valid method. Allow M1 for 3/8 × 48	
(c) 2166	B1	C.A.O.	
	6		
10. (a) (i) 64	B1	C.A.O.	
(ii) 61, 67	B2	B1 for any one **or 2 correct** with no more than one incorrect number	
(b) (i) 200	B2	B1 for the 8 or the 25	
(ii) 2·63	B1	C.A.O.	
	6		
		Ignore x= OR =x OR y= etc . **Ignore use of capital letter but use of a different letter is penalised −1 once only.**	
11. (a) x + 6 ISW	B1	C.A.O.	
(b) 25y (pence) ISW	B1	Accept 25yp	
(c) b – 2 ISW	B1	C.A.O.	
(d) 9r + 3t	B2	C.A.O. B1 for either 9r or 3t **in an expression like 9r + 11t.** If B2 then penalise −1 for extra incorrect algebra.	
	5		
12. (a) 0 7 14 21	B2	C.A.O.	NOTES
0 6 12 18		B1 for any 1 correct row or any 2 correct columns	Penalise −1 for use of words such as "4 out of 16", "4 in 16" OR "4:16" **OR 4 over 16.** When fraction and wrong notation seen, DO NOT penalise wrong notation.
		F.T. their table in (b) and (c)	
(b) (i) 4/16 ISW **OR ·25 OR 25%**	B2	B1 for a numerator of 4 in a fraction less than 1. **4% (4/100) gets B1 for the 4.** B1 for the 16 in a fraction <1. Do not penalise incorrect reduction of fractions.	
(ii) 12/16 **OR ·75 OR 75%**	B1	F.T. 1 – 'their 4/16' in a fraction <1.	
(c) 9/16	B1	F.T. consistent use of 'their 16' in a fraction <1.	
	6		

2009 Summer Paper 1 (Non calculator) Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME (23/05/2009) Comments (Page 3)
13. (a) (180 – 56) OR 124 124/2 62 (b) Other base angle = 62 (y =) 180 – 43 – 'their 62' = 75	**M1** **m1** **A1** B1 M1 A1 6	 **F.T. 'their 124'** **C.A.O.** **F.T. 'their 62'. Look in the diagram.**
14. (a) 70 (kg), 175 (cm) (b) Positive (c) Suitable line, with some points above and below (d) Answers in the range >50 (kg) but ≤ 65 (kg) (e) No, not plotted in order OR similar explanation	B2 B1 B1 B1 B1 6	B1 for either or if reversed Do not accept a description No requirement to pass through the means OR Suitable answer from their line of best fit No may be implied in their statement
15. (a) Entries of 1000 (ml) and 1000 (ml) 16/4 × 115 or other complete method 460 (g) 60 (ml) (b) 1000ml = 1 litre (5500 × 8) / their (a) entry for milk 44 (people)	B1 M1 A1 B1 B1 M1 A1 7	**Accept 1 litre.** Maybe implied by use of 1000ml & 5500ml OR 1litre & 5.5litres, OR from their milk entry OR (5.5× 8) / their (a) entry for milk for M1 only FT their entry for milk in (a) **(5.5× 8) gets B1, M1** **SC1 for sight of the digits 44 but with incorrect place value e.g. 4·4**
16. (a) (b) 3 + 5 < 10 or equivalent in words (c) Sight of 30 and 70 OR exterior total is 360 180 – (30+70) and intention to subtract this from 180 OR 360 – (150+110) $100^{(0)}$	B3 B1 M1 M1 A1 7	**B2 for any 2 columns correct or any 2 rows correct** **B1 for any 1 column correct or any 1 row correct** For understanding of triangle formation. **Ignore 10 stated as hypotenuse** Intention rather than accurate notation CAO. SC1 for 80 if no other marks awarded
17. (a) $c^4 - 5c$ (b) 8d – 12 + 15 – 21d = −13d + 3 (c) 7e + 12 = 3e + 18 7e – 3e = 18 – 12 OR 4e = 6 e = 6/4 **ISW** (= 1.5)	B1 B1 B1 B1 B1 B1 6	**Not ISW** FT their expand if not more than 1 error Expand bracket **in an equation**. *FT until 2nd error in (c)* Collection like terms, no need to see simplified

