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Mark Scheme (Results)

Summer 2013

International GCSE Mathematics (4MA0) Paper 4H

Level 1/Level 2 Certificate in Mathematics (KMA0) Paper 4H

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme.
- Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- **Types of mark**
  - M marks: method marks
  - A marks: accuracy marks
  - B marks: unconditional accuracy marks (independent of M marks)
- **Abbreviations**
  - awrt – answers which round to.....
  - cao – correct answer only
  - ft – follow through
  - isw – ignore subsequent working
  - SC - special case
  - oe – or equivalent (and appropriate)
  - dep – dependent
  - indep – independent
  - eeoo – each error or omission
- **No working**

  If no working is shown then correct answers normally score full marks

  If no working is shown then incorrect (even though nearly correct) answers score no marks.

- **With working**
  If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

  If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks.

  Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks.

  If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

  If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

  If there is no answer on the answer line then check the working for an obvious answer.

- **Ignoring subsequent work**
  It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. Incorrect cancelling of a fraction that would otherwise be correct.

  It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.

  Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

- **Parts of questions**
  Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another

Apart from Questions 5b, 6 and 23 (where the mark scheme states otherwise) the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.				
Question Number	**Working**	**Answer**	**Mark**	**Notes**
1 (a)	1 – (0.15 + 0.4 + 0.35)	0.1	2	M1 A1 oe
(b)	0.15 + 0.4	0.55	2	M1 A1 oe
				Total 4 marks

2	3/5 x 15 or 15 ÷ 5 × 3	9	2	M1 M1 for 3/5 or 15 ÷ 5 × 3 A1
				Total 2 marks

3	7800 ÷ 9.75 or 7800 ÷ 585 x 60	800	3	M2 M1 for 7800 ÷ 9.45 or 7800 ÷ 585 or 13.3.... A1
				Total 3 marks

4 (a)		Rotation 90° or quarter turn anticlockwise (0,0) or *O* or origin	3	B1 B1 accept 90° or – 270° B1 **Award B0 (no marks) if the response is not a SINGLE transformation**
(b)		Shape in correct position	2	B2 B1 for translation 6 units left or 2 units up
				Total 5 marks

5 (a)	21/24 – 20/24 = 1/24		2	B2 for both fractions written correctly with a common denominator, followed , if necessary, by cancelling to 1/24 B1 for 1 correct fraction with denominator of a multiple of 24
(b)	5/8 x 12/7 or 15/24 ÷14/24	60/56	2	M1 leaving first fraction unchanged, changing ÷ to x and inverting the second fraction or converting each fraction with a common denominator of 24 oe with ÷ sign A1 60/56 from the x or 15/14 from the ÷
				Total 4 marks

6	$5y=14$ **or** $7y-2y=14$ **or** $5y=8+6$ **or** $5y-14=0$	2.8	3	M2 for correct rearrangement with *y* terms on one side AND correct collection of terms on at least one side or for correct collection to 2 terms M1 for correct rearrangement with *y* terms on one side and numbers on the other eg $7y-2y=8+6$ **OR** correct collection and simplification of either numbers or *y* terms eg $5y-6=8$ or $5y=a$ or $by=14$ A1 2.8 oe dependent on at least one M1
				Total 3 marks

7 (a)		(4.5 , 3)	2	B1 B1
(b)	Identifies 2 & 7 as sides "2"^{2} + "7"^{2} √("2"^{2} + "7"^{2})	7.28	4	B1 M1 "2" & "7" must be identified as sides M1 dep A1 awrt 7.28
				Total 6 marks

8	Factor tree or repeated division with 2 or more correct prime factors (2, 2, 3, 17) Fully correct factor tree or repeated division or 2, 2, 3, 17	 2 x 2 x 3 x 17	 3	M1 condone 1s; factors must multiply to 204 M1 condone 1s A1
				Total 3 marks

9 (a)	$-6/3 \leq x < 9/3$	$-2 \leq x < 3$	2	M1 M1 for $-6/3 \leq x$ or $x < 9/3$ A1 SC B1 for $-2 < x < 3$
(b)		−2, −1 , 0, 1, 2	2	B2 B1 for five correct values and one wrong value or four correct values with no wrong value
				Total 4 marks

10	22 x 25000 (=550000) "550000" ÷100000	 5.5	 3	M1 or 25000 cm = 0.25km or 22 ÷100000 M1 or 22 x 0.25 or "0.00022" × 25000 A1
				Total 3 marks

11 (a) (i)	$2^3 - 6 \times 2^2 + 20$		2	B1 must see 8 – 24 + 20 oe
(ii)	13, (20), (15), 4,(−7), (−12), −5, (20)			B1 for all correct
(b)	Points plotted Curve		1 1	B1 ft ± ½ square B1 ft if at least B1 scored in (a)
(c) (i)		$3x^2 - 12x$	2	M1 for $3x^2$ or $12x$ A1
(ii)	3 x $(-3)^2$ – 12 x (−3)	63	2	M1 ft for a quadratic in c) i) A1
				Total 8 marks

