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

Question	Working	Answer	Mark	Notes
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

Question	Working	Answer	Mark	Notes
3.	15÷6 (=2.5) or 6÷15 (=0.4) or 230÷6 (=38.33) or 200÷6 (=33.33) or 6÷230 (=0.026) or 6÷200 (=0.03) 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

International GCSE Mathematics (4MA0) Paper 4H Summer 2011

4.	$72 \div 1\frac{1}{3}$ oe				B1M1 accept $72 \div 1.33$ (2dp or better) or 0.9 x 60
			54	3	(B1 M0 for $72 \div 1.2(0)\{=60\}$ or $72 \div 80 \{=0.9\}$ or $72 \div 1.3 \{=55.4$ or better$\})$ or $72000 \div 1.33($ 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)	$5 - 12 = 2y$ oe		-3.5 oe	2	M1 or $5 - 12 \div 2$ or $12 - 5 \div -2$ 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 $(PQ^2=) ("8 - 6")^2 + 5^2 (=29)$ $(PQ=) \sqrt{"29"}$		5.39	4	B1 could be seen on diagram M1 (dep) $(\theta=) \tan^{-1} (5/"8 - 6") (=68.2$ 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

International GCSE Mathematics (4MA0) Paper 4H Summer 2011

8.		Intersecting arcs from P and Q			B1	arcs must intersect above and below line PQ
		Perpendicular bisector joining both arcs		2	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		M1	could be implied from a factor tree or division ladder
		2 x 3 x 3 x 7	3	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)			M1	$9.3^2 - (9.3 \cos 42)^2$ (=38.72..)
	9.3 x sin 42 or 9.3 cos (90 – 42)			M1	$\sqrt{(\text{"}38.72..\text{"})}$ (M1 dep)
		6.22	3	A1 awrt 6.22	6.22(2914…)
					Total 3 marks

12. (i)	$2x \geq 6 - 13$ oe			M1	Condone $2x > 6 - 13$ oe
				A1	mark response on answer line (do not isw)
		$x \geq -3.5$ oe	2		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			M1	or sight of digits 722
		7.22×10^6	2	A1	
					Total 4 marks

International GCSE Mathematics (4MA0) Paper 4H Summer 2011

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±12)(a±12)
(c)	$p + 5r$ (=√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 $4+(5 \times 4)=5y$	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)		$\frac{7}{8}$ 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) $\dfrac{15}{64}$		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

International GCSE Mathematics (4MA0) Paper 4H Summer 2011

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

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

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

International GCSE Mathematics (4MA0) Paper 4H Summer 2011

21. (a)	$\dfrac{(600+5x)-50x}{50x} \times 100 = x$ oe	$50x \times [1+\dfrac{x}{100}] = 600 + 5x$ oe		M1 $\dfrac{actual\ profit}{original} \times 100 = x$	$(\dfrac{(600+5x)}{50x}-1) \times 100 = x$ oe
	$100(600 +5x - 50x)= 50x^2$ oe	$5000x + 50x^2 = 60000 +500x$		M1 dep (removing denominator)	$(600 +5x - 50x) \times 100 = 50x^2$
	$2(600-45x)=x^2$ oe (but not ans)	$x^2 = 1200 - 90x$	3	A1 reducing to $1x^2$ dep on M2	$1200 - 90x = x^2$
(b)	$x=\dfrac{-90\pm\sqrt{90^2-4 \times 1x - 1200}}{2}$ $x=\dfrac{-90\pm\sqrt{8100+4800}}{2}$			M1 condone 1 sign error {working can be seen in part a)} sign error = +90 instead of − 90 or +1200 instead of −1200 M1	
		11.789........	3	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)			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)	
	$(AG =) \sqrt{"83"}$		9.11	M1 ft (dep on M1) M1M1 for $\sqrt{(5^2 + 7^2 + 3^2)}$ A1 awrt 9.11	
(b)	$\sin \theta = 3/\sqrt{"83"}$			M1 or $\cos \theta = \sqrt{"74"}/\sqrt{"83"}$ or $\tan \theta = 3/\sqrt{"74"}$ or $\cos \theta = \dfrac{"74"+"83"-9}{2 \times \sqrt{"74"} \times \sqrt{"83"}}$	
			19.2	2 A1 awrt 19.2 or 160.8	
					Total 5 marks

International GCSE Mathematics (4MA0) Paper 4H Summer 2011

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 $\dfrac{10}{\sqrt{2}}$	M1 M1 A1	or $\sqrt{(16 \times 3)} + \sqrt{(36 \times 3)}\ (=10\sqrt{3})$ $10\sqrt{3} \times \dfrac{\sqrt{2}}{\sqrt{2}}$ or $\dfrac{10\sqrt{3}}{\sqrt{6}}$ dep on at least 1 M1 sight of decimals *used in working* loses M marks at that stage and A mark	or $\sqrt{(4 \times 12)} + \sqrt{(9 \times 12)}\ (=5\sqrt{12})$ $5\sqrt{12} \times \dfrac{\sqrt{2}}{\sqrt{2}}$ or $5 \times \sqrt{(6 \times 2)}$
					Total 3 marks

24. (a) (i)		4**b**	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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