Paper 1 - Higher Tier

Paper 1 2009 Higher Tier		Comments
1.(a) 70 (kg), 175 (cm) (b) Positive (c) Suitable line, with some points above and below (d) Answers in the range >50 (kg) but $\leq$ 65 (kg) (e) No, not plotted in order OR similar explanation	B2 B1 B1 B1 B1 6	B1 for either or if reversed Do not accept a description No requirement to pass through the means OR Suitable answer from their line of best fit No maybe implied in their statement
2. (a) Entries of 1000 (ml) and 1000 (ml) 16/4 x 115 or other complete method 460(g) 60 (ml) (b) 1000ml = 1 litre (5500x8) / their (a) entry for milk 44 (people)	B1 M1 A1 B1 B1 M1 A1 7	 Maybe implied by use of 1000ml & 5500ml OR 1litre & 5.5litres, or from their milk entry OR (5.5x8) / their (a) entry for milk for M1 only FT their entry for milk in (a) SC1 for 44 with incorrect place value
3. (a) Sight of any two from: 50, 400 and 200 100 (b) 4280 (c) 90 (%) (d) Attempt common format of 3 given values 13/20, 8/20, 6/20 with 5/20 or equivalent 3/10 or its equivalent	M1 A1 B1 B1 M1 A1 B1 7	Maybe implied if correct response is given. Accept values that could lead to a simple calculation For their simple calculation, e.g 98 All decimals, common denominator or % Or 65%, 40%, 30% with 25%, or as decimals
4. (a)(i) Sight of 10 or +6 within the substitution 8 (ii) Sight of 3 x 5 x 4 or 3 x 5 x -2^2 60 (b) 6n + 5 or equivalent ISW (c) (i) 7n - 2 (ii) $20^2 - 2$ OR 20x20 -2 = 398	B1 B1 B1 B1 B1 B2 M1 A1 9	{ 10 - (-6)}/2 CAO If no B marks award SC1 for -60 Accept 6×n + 5 B1 for 7×n seen, (not n+7), or "term in n" -2 MR-1 for finding 12th term (No marks for 38)
5.(a) (b) 3 + 5 < 10 or equivalent in words (c) Sight of 30 and 70 OR exterior total is 360 180 – (30+70) and intention to subtract this from 180 OR 360 – (150+110) $100^{(0)}$	B3 M1 M1 A1 7	B2 for any 2 columns correct or any 2 rows correct B1 for any 1 column correct or any 1 row correct For understanding of triangle formation. Ignore 10 stated as hypotenuse Intention rather than accurate notation CAO. SC1 for 80 if no other marks awarded
6. (a) 1.5kg = 1500 (g) 1500/300 or 1.5/300 5 (g/cm^3) (b) (10 minutes =) 600 (seconds) 600/50 (=12 buckets) 48 (litres) OR equivalent (c) 158 (mm)	B1 M1 A1 B1 M1 A1 B1 7	Stated or implied by x1000 CAO Seen or implied in working, or reverse 50/60 hrs Or alternative method CAO. When units are given they should be correct Accept 157.$\dot{9}$
7.(a) $c^4 - 5c$ (b) 8d – 12 + 15 – 21d = - 13d + 3 (c)(i) 7e + 12 = 3e + 18 7e – 3e = 18 – 12 OR 4e = 6 e = 6/4 (= 1.5) (ii) f/5 = 17 – 7 OR f/5 = 10 OR f + 35 = 17x5 f = 50	B1 B1 B1 B1 B1 B1 B1 B1 8	Not ISW FT their expand if not more than 1 error Expand bracket. *FT until 2nd error in (c)* Collection like terms, no need to see simplified ISW CAO

