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Mark Scheme (Results)

June 2011

International GCSE
Mathematics (4MA0) Paper 4H

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International GCSE Maths June 2011 – Paper 4H Mark scheme

Apart from questions 5b, 8, 15d, 20b, 21b, 23, 24b (where the mark scheme states otherwise) the correct answer, unless clearly obtained by an incorrect method, should be taken to imply correct working.

Question	Working	Answer	Mark	Notes
1.	15/100 x 640 (=96) 640 – "96"	 544	 3	M1 M1 dep or M2 for 640 x 0.85 A1
				Total 3 marks

2. (a)	120 – 90 (=30)	30/120 oe	2	M1 or 1 – 90/120 A1
(b)	"30/120" X 200 oe	50	2	M1 ft or 200 – "90/120" x 200 (i.e. 200 – "heads"/120 x 200) A1 ft ft if final ans < 200
				Total 4 marks

3.	15÷6 (=2.5) or 6÷15 (=0.4) or 230÷6 (=38.33) or 200÷6 (=33. or 6÷230 (=0.026) or 6÷200 (=0.0 230 x "15/6" or 200 x "15/6" oe	apples = 575 & raspberries = 500	3	M1 M1 dep (i.e "correct" calculation for apples OR raspberries) A1 cao both correct SC M1M1A0 if answers wrong way round with/without working
				Total 3 marks

4.	$72 \div 1\frac{1}{3}$ oe	54	3	B1M1 accept 72 ÷ 1.33 (2dp or better) or 0.9 x 60 (B1 M0 for 72 ÷ 1.2(0){=60} or 72 ÷ 80 {=0.9} or 72 ÷ 1.3 {=55.4 or better}) or 72000 ÷ 1.33(or better) A1 cao
				Total 3 marks

5. (a) (i)		a^4	1	B1 not a4 accept upper case A
(a) (ii)		30ab	1	B1 accept ab30, 30ba, a30b,b30a (no x signs allowed) accept upper case A and/or B
(a) (iii)		q^6	1	B1 accept upper case Q
(b)	5 – 12 = 2*y* oe	– 3.5 oe	2	M1 or 5 – 12 ÷ 2 or 12 – 5 ÷ – 2 A1 ans dependent on M1 (above numerical methods acceptable)
(c)	6^2 – 2 x 6 oe	24	2	M1 accept 36 – 12 A1
				Total 7 marks

6. (a)	½ (6+8)x5 or ½ x2x5 + 6x5	35	2	M1 A1
(b)	8 – 6 (=2) and 5 seen (PQ^2=) (“8 – 6”)^2+5^2 (=29) (PQ=) √”29”	5.39	4	B1 could be seen on diagram M1 (dep) (θ=) $\tan^{-1}$ (5/”8 – 6”) (=68.2 or better) M1 (dep) (PQ=) “8–6”/ cos “68.2” or 5 / sin “68.2” A1 5.38516..... awrt 5.39
				Total 6 marks

7.	6x5 (= 30) or 3+2+7+6+2 (=20) or (3+2+7+6+2 +”*x*”)/6=5 “30” – “20”	10	3	M1 M1 dep A1
				Total 3 marks

8.		Intersecting arcs from P and Q Perpendicular bisector joining both arcs	2	B1 arcs must intersect above and below line PQ B1 dep
				Total 2 marks

9. (i)		136.5	1	B1
(ii)		137.5 or 137 .49 recurring or 137.499..	1	B1 dot above 9 for recurring or 137.499….. (i.e .499 or better)
				Total 2 marks

10.	3 or more correct factors of which 2 are from 2,3,3,7			M1 e.g 2 x 3 x 21 or 2, 3, 21 must multiply to 126 could be implied from a factor tree or division ladder
	All 4 correct prime factors & no extras (ignore 1's)	2, 3, 3, 7 or 2, 3, 3, 7, 1 or 2x3x3x7x1 2 x 3 x 3 x 7	3	M1 could be implied from a factor tree or division ladder A1 any order, do not accept inclusion of 1's must be a product on answer line (dots or crosses)
				Total 3 marks

