Mark Scheme Summer 2007

IGCSE

IGCSE Mathematics (4400)

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Summer 2007

4400 IGCSE Mathematics
Summer 2007
Paper 3H

Q		Working	Answer	Mark	Notes
1.	(a)	$\frac{68.89}{9.1}$		**2**	M1 for 8.3, 68.89, 9.1 or 30.90…
			7.5703…		A1 Accept if first 5 figures correct Also accept $7\frac{519}{910}$, $\frac{6889}{910}$
	(b)		7.57	**1**	B1 ft from (a) if non-trivial ie (a) must have more than 2 d.p.
					Total 3 marks

2.	(a)	$(-3)^2 - 5 \times -3$		**2**	M1 for substn or 9 or 15 seen
			24		A1 cao
	(b)		$x(x-5)$	**2**	B2 B1 for factors which, when expanded and simplified, give two terms, one of which is correct *SC* B1 for $x(5 - x)$ and for $x(x - 5x)$
					Total 4 marks

3.		46×3+47×6+48×3+49×5+50×2+51×1 or 138+282+144+245+100+51 or 960		**3**	M1 for finding at least 4 products and adding
		"960" ÷ 20			M1 (dep) for division by 20
			48		A1 cao
					Total 3 marks

Q		Working	Answer	Mark	Notes		
4.	(a)	translation 3 squares to the right and 1 square down		**2**	B2	B1 for translation Accept translate, translated etc	These marks are independent but award no marks if answer is not a single transformation
						B1 for 3 right and 1 down (accept 'across' instead of 'to the right') or $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$ but not (3, −1)	
	(b)	rotation of 90° clockwise about (2, −1)		**3**	B3	B1 for rotation Accept rotate, rotated etc	
						B1 for 90° clockwise or −90° or 270°	
						B1 for (2, −1)	
							Total 5 marks

5.	(ai)		7^8	**2**	B1	cao
	(ii)		5^6		B1	cao
	(b)	$9 + 4 - n = 8$ or $13 - n = 8$		**2**	M1	Also award for $2^n = 2^5$ or 2^5 on answer line
			5		A1	cao
						Total 4 marks

Q		Working	Answer	Mark	Notes
6.	(a)	$12x-15-8x-4$		**2**	M1 for at least 3 terms correct inc signs
			$4x-19$		A1 cao
	(b)	$y^2+3y+8y+24$		**2**	M1 for 3 terms correct or $y^2 + 11y$ seen
			$y^2+11y+24$		A1
	(c)		$5p^3+4p$	**2**	B2 cao B1 for either $5p^3$ or for $+4p$
					Total 6 marks

7.	(a)	$\frac{38.5}{21}\times 60$ or $\frac{21}{60}=0.35$; $\frac{38.5}{0.35}$		**3**	M1 for $\frac{38.5}{21}$ or 1.83 or better or $\frac{38.5}{0.21}$ or 183.3 or better or $\frac{21}{60}$ or 0.35
					M1 for '1.8333...' $\times 60$ or $\frac{38.5}{'0.35'}$
			110	**3**	A1 cao
	(b)	$\pi\times 4.19^2\times 38500$			M2 M1 for π × (no with digits 419)^2 × no with digits 385
			2 120 000		A1 for 2 120 000 or for answer which rounds to 2 120 000
					Total 6 marks

Q		Working	Answer	Mark	Notes
8.	(a)	$\frac{270}{4500} \times 100$		**2**	M1 for $\frac{270}{4500}$ or 0.06 or $\frac{4770}{4500}$ or 1.06
			6		A1 cao
	(b)	$117 \times \frac{100}{4.5}$		**2**	M1 for $\frac{117}{4.5}$ or 26 seen
			2600		A1 cao
	(c)	$\frac{3328}{1.04}$ or $3328 \times \frac{100}{104}$		**3**	M2 for $\frac{3328}{1.04}$ or $3328 \times \frac{100}{104}$ M1 for $\frac{3328}{104}$, 104% = 3328 or 32 seen
			3200		A1 cao
					Total 7 marks

Q		Working	Answer	Mark	Notes
9.	(a)	$5x - 2x = 7 + 4$		**2**	M1 for correct rearrangement
			$\frac{11}{3}$, $3\frac{2}{3}$ oe		A1 Also accept 2 or more d.p. rounded or truncated e.g. 3.66, 3.67
	(b)	$4 \times \frac{7-2y}{4}$ or $7 - 2y$ $= 4(2y + 3)$		**4**	M1 for clear intention to multiply both sides by 4 or a multiple of 4 For example, award for $4 \times \frac{7-2y}{4}$ or $7 - 2y$ $= 4 \times 2y + 3$ or $8y + 3$ or $2y + 3 \times 4$ or $2y + 12$
		$7 - 2y = 8y + 12$ or simpler			M1 for correct expansion of brackets (usually $8y + 12$) or for correct rearrangement of correct terms e.g. $8y + 2y = 7 - 12$
		$10y = -5$			A1 for reduction to correct equation of form $ay = b$
			$-\frac{1}{2}$ oe		A1
					Total 6 marks