Paper 1 2009 Higher Tier		**Comments**
8. (a) 0.6, 0.3, 0.7, 0.3, 0.7 (b) 0.4 x 0.7 = 0.28	B2 M1 A1 4	B1 0.6 with one other correct, or 0.3 & 0.7 once FT their 0.7
9.(a)(i) 4.7 x 10^{-3} (ii) 3.2 x 10^{4} (b) 6.3 x 10^{3} (c) 10/3 x 6/5 = 4 (d) 19 (e) 1/81	B1 B1 B2 B1 B1 B1 B1 8	Penalise incorrect notation on the 1st occasion only B1 for 6300 or …. x 10^{3} CAO. Do not accept an improper fraction.
10. Sight of terms 5x and 5x + 12 Their expression of 3 terms = 672 x + 5x + 5x + 12 = 672 x= 60 (litres of black paint) 300 and 312 (litres)	B1 M1 A1 B1 B1 5	Accept "×" sign included Correct equation CAO FT their x for 5x and 5x+12, provided at least 1 mark already awarded *SC2 for 60, 300 and 312 only, no equation, OR SC1 for 60 litres of black paint, no equation*
11.(a) -19 (b) Suitable scale Plotting 4 points correctly Smooth curve through 5 correct points (c) Straight line y = x+ 4 seen Approximately (1.7 , 5.5), use their graph	B1 M1 M1 A1 B1 B1 6	 Not off the paper provided FT from (a) FT from (a) CAO. Tolerance of to a square on each axis
12. (a) (i) (5x + 7y) (5x – 7y) (ii) Denominator factorised 2x(5x - 7y) (5x+7y)/ 2x (b) (5x + 3) (3x + 2) -3/5 and -2/3 ISW	B2 B1 B1 B2 B1 7	B1 for (5x 7y) (5x 7y) or one slip FT from (i) if equivalent problem Penalise further working -1 B1 for 5x, 3x, 3 and 2 FT their pair of brackets
13. (a) Entries 30, 30, 40, 35, 5 (b) Attempt to find 8/10 30 to 40 group (= 8/10 ×40) = 32 72 (cars) (c) 3, 4, 2, 1.5, 0.5 Axes correct and labelled, no gaps between bars Correct histogram (d) Yes, with reason (e.g. more slower)	B2 M1 M1 A1 B1 M1 A1 B1 9	B1 for any 3 correct entries FT for their entries for M marks only in (b) OR 2/10 of 30 to 40 group (2/10×40) OR 140 – (8 + 30 + 30) CAO Histogram needs to be attempted FT candidates frequency density if table completed incorrectly but the idea of frequency density is used. SC1 if correct but not labelled. FT from their histogram in (b) if necessary
14. y=2+cosx, y= tanx, y=sinx	B2 2	B1 for any one correct
15. **AB**= **b** – **a** OR **AC**= 2/5**AB** OR **AC** = 2/5(**b**-**a**) OR **CB** =3/5**AB** OR **CB** = 3/5(**b** – **a**) OR **OC** = **a** + 2/5 **AB** **OC** = **a** + 2/5(**b** – **a**) OR **OC** = **b** – 3/5(**b** – **a**) **OC** = 3/5**a** + 2/5**b**	M1 A1 A1 3	OR equivalent OR equivalent CAO
16. (a) All 5 points plotted correctly (b) b ≈ 100 Gradient = difference y / difference x^2 a ≈ 8	B2 B1 M1 A1 5	B1 for one error Or alternative method to find a ≈ 10

Paper 2 - Foundation Tier

2009 Summer Paper 2 (Calculator allowed) Foundation Tier	Marks	FINAL POST COFERENCE MARK SCHEME Comments (06/06/2009) (Page 1)
1. (a) (35.90) 3.6(0) (flower pots) 31.88 (compost) 13.92 (lawn seed) 85.3(0) (b) (£) 8.53 **ISW**	 B1 B1 B1 B1 B1 5	 C.A.O. C.A.O. C.A.O. F.T. their figures for 1 error **Unsupported 85.3(0) gets B4.** F.T. their total **and allow more than 2 decimal places.** **(£)76.77 gets the B1.**
2. m^2 Litres or cm^3 or cl or ml metres or kilometres kg	B1 B1 B1 B1 4	 **kilos gets B0.**
3. (a) B F OR G C G (b) Straight lines Arc	B1 B1 B1 B1 B1 B1 6	C.A.O. C.A.O. C.A.O. C.A.O. **Allow ±2mm** **F.T. from the 2 ends of 'their corresponding lines'.**
4. (a) Cost = 4 × 21 + 15 = (£) 99 (b) Hiring = 230 − 10 × 21 Hiring Fee = (£) 20	M1 A1 M1 A1 4	Correctly substituted. C.A.O. For correct substitution and subtraction C.A.O. Allow embedded references to the correct answer.
5. (a) Sum of the numbers (468) Sum/9 52 (b) 35 40 46 46 51 53 60 63 74 Median = 51	M1 m1 A1 M1 A1 5	For attempt to add the numbers , **e.g 46 + 60 ... is enough** **OR seeing a number in the range 390 – 540** **seeing a number in the range 390 – 540 divided by 9** C.A.O. Some sign of finding the middle number **from an ordered list** C.A.O.
6. (a) (£) 40.09 (b) 42.99, 20.99 42.99 – 20.99 (£) 22 **ISW** (c) 59.38 – 20.99 38.39 10 am (next day service)	B1 B1 M1 A1 M1 A1 A1 7	C.A.O. Sight of either of the correct readings For subtracting their readings if from the 9, 12 columns C.A.O. **£ sign not required, but A0 for 22p.** **C.A.O.** **C.A.O.** **SC1 for (£)59.38 – a cost from the 12 noon column.**
7. (Car) 4 – 6 ft **inclusive** 1 – 2 metres **inclusive** Car 1cm church 12cm Multiplying factor = 12 Height of church = car estimate × 12 = F.T. their car estimate	B1 B1 M1 A1 4	 F.T. their car estimate AND multiplying factor **Unsupported answers in the range 48–72 ft OR 12–24 m get B0, B1, M1, A1 if correct units given, but B0, B1, M1, A0 if units are missing**