11.	Use of sin 42 or cos (90 – 42) 9.3 x sin 42 or 9.3 cos (90 – 42)	6.22	3	M1 $9.3^2 – (9.3 \cos 42)^2$ (=38.72..) M1 √("38.72..") (M1 dep) A1 awrt 6.22 6.22(2914...)
				Total 3 marks

12. (i)	$2x \geq 6 – 13$ oe	$x \geq –3.5$ oe	2	M1 Condone 2x > 6 – 13 oe A1 mark response on answer line (do not isw) correct answer with no working = M1A1
(ii)		–3, –2, –1	2	B2 any order B1 for –3, –2, –1, 0
				Total 4 marks

13. (a)		Earth	1	B1 or 1.28×10^7
(b)		6790000	1	B1
(c)	$1.21 \times 10^7 – 4.88 \times 10^6$ oe	7.22×10^6	2	M1 or sight of digits 722 A1
				Total 4 marks

14.	7×3^2	63	2	M1 for 3^2 or 9 or $\frac{1}{9}$ or $(\frac{1}{3})^2$ A1
				Total 2 marks

15. (a)	Correct cancelling 8 & 4 or brackets	$2(x - 3)$ oe	2	M1 A1
(b)		$(a + 12)(a - 12)$	2	B2 B1 for $(a\pm12)(a\pm12)$
(c)	$p + 5r$ ($=\sqrt{q}$)	$(p+5r)^2$ oe	2	M1 A1 do not isw (e.g. proceed onto $p^2 + 25r^2$)
(d)	$4 = 5(y - 4)$ oe $4+(5x4)=5y$	must be 5 x 4 or 20 or LHS = 24 4.8 oe	3	M1 or $(y-4)/4 = 1/5$ M1 $4/5 = y - 4$ A1 dep on M2 correct answer only = M0M0A0
				Total 9 marks

16. (i)		120 ,100	2	M1 1 square = 10 people or any correct fd value seen in correct place with no errors A1 both values correct
(ii)		Blocks at 5, 1, 2 squares	2	B1B1 for all 3 correct blocks, B1B0 for 1 or 2 correct blocks.
				Total 4 marks

17. (a)		for not late Correct binary structure ALL labels and values correct	3	B1 on lower first branch B1 4 branches needed on RHS B1
(b)	(1/8) x "(7/8)" or "(7/8)" x (1/8) or (1/8) x (1/8) (1/8) x "(7/8)" + "(7/8)" x (1/8) + (1/8) x (1/8)	$\frac{15}{64}$	3	M1 ft Any 1 "correct" product M1 ft 3 "correct" products with intention to add. Only ft probabilities < 1 or M2 for $1 -$" $(\frac{7}{8})^2$ " A1 cao (0.234375)
				Total 6 marks

18.	$x = 0.396396\ldots$ $1000x = 396.396....$ $999x = 396$	$\frac{44}{111}$	2	M1 A1 must reach $\frac{396}{999}$ or equivalent fraction (but not $\frac{44}{111}$)
				Total 2 marks

19.	$\frac{AB}{\sin 28} = \frac{10.2}{\sin 134}$ (AB =) sin 28 x $\frac{10.2}{\sin 134}$	6.66	3	M1 M1 isolate AB correctly (14.17 or 14.18 or 14.2 for $\frac{10.2}{\sin 134}$) A1 (6.65695....) awrt 6.66
				Total 3 marks

20. (a)		$(x=)0$	1	B1 Accept (x)≠0	
(b)	$(\frac{2}{a}+1)/\frac{2}{a} = 3$ $\frac{2}{a} + 1 = \frac{6}{a}$ or $1 + \frac{a}{2} = 3$ oe	4	3	M1 (Any letter in place of *a* acceptable) Solve g(x)=3 (x=0.5) M1 Solve f(a)=0.5 A1 dep on M2	
(c)	$y = \frac{x+1}{x}$ $x(y-1) = 1$ $x = \frac{1}{y-1}$	$\frac{1}{x-1}$	3	M1 M1 one occurrence of *x* A1 reverse labels *x* and *y*	$x = \frac{y+1}{y}$ reverse labels *x* and *y* $y(x-1) = 1$ one occurrence of y
					Total 7 marks

