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IGCSE

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Mathematics - Higher (4400)

November 2006

Mark Scheme

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IGCSE Maths November 2006 – Paper 3H Final Mark Scheme				
Question No.	**Working**	**Answer**	**Mark**	**Notes**
1 a		290 ± 2	2	B2 B1 for 290 ± 5 or 360 − 70
b	226 − 180		2	M1
		046		A1 Condone omission of 0
				Total 4 marks

2 a	x + x + x + x + x + x or 6x		2	B1
	x + 7 + x + 7 + x + 7 + x + 7 or 4(x + 7) or 4x + 28			B1
bi	"6x" = "4(x + 7)"		4	M1
ii	6x = 4x + 28			M1
	6x − 4x = 28 oe			M1
		14		A1 cao
				Total 6 marks

3	100 × 1.80 or 180		6	M1	
	60 × 4.00 or 240			M1	
	4.00 ÷ 5 or 0.8(0) or 3.2(0)			M1	may be part of an expression
	35 × 3.20 or 112			M1	
	"240" + "112" – "180"			M1	dep on at least 2 of previous 4 M marks
		172		A1	cao
					Total 6 marks

4 a	$\frac{150 \pm 2}{360}$ oe inc $\frac{5}{12}$, 0.42, $0.41\dot{6}$, 0.417		2	B1 B1	numerator = 150 ± 2 denominator = 360
b	10×30+12×12+14×18+17×60 or 300+144+252+1020 or 1716		4	M1	finds products f×x consistently within intervals (inc end points) & sums them
	use of at least 3 midpoints			M1	
	$\frac{"1716"}{120}$			M1	(dep on 1st M1) for division by Σf
		14.3		A1	Accept 14 if all M marks scored
					Total 6 marks

5	$\frac{48}{60}$ or $60-48$		3	M1
	80 or $\frac{"12"}{60}$			M1
		20		A1 cao
				Total 3 marks

6	$240\times\frac{5}{2}$		2	M1
		600		A1 cao SC B1 for $240\times\frac{2}{5}$ or 96
				Total 2 marks

7	$4x < 6$ or $-6 < -4x$		3	M1 correctly collects x terms
				M1 correctly collects constants
		$x < 1.5$ oe		A1
				Total 3 marks

8	0.5 + 0.1 or 0.5 + 0.1 + 0.3 or table completed with 0.1		3	M1
	1−(0.5+0.1) or1−(0.5+0.1+0.3) + 0.3			M1
		0.4		A1
				Total 3 marks

9 a	BM = 5 seen or implied		4	B1	
	$13^2 - 5^2$ or 144			M1	for squaring and subtracting Accept $13^2 - 10^2$ or 69
	$\sqrt{13^2 - 5^2}$			M1	for $\sqrt{13^2 - 5^2}$ only
		12		A1	cao
b	$\frac{1}{2} \times 10 \times$"12"		4	M1	for $\frac{1}{2} \times 10 \times$ their (a)
	× 4			M1	dep on first M1
	10 × 10 or 100			M1	indep
		340		A1	ft from "12"
					Total 8 marks

10	Q correct		4	B1		
	R correct			B1	ft from Q	
		Reflection		B1		ft from **R** if at least one transformation correct
		y = x		B1	Accept eg in dotted line but, if stated, equation must be correct	
						Total 4 marks

11 a	1 2 2 2 5 5 5 5 5 6 6 6 6 7 9		3	M1
	Attempt to find 4th (or 3¾th) & 12th (or 11¼th) values			M1
		4		A1 cao
bi	eg B had higher marks than A		2	B1 B0 if median for A seen and $\neq 5$
ii	eg B less spread or more consistent			B1
				Total 5 marks

12 a	Attempt to find $\frac{\text{vert}}{\text{horiz}}$ for line PQ		4	M1
	(gradient =) 2			A1 (y =) 2x $\Rightarrow$ M1A1
		y = 2x − 4		B2 ft from "2" B1 for 2x − 4 B1 for y = mx − 4 where m $\neq$ 2
b	Line through (0, 1)		3	M1
	Attempts grad −½ or correctly finds coordinates of another point			M1
		Correct line		A1 Passes within 1mm of (−2, 2) and (2, 0)
				Total 7 marks