2009 Summer Paper 2 (Calculator allowed) Foundation Tier	Marks	FINAL POST COFERENCE MARK SCHEME Comments (06/06/2009) (Page 2)
8. (a =) 3 (b =) 6 (c =) 7 (d =) 5	B1 B1 B1 B1 4	C.A.O F.T 9 – a F.T. 22 – 2b – a F.T. 21 – (a +b+c)
9. (a) (i) 29 (ii) (17 + 3)/4 = 5 (b) (i) add three (to the previous term) (ii) halve or divide by two	B1 M1 A1 B1 B1 5	C.A.O. **Accept embedded answers such as 5 × 4 – 3 = 17** Accept +3 Accept ÷2
10. A (12, 4) B (0, 8) C (16, 16)	B1, B1 B1, B1 B1, B1 6	C.A.O. **REVERSED COORDINATES GET NO MARKS.** C.A.O. C.A.O. **Penalise –1 once only for incorrect notation such as (12x, 4) OR (x=12, y=4)**
11. (a) 4 −6 (b) (x =) 32 (c) − 13	B1 B1 B1 B2 5	C.A.O. F.T. 'their 4' – 10 if negative **Accept embedded answers such as 32/4 = 8** B1 for the −3 OR − 10 **−3a − 10b gets B0.**
12. (a) 21/50 **ISW** (b) (0 × 3) + 1×12 + 2×14 + 3×18 + 4×2 + 5×1 = 107	B2 M1 A1 4	**B1 for a numerator of 21 OR B1 for a denominator of 50 if in a fraction < 1** **Accept percentages 42% OR decimals ·42** **Adding two fx terms is enough, e.g. 1×12 + 2×14** C.A.O.
13. (a) $\frac{36}{100} \times 72$ = 25·92 **ISW** (b) $\frac{78}{120} \times 100$ = 65 (%)	M1 A1 M1 A1 4	**Accept other methods such as 10%=7·2, 30%=21·6, 5%=3·6, 1%=·72 as long as the partitioning would lead to 25.92 if calculated correctly** C.A.O. **Ignore % sign in the answer.** **C.A.O.**
14. 3 or 4 angles correct and correctly labelled. 3 or 4 angles correct, labels not fully correct. 2 angles correct and correctly labelled. 2 angles correct, labels not fully correct. 1 angle correct and correctly labelled. OR If 0 OR 1 for their diagram or no diagram, 360/120 Angles are 126, 81, 105 and 48	B4 OR B3 B3 B2 B1 M1 A1 4	Use the overlay and allow ± 2°. Correct labels (Words NOT the frequency OR angle). 3 correct labels is enough. If only B1 is scored for the diagram, and all the angles given correctly, then cancel the B1 and award M1, A1 for 2 marks. If B0 scored for the diagram, check the angles and the method to see if the M1 and the A1 can be awarded. (1 is) 3° gets the M1. OR SC1 for all correct percentages: 35, 22·5, 29·2, 13·3 **OR 35, 22 or 23, 29, 13**
15. (a) Distance = **10·2 – 10·6** (cm) = ÷ 2 = **5·1 – 5·3** (km) (b) Bearing Distance	B1 M1 A1 B1 B1 5	Allow 10·4 ± 2mm F.T. their distance Use overlay **Use overlay**

