

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
	$4.00 \div 5$ 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	$\frac{150 \pm 2}{360}$ oe inc $\frac{5}{12}$, 0.42, 0.416, 0.417		2	B1 B1 numerator = 150 ± 2 denominator = 360
	$10 \times 30 + 12 \times 12 + 14 \times 18 + 17 \times 60$ or $300 + 144 + 252 + 1020$ or 1716		4	M1 finds products $f \times x$ 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
	"12" 80 or $\frac{60}{60}$			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
	$1 - (0.5 + 0.1)$ or $1 - (0.5 + 0.1 + 0.3) + 0.3$			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)
		$\times 4$			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 6 6 6 6 7 9		3	M1
		Attempt to find 4th (or 3 ³ /4th) & 12th (or 11 ¹ /4th) 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 (gradient =) 2		4	M1
					A1 $(y =) 2x \Rightarrow \text{M1A1}$
			$y = 2x - 4$		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 $-\frac{1}{2}$ 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 \rightarrow 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	$\frac{x}{\frac{x-1}{x} - 1}$		4	M1	
		$\frac{x}{\frac{x-1}{x-(x-1)} \text{ or } \frac{x}{x-(x-1)}} \text{ oe}$			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	$y^2 - 34y + 225 = 0$
		$(x+3)(x-5) = 0 \quad x = \frac{2 \pm 8}{2}$			M1	$(y-25)(y-9) = 0$
		$x = -3 \text{ or } x = 5$			A1	$y = 9 \text{ or } y = 25$
			-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	