13 a		$\frac{1}{8}$	1	B1	Accept equivalent fractions
b		$\frac{3}{7}$	1	B1	
c		$\frac{9}{64}$	1	B1	
				Total 3 marks	

14 a		5000 −1250x	2	B2	B1 for 5000 B1 for −1250x
b	5000 − 1250x = 0		3	M1	ft from a if at least B1 scored and a is linear
	x = 4			M1	
		4 10 000		A1	
ci		max	2	B1	independent
ii	coeff of $x^2 < 0$ or $\frac{dy}{dx} > 0$ for x value < 4 and $\frac{dy}{dx} > 0$ for x value > 4 or y < 10 000 for x value < 4 and for x value > 4 or $\frac{d^2y}{dx^2} = -1250 < 0$			B1	
di		4	2	B1	ft from b if at least 1 scored
ii		max profit oe		B1	Accept eg largest profit
				Total 9 marks	

15	$\frac{4}{3}\pi \times 3^3 \div 2 + \frac{1}{3}\pi \times 3^2 \times 10$		4	M1	for $\frac{4}{3}\pi \times 3^3 \div 2$ or value rounding to 56.5 or 56.6
				M1	for $\frac{1}{3}\pi \times 3^2 \times 10$ or value rounding to 94.2 or 94.3
				M1	for sum (dep on first two M marks)
		151		A1	for 151 or better (150.796…) (3.14 → 56.52 + 94.2 = 150.72)
					Total 4 marks

16 i		$B \subset A$	2	B1	cao
ii		$A \cap B = \emptyset$		B1	cao
					Total 2 marks

17 ai		$1\frac{1}{2}$ oe	2	B1	
ii		$\frac{3}{4}$ oe		B1	Don't accept $\frac{-3}{-4}$
b		1	1	B1	cao
ci	$\frac{\frac{x}{x-1}}{\frac{x}{x-1}-1}$		4	M1	
	$\frac{\frac{x}{x-1}}{\frac{x-(x-1)}{x-1}}$ or $\frac{x}{x-(x-1)}$ oe			M1	SC B1 for ff(x) evaluated correctly for two values of x and an answer of x
		x		A1	cao
ii	eg f is its own inverse, $f^{-1} = f$			B1	dep on correct ci
					Total 7 marks

18	$x^2 = 2x + 15$		5	M1	$\left(\frac{y-15}{2}\right)^2 = y$
	$x^2 - 2x - 15 = 0$			M1	$y^2 - 34y + 225 = 0$
	$(x + 3)(x - 5) = 0$ $x = \frac{2 \pm 8}{2}$			M1	$(y - 25)(y - 9) = 0$
	$x = -3$ or $x = 5$			A1	$y = 9$ or $y = 25$
		-3, 9 and 5,25		A1	
					Total 5 marks

19	a		$7 - x$	1	B1
	b	$8 - x$ seen or 9, 13, 6 marked correctly on diagram or $50 - (10 + 9 + 13 + 6) = 50 - 38 = 12$ and $8 + 7 = 15$		3	M1
		$10+13+9+6+(7 - x)+(8 - x)+x=50$ oe inc $7 - x + 8 - x + x = 12$ or $15 - 12$			M1 equation must be correct
			3		A1
					Total 3 marks

20	a		$1 : \sqrt{k}$	1	B1 Accept $\sqrt{k}$
	b	$\sqrt{2}$ or $\sqrt{\frac{1}{2}}$ seen		2	M1
			7.1		A1 for 7.1 or better (7.071…) Accept $\sqrt{50}$
					Total 3 marks

21 a		3n oe	1	B1	Accept eg n + 2n
b	n − 1, 3n − 1 seen		5	B2	B1 for each
	$\frac{1}{3}\times\frac{n-1}{3n-1}=\frac{1}{10}$ oe inc $\frac{n}{3n}\times\frac{n-1}{3n-1}=\frac{1}{10}$			M1	for correct equation
	10(n − 1) = 3(3n − 1) oe inc 10n(n−1) = 3n(3n − 1)			M1	for correctly removing fractions
	(n = 7)	21		A1	cao
					Total 6 marks
					Total 100 marks

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