21. (a)	$\frac{(600+5x)-50x}{50x}$ x 100 = x oe 100(600 +5x − 50x)= 50x^2 oe 2(600–45x)=x^2 oe (but not ans)	50x x [1 + $\frac{x}{100}$] = 600 + 5x oe 5000x + 50x^2 = 60000 +500x x^2 = 1200 – 90x	3	M1 $\frac{actual\ profit}{original}$ x 100 = x M1 dep (removing denominator) A1 reducing to 1x^2 dep on M2	($\frac{(600+5x)}{50x}$ −1) x 100 = x oe (600 +5x – 50x) x 100 = 50x^2 1200 − 90x = x^2
(b)	$x=\frac{-90\pm\sqrt{90^2-4x1x-1200}}{2}$ $x=\frac{-90\pm\sqrt{8100+4800}}{2}$	11.789.....	3	M1 condone 1 sign error {working can be seen in part a)} sign error = +90 instead of – 90 or +1200 instead of –1200 M1 A1 dep on M2 awrt 11.8 (ignore negative root).	
					Total 6 marks

22. (a)	(AC^2 =) 5^2 + 7^2 (=74) (AG^2 =) "74" + 3^2 (=83) (AG =) √"83"	9.11	3	M1 or AC = 8.6.. or (BG^2)= 3^2 + 7^2 (=58) or (AF^2)= 3^3 +5^2 (AG^2 =) "58" + 5^2 (=83) M1 ft (dep on M1) M1M1 for √(5^2 + 7^2 + 3^2) A1 awrt 9.11
(b)	sin θ = 3/ √"83"	19.2	2	M1 or cos θ = √"74"/ √"83" or tan θ = 3 / √"74" or cos θ = $\frac{"74"+"83"-9}{2\ x\ \sqrt{"74"}x\ \sqrt{"83"}}$ A1 awrt 19.2 or 160.8
				Total 5 marks

23.	$\sqrt{(8 \times 6)} + \sqrt{(18 \times 6)}$ $(2\sqrt{2} \times \sqrt{6}) + (3\sqrt{2} \times \sqrt{6})$	must see intention to add $(k=)\ \sqrt{50}$ or $5\sqrt{2}$ or $\frac{10}{\sqrt{2}}$	M1 M1 A1	or $\sqrt{(16 \times 3)} + \sqrt{(36 \times 3)}$ $(= 10\sqrt{3})$ $10\sqrt{3} \times \frac{\sqrt{2}}{\sqrt{2}}$ or $\frac{10\sqrt{3}}{\sqrt{6}}$ dep on at least 1 M1 sight of decimals *used in working* loses M marks at that stage and A mark	or $\sqrt{(4 \times 12)} + \sqrt{(9 \times 12)}$ $(= 5\sqrt{12})$ $5\sqrt{12} \times \frac{\sqrt{2}}{\sqrt{2}}$ or $5 \times \sqrt{(6 \times 2)}$
					Total 3 marks

24. (a) (i)		**4b**	1	B1	4 x b etc Do not accept upper case letters
(a) (ii)		**a** + **b**	1	B1	Do not accept upper case letters
(a) (iii)		3**b** – **a** oe	1	B1	needs not be simplified (e.g –b –a +4b) No upper case
(b)	TS=1/5 (**a**+**b**)+3**b** – **a** QT= – **a**+4/5(**a**+**b**) TS= – 4/5**a** +16/5**b** QT= – 1/5**a**+4/5**b** TS=4/5(– **a**+4**b**) and QT=1/5(– **a** +4**b**)	k=4	3	M1 for any correct route from T to S or from Q to T using capitals or lower case e.g. TS =TR + RS or QT = QP + PT M1 for both correct simplified routes from T to S and Q to T (must be lower case vectors here) A1 dep on B1 in aii) and aiii) and at least M1
					Total 6 marks

			TOTAL FOR PAPER: 100 MARKS

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