2009 Summer Paper 2 (Calculator allowed) Foundation Tier	Marks	FINAL POST COFERENCE MARK SCHEME Comments (06/06/2009) (Page 3)
16. 2380 a 267.75 b 294.89 c 14.74(45) d 288.26(45) e 9.01(45) **6**	B1 B1 B1 B1 B1 B1 6	C.A.O. **Accept truncated or rounded answers** F.T. **a × 0·1125** F.T. **b + 27·14** F.T. **c × 0·05** F.T. **c + d – 21·37** F.T. **e – 279·25** **Allow ±2p** **If their total cost is < 279·25 then their final balance must show a – or CR**
17. (a) Strategy, knowing that the probabilities add to 1 0.13 (b) Yellow and Blue (c) 0.24 + 0.37 = 0.61 **H1**	M1 A1 B1 M1 A1 5	E.g. Attempt to add all and subtract from 1, or noticing first 2 make 0.5 & working towards 0.5 **Accept percentages 13% OR fractions 13/100** FT their (a) if greater than either of these
18. (a) (12/100) × 132 + 132 OR 1.12 × 132 = (£) 147.84 **ISW** (b) 8.1 **H3b&d**	M2 A1 B2 5	M1 for (12/100) × 132 (= 15.84) **M1 for (£)116.16** B1 for 8 or 8.(05263…..)
19. Strategy of finding prime factors 24 = 2×2×2×3 and 54 = 2×3×3×3 24 ×54 = $2^4 \times 3^4$ OR $2^2 \times 2^2 \times 3^2 \times 3^2$ OR 2×2×2×2×3×3×3×3 Explanation, even powers **H4**	M1 M1 A1 E1 4	At least 2 prime factors for either value For prime factors, not notation Or implied by the explanation of prime factors and even indices. **SC1 for $2^4 \times \cdots$ OR $3^4 \times \cdots$** **F.T. if work has even powers with some primes. For example a correct explanation based on $2^4 \times 9^2$ gets E1.**
20. 1.4 gives **19.(04)**, 1.5 gives **22.875** (22, 22.8, 22.87) ***Alternative: -20 then compare with 0*** Explanation that one calculated value is too small and the other calculated value is too large, these calculated values need to be shown and used. Use of inequality signs with calculated values without words is acceptable. *Accept arrows as indication of too small, too large – both are required* **H6**	B1 E1 2	Or two other **values**, giving <20, the other >20. 1.41 19.(402305) *-0.597695* 1.42 19.(76924) 1.43 20.(140835) 1.44 20.(51712) 1.45 20.(898125) 1.46 21.(28388) 1.47 21.(674415) 1.48 22.(06976) 1.49 22.(469945) ***2.469945***
21. $AB^2 = 5.3^2 – 2.8^2$ = 20.25 AB = 4.5(cm) Area cross section = ½ × 2.8 × AB or embedded in volume calculation Volume = area cross section × 3.5 22.(05 cm^3) or 22.1 (cm^3) **H7**	M1 A1 A1 M1 M1 A1 6	**F.T. if M1 awarded** F.T. 'their area x-section' CAO **OR** cos C = 2.8/5.3 M1 C = 58(.1….^{0}) A2 (A1 for 0.52..) ½ x 5.3 x 2.8 x sin C M1 ↓