12	10 x 24 ,30 x 20, 50 x 9, 70 x 12, 90 x 15 10 x 24 + 30 x 20 + 50 x 9 +70 x 12+ 90 x 15 240 + 600 + 450 + 840 +1350	3480	3	M1 at least 4 products $f \times x$ used consistently within interval (inc end points) M1(dep) for Σfx with use of at least 4 correct ½ way values A1
				Total 3 marks

13	20 or 160 360 ÷ "20" or 720 ÷ "40"	18	4	M1 for (140 + x) + x = 180 oe or y + (y – 140) = 180 or $\frac{180(n-2)}{n} - 140 = \frac{360}{n}$ A1 x = 20 or y = 160 or 180n – 140n = 720 M1dep on previous M1 A1
				Total 4 marks

14 (a)		Pacific	1	B1
(b)	$(7.68 \times 10^7) + (6.86 \times 10^7) + (1.56 \times 10^8) + (2.03 \times 10^7) + (1.41 \times 10^7)$	3.358×10^8	2	M1 oe or digits 3358 or 336 A1 accept 3.36×10^8
(c)	(("3.358×10^8")÷ (5.1×10^8)) x 100	65.8	2	M1 ft oe A1 awrt 65.8
				Total 5 marks

15 (a)		0.85 on lower branch Binary tree structure All labels & values correct	3	B1 on lower branch for first game B1 B1 0.15 & 0.85 in correct position + labels
(b)	0.15 x 0.15	0.0225 oe	2	M1 A1 9/400 etc
				Total 5 marks

16 (a)	P = "k" / r^2 22.5 = "k"/ 2^2	P = 90 / r^2	3	M1 $k \neq 1$ M1 $k \neq 1$ A1
(b)		40	1	B1 ft from "k" ÷ 1.5^2 $k \neq 1$
(c)	10 = "k"/r^2 (r =) √("k"/10)	3	2	M1 $k \neq 1$ A1 ft ignore ±
				Total 6 marks

17 (a)		1	1	B1	
(b)	$y = (x - 6) / 2$ $2y = x - 6$ $2y + 6 = x$	$2x + 6$	2	M1 or for a correct flowchart including inverse A1	$x = (y - 6) /2$ $2x = y - 6$
(c)		$(x) < 4$	2	B2 B1 for $(x) \leq 4$	
(d)	$\sqrt{\frac{x-6}{2} - 4}$	$\sqrt{\frac{x-14}{2}}$	2	M1 A1 accept $\sqrt{\frac{x}{2} - 7}$ condone ±	
				Total 7 marks	

18	(0.5 x 160), (2 x 50), (1 x 25) 80 + 100 + 25	205	3	M1 for any two or a clear indication that 1 car = 1 small sq or 25 cars = 1 cm^2 M1 or 8.2 x 25 oe A1
				Total 3 marks

19 (a) (i)		6	1	B1
(ii)		Tangents from a point to a circle are equal in length	1	B1 oe
(b)	*RT* (or *RU*) = 8 "15"^{2}=13^2 + "14"^{2} −2x13 x "14" cos (*PQR*) cos (*PQR*) = (13^2+"14^2"− "15"^{2}) ÷ (2x13x"14")	67.4	4	B1 or *QR* = 14 M1ft Allow ft for *QR* and *PR* if lengths stated or marked on diagram M1ft A1 awrt 67.4
				Total 6 marks

20 (i)		15	1	B1
(ii)		23	1	B1
(iii)		2	1	B1
(iv)		12	1	B1
				Total 4 marks

21 (i)		− **a** − **b** + **c**	1	B1 any order
(ii)	*PX* = *PU* + *UT* + ½ *TQ* oe	½ (**a** + **b** + **c**)	2	M1ft any valid route in capitals or lower case A1 accept ½**a** +½ **b** + ½**c**
				Total 3 marks

22	$3.5^2 + 10^2$ (=112.25) **or** $6^2 + 3.5^2 + 10^2$ (=148.25) $\sqrt{"112.25"}$ (=10.59..) **or** $\sqrt{"148.25"}$ (=12.17..) tan ("x")= 6 / "10.59.." or sin("x") = 6/"12.17.."	29.5	4	M1 M1 awrt 10.6 or 12.17 M1(dep on M1M1) A1 awrt 29.5
				Total 4 marks

23	$\frac{3(2x-3)+2(x+1)}{(x+1)(2x-3)}$ (=1) $8x - 7 = (x + 1)(2x - 3)$ oe $2x^2 - 9x + 4$ (= 0) $(2x - 1)(x - 4)$ (=0)	x = ½ or 4	5	M1 or $3(2x - 3) + 2(x + 1) = (x + 1)(2x - 3)$ M1 $8x - 7 =$ "$(x + 1)(2x - 3)$" A1 oe correct 3-part quadratic in the form $ax^2 + bx + c$ (=0) M1 or $\frac{--9 \pm \sqrt{(-9)^2 - 4 \times 2 \times 4}}{2 \times 2}$ A1 dep on previous M1
				Total 5 marks

				Total : 100 marks

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