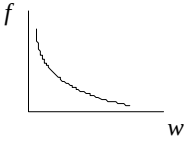
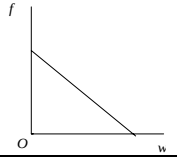
Q		Working	Answer	Mark	Notes	
10.					Accept decimals in parts (a) and (b)	
	(a)	$150 \times \frac{3}{5}$		**3**	B1 for $\frac{3}{5}$ seen	
					M1 for $150 \times \frac{3}{5}$	
			90		A1 cao Do not accept $\frac{90}{150}$	
	(bi)	$\frac{4}{5} \times \frac{3}{4}$		**5**	M1 for $\frac{4}{5} \times \frac{3}{4}$ seen	
			$\frac{12}{20}$ or $\frac{3}{5}$ oe		A1	
	(ii)	$\frac{2}{5} \times \frac{1}{4} + \frac{3}{5} \times \frac{2}{4}$			M1 for $\frac{2}{5} \times \frac{1}{4}$ or $\frac{3}{5} \times \frac{2}{4}$	*SC* M1 for $\frac{2}{5} \times \frac{2}{5}$ or $\frac{3}{5} \times \frac{3}{5}$
					M1 (dep) for adding both above products	*SC* M1 (dep) for adding both above products
			$\frac{8}{20}$ or $\frac{2}{5}$ oe		A1 for $\frac{8}{20}$ or $\frac{2}{5}$ oe	
						Total 8 marks

Q		Working	Answer	Mark	Notes
11.	(a)	tangent at any point of a circle and the radius at that point are perpendicular		**1**	B1 for mention of tangent and radius or line from centre
	(b)	$6.9^2 - 5.7^2$ or 47.61 – 32.49 or 15.12		**5**	M1 for squaring and subtracting
		$\sqrt{6.9^2 - 5.7^2}$			M1 (dep) for square root
		3.88844…			A1 for 3.89 or better
		$2 \times 5.7 + 2 \times$"3.88844…"			M1 for $2 \times 5.7 + 2 \times$ "3.888…" only
			19.2		A1 for 19.2 or answer which rounds to 19.2 (19.176888…)
					Total 6 marks

12.	(a)	10, 26, 41, 50, 56, 60		**1**	B1 cao
	(b)	Points correct		**2**	B1 $\pm$ ½ sq ft from sensible table
		Curve or line segments			B1 ft if 4 or 5 points correct or if points are plotted consistently within each interval (inc end points) at the correct height
	(c)	Use of w = 430 on graph		**2**	M1 may be shown on graph or implied by 43, 44 or 45 stated
			Approx 16		A1 If M1 scored, ft from cumulative frequency graph If no method shown, ft only from correct curve
					Total 5 marks

Q		Working	Answer	Mark	Notes
13.			lines	**4**	B3 B1 for each correct line (full or broken) Ignore additional lines
			region		B1 for correct region shaded in or out or for correct region labelled **R**
					Total 4 marks

14.	(a)	$r^2 = \frac{A}{\pi}$		**2**	M1 for $r^2 = \frac{A}{\pi}$ or $r^2 = A \div \pi$
			$\sqrt{\frac{A}{\pi}}$		A1 Ignore ±
	(bi)	$\sqrt{\frac{13.5}{\pi}}$	2.07296…	**4**	M1 for 13.5 seen A1 for answer which rounds to 2.073
	(ii)	$\sqrt{\frac{14.5}{\pi}}$ or 2.14836…	2.1		M1 for $\sqrt{\frac{14.5}{\pi}}$ or value which rounds to 2.148 or 2.149 cao A1 dep on previous 3 marks in (b)
					Total 6 marks

Q		Working	Answer	Mark	Notes
15.	(ai)	$f = \frac{k}{w}$		**4**	M1 May be implied by $1500 = \frac{k}{200}$
			$f = \frac{300000}{w}$		A1 Also award if answer is $f = \frac{k}{w}$ but k is evaluated as 300 000 in (a) **or** (b)
	(ii)				B2 B1 for graph with negative gradient (increasing or constant) even if it touches or crosses one or both axes e.g. 
	(b)	$f = \frac{300000}{1250}$		**2**	M1 for substitution in $f = \frac{k}{w}$
			240		A1 ft from k
					Total 6 marks