Paper 2 - Higher Tier

Paper 2 2009 Higher Tier		Comments
1.(a) Strategy, knowing that the probabilities add to 1 0.13 (b) Yellow and Blue (or 0.26 and 0.37) (c) 0.24 + 0.37 = 0.61	M1 A1 B1 M1 A1 5	E.g. Attempt to add all and subtract from 1, or noticing first 2 make 0.5 & working towards 0.5 FT their (a) if greater than either of these
2. (a) Enlargement scale factor 2 Correct position (b) Correct reflection in x = 1 (c) Correct translation (d) Bottom right shape indicated	B2 B1 B2 B1 B1 7	B1 3 lines correct, or consistent incorrect scale FT consistent incorrect scale B1 a reflection in y=1 or either axis, OR for drawing x=1. MR-1 for use of x=-1 Accept any unambiguous indication
3.(a) 57 / 1h 30 mins 57/1.5 or equivalent 38 (mph) (b) (12/100) x 132 + 132 OR 1.12 x 132 = (£) 147.84 (c) 400 x 1.44 = 576 (Euros) (576 – 180 =) 396 (Euros left) their 396 / 1.44 = (£)275 (d) 8.1	M1 A1 A1 M2 A1 M1 A1 B1 M1 A1 B2 13	Method only, e.g. implied by 43.8.., 0.63..,0.438 CAO M1 for (12/100) x 132 (= 15.84), or 116.16 ISW **OR** 180/1.44 M1 = 125 (pounds spent) A1 400 – their 125 M1 = (£) 275 A2 CAO CAO *SC1 for an answer 152.77or 152.78* B1 for 8 or 8.05263…..
4. Strategy of finding prime factors 24 = 2x2x2x3 and 54 = 2x3x3x3 24 x 54 = 2^4 x 3^4 or $2^2x2^2x3^2x3^2$ or 2x2x2x2x3x3x3x3 Explanation, even powers or occurs in pairs *(Accept perfect square from correct prime factor working)*	M1 M1 A1 E1 4	At least 2 prime factors for either value For prime factors, not notation Or implied by the explanation of prime factors and even indices *SC1 for $2^2x…$ or $3^4x…$* FT from 3^4x4^2 or 2^4x9^2.
5. Mid-points 32, 36, 40, 44, 48 $\frac{32x2+36x9+40x30+44x11+48x8}{60}$ (OR 2456) = 40.9(..(or 40.93 or 40.93· OR 41 (seconds)	B1 M1 M1 A1 4	Two shown is sufficient if no error Attempt ∑fx for their mid-points Attempt their∑ fx divided by 60. CAO
6. 1.4 gives **19.(04)**, 1.5 gives **22.875** (22, 22.8, 22.87, 22.9, 23) ***Alternative: -20 then compare with 0*** Explanation that one calculated value is too small and the other calculated value is too large, these calculated values need to be shown and used. Use of inequality signs with calculated values without words is acceptable. *Accept arrows as indication of too small, too large – both are required*	B1 E1 2	Or two other **values**, giving <20, the other >20. 1.41 19.402305 *-0.597695* 1.42 19.76924 1.43 20.140835 1.44 20.51712 1.45 20.898125 1.46 21.28388 1.47 21.674415 1.48 22.06976 1.49 22.469945 *2.469945*
7. $AB^2 = 5.3^2 – 2.8^2$ OR sine rule, with values = 20.25 OR correct rearranged sine rule AB = 4.5(cm) OR Angle A (31.89…^{0}) Area cross section = ½ x 2.8 x AB OR other correct method OR embedded in volume calculation Volume = area cross section x 3.5 22.(05 cm^3) or 22.1 (cm^3)	M1 A1 A1 M1 M1 A1 6	**OR** cos C = 2.8/5.3 M1 C = 58(.1….^{0}) A2 (A1 for 0.52..) ½ x 5.3 x 2.8 x sin C M1 (6.3) ↓ FT their area x-section CAO
8.(a) q + 45 = 8p OR -8p = -q - 45 p = (q + 45) / 8 or equivalent ISW (b) 15t – 4t < 7 t < 7/11 ISW *No marks for use of "=" unless replaced at the final stage, then allow all possible marks*	B1 B1 B1 B1 4	 FT q – 45 = 8p **only** to p = (q - 45) / 8 Accept t<0.6 from correct working. FT if only one error in first stage.

Paper 2 2009 Higher Tier		Comments
9.(a) 15, 50, 60	B1	
		In (b) accept plots at 20,40,60,80 OR 19.5,39.5,59.5,79.5
(b) Idea, plotting upper class boundary (consistent)with the corresponding cumul. freq.	M1	FT their **cumulative** table of values for all marks, must be cumulative
2 points plotted correctly	A1	
All points correct and joined by straight lines or curve	A1	*SC1 if plotted and joined using mid-points or -1*
(c) Median …….	B1	(approximately 49)
First group by ……..	B1	FT their **cumulative** diagram in(c)
	6	FT logic, group with difference from 40. The median maybe implied by the difference
10.(a) 4500 / 15 (= 300)	M1	
(£)600, (£) 1500, (£) 2400	A2	A1 for any one answer
(b) Area = ½ Π28^2 OR ½ Π2.8^2	M1	
1230 to 1232 (mm^2) 12.30 to 12.32 (cm^2)	A1	Ignore final incorrect conversion of units *SC1 for24(.)60 to 24(.)6 or 2460 to 2464*
(c) 68.25 / 105 x 100	M1	
= 65	A1	Maybe implied within final A1
3.25 (dollars)	A1	Ignore £ given
	8	*SC1 for sight of1.05 or 105 if no other marks*
11.(a) $6x^9y^9$	B2	B1 for an two of the three correct, e.g. $6x^9y^7$, i.e. -1 per error
(b) $x^2 + 8x – 2x – 16$	B1	Any three of the 4 terms correct
$= x^2 + 6x – 16$	B1	CAO. Penalise further working -1
(c) $a^2 (a + 4)$	B1	
	5	
12. Overall strategy	B1	
BC = 19.6 x tan 27	M2	M1 for tan27 = BC/19.6
BC = 9.986….	A1	
AC = 17.5 + BC	B1	FT their BC (AC=27.486…)
Tan ADC = AC/19.6	M1	FT their AC which is > BC for M1 and A1 mark
Tan ADC = 1.4(023…)	A1	
<ADC = 54^0 to 55^0	A1	CAO
	8	
General principles for other methods in Q12. B1 overall strategy, M2 A1 for the first relevant application of trigonometry, B1 for simple calculation of a length or angle for the nest step, M1 A2 for the last relevant step using trigonometry. E.g Initially use of sine rule with values M1, Rearrange for BC M1, BC = 21.997…,		
13. 3/10 x 7/9 or equivalent	M1	3/10 x 5/9 + 3/10 x 2/9 (would give 21/90)
2 x ……. Or listing 2 ways **only**	M1	P(B)xP(B') + P(B')xP(B) only or alternative complete idea, irrespective of replacement
42/90 (= 7/15) or equivalent	A1	ISW
		Alternative method: 1 – P(bb) – P(no blue) M1
		Use of correct values M1
	3	*42/90 A1*
14.(a) 56^0	B1	
(b) 57^0	B1	
(c) 114^0	B1	FT 2 (b). Accept 246^0
	3	
15.(a) sin BAC/ 6.6 = sin62/8.4	M1	
sin BAC = sin62/8.4 x 6.6	M1	Alternative for (b)
BAC = 43.9(….) or 44^0	A1	CAO AB=9(.1..) M1
(b) Strategy to find missing angle, 180 – 62 – BAC	M1	(74) ½ 6.6x9.1xsin62
Area = ½ 8.4 x 6.6 x sinC	M1	FT their Cfrom their BAC M1
= 26.6(555….cm^2) or 27 (cm^2)	A1	FT their C from their BAC 26.6(555….cm^2)
	6	or 27 (cm^2) A1

Paper 2 2009 Higher Tier		**Comments**
16.(a) $1/3\ \Pi x^2 3$ OR $1/3\ \Pi(x+1)^2 6$	B1	
$1/3\ \Pi x^2 3 + 1/3\ \Pi(x+1)^2 6 = 102\Pi$	M1	Their expression for the sum of volumes, with at least one expression correct, equated to 102Π
$x^2 + 2(x+1)^2 = 102$	A1	Eliminate fraction and Π
$x^2 + 2x^2 + 4x + 2 = 102$ leading to $3x^2 + 4x - 100 = 0$	A1	CAO
(b) $x = \{-4 \pm \sqrt{(4^2 - 4x3x-100)} / 2x3\}$	M1	Allow one slip for M mark only
$= \{-4 \pm \sqrt{1216} / 6\}$	A1	
$x = 5.145\ldots$	A1	Ignore negative solution
Radius larger cone = 6.1 or 6 (cm)	A1	FT their x+1 to whole or 1dp if M1 awarded
		Trial & Improvement:
		M1 correct evaluation either side, M1 check to
	8	*2dp, A1 for 5.1(…), A1 for 6.1 or 6*
17.Tangent used or shown at 12.30	B1	
Use of difference distance / difference time	M2	Award M1 only if time unit is minutes
…… $\pm$ 2 km/h	A1	***No marks for reading at 12 30 for distance then doubling***
	4	
18. Numerator $x(8x - 1) - 2(3x + 1)$	M1	
Denominator $(3x + 1)(8x - 1)$	M1	
$8x^2 - 7x - 2$ seen in working	B1	
$\frac{8x^2 - 7x - 2}{(3x + 1)(8x - 1)}$ or $\frac{8x^2 - 7x - 2}{24x^2 + 5x - 1}$	A1	Penalise further working, apart from incorrect expansion of denominator
	4	

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