Q		Working	Answer	Mark	Notes
16.	(ai)		$3\mathbf{b}$	**3**	B1
	(ii)		$3\mathbf{b} - \mathbf{a}$		B1
	(iii)	$\frac{2}{3}\mathbf{a} + \mathbf{b}$ or $\mathbf{a} + \frac{1}{3}(3\mathbf{b} - \mathbf{a})$ or $3\mathbf{b} - \frac{2}{3}(3\mathbf{b} - \mathbf{a})$ oe			B1
	(b)	$\frac{2}{3}\mathbf{a}$ or $\frac{2}{3}\overrightarrow{PQ}$ or $k = \frac{2}{3}$ or $\mathbf{a} + \frac{1}{3}(3\mathbf{b} - \mathbf{a}) - \mathbf{b}$ or $\frac{2}{3}\mathbf{a} + \mathbf{b} - \mathbf{b}$ or (a)(iii) $- \mathbf{b}$ or $-\mathbf{b} + \mathbf{a} + \frac{1}{3}(3\mathbf{b} - \mathbf{a})$ or $-\mathbf{b} + \mathbf{a} + \frac{1}{3}$(a)(ii) or $2\mathbf{b} - \frac{2}{3}(3\mathbf{b} - \mathbf{a})$ or $2\mathbf{b} - \frac{2}{3}$(a)(ii) oe		**2**	B2 for $\frac{2}{3}\mathbf{a}$ or $\frac{2}{3}\overrightarrow{PQ}$ or $k = \frac{2}{3}$ unless clearly obtained by non-vector method or for expression in terms of **a** and/or **b** (need not be simplified) for $\overrightarrow{EF}$ either correct or ft from (a) B1 for correct vector statement with at least 3 terms which includes $\overrightarrow{EF}$ (or $\overrightarrow{FE}$) in terms of capital letters and/or **a**, **b** eg $\overrightarrow{PQ} = \overrightarrow{PE} + \overrightarrow{EF} + \overrightarrow{FQ}$ $\overrightarrow{PF} = \overrightarrow{PE} + \overrightarrow{EF}$ $\quad$ $\mathbf{a} = \mathbf{b} + \overrightarrow{EF} + \overrightarrow{FQ}$ If an attempt is crossed out and replaced, mark all attempts, including crossed out one, and award best mark.
					Total 5 marks

Q		Working	Answer	Mark	Notes
17.		$\left(\frac{dy}{dx} =\right)\ 2x - \frac{16}{x^2}$		**4**	B1 for $2x$ B1 for $\pm \frac{16}{x^2}$ or $\pm 16x^{-2}$
		$"2x \pm \frac{16}{x^2}" = 0$			M1
			(2, 12)		A1 cao For answer (2, 12) with no preceding marks scored, award B0 B0 M1 A1
					Total 4 marks

18.	(a)	$\pi \times 2.8^2 + \frac{1}{2} \times 4\pi \times 2.8^2$		**3**	M2 M1 for each term Also award for values rounding to 24.6 and to 49.2 or 49.3
			73.9		A1 for 73.9 or for answer which rounds to 73.9
	(b)	$\sqrt[3]{125}$ or 5 seen		**3**	M1
		$25 \times 73.89\ldots$			M1 for 25 × (a) or for $\pi \times (2.8 \times 5)^2 + 2\pi \times (2.8 \times 5)^2$ or for substituting $r = 2.8 \times 5$ in the expression used in (a)
			1850		A1 for 1850 or for any value in range 1846.3 - 1847.5 ft from 25 × (a)
					Total 6 marks

Q		Working	Answer	Mark	Notes
19.		$x^2 + (3x-1)^2 = 5$		**6**	M1 for correct substitution
		$x^2 + 9x^2 - 3x - 3x + 1 = 5$ or $x^2 + 9x^2 - 6x + 1 = 5$			B1 (indep) for correct expansion of $(3x - 1)^2$ even if unsimplified
		$10x^2 - 6x - 4 = 0$			B1 for correct simplification
		$(5x+2)(2x-2) = 0$ or $(5x+2)(x-1) = 0$ or $(10x+4)(x-1) = 0$ or $\frac{6 \pm \sqrt{196}}{20}$ or $\frac{3 \pm \sqrt{49}}{10}$ or $\frac{3}{10} \pm \frac{\sqrt{49}}{10}$			B1 for correct factorisation or for correct substitution into the quadratic formula and correct evaluation of '$b^2 - 4ac$' or for using square completion correctly as far as indicated
		$x = -\frac{2}{5}$ or $x = 1$			A1 for both values of x
			$x = -\frac{2}{5}$, $y = -2\frac{1}{5}$ $x = 1$, $y = 2$		A1 for complete, correct solutions
					Total 6 marks **PAPER TOTAL 100 MARKS**

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