4400 IGCSE Mathematics
May 2006
Paper 3H

Q		Working	Answer	Mark		Notes	
1.	(a)	$\frac{180}{510}\times 100$	 35	**2**	M1 A1	for $\frac{180}{510}$ or 0.35… for 2 sf or better (35.2941…)	
	(b)	$\frac{35}{14}$		**2**	M1	for $\frac{35}{14}$	**SC** Award M1 for 0.4 oe or for 2 : 5
			2.5		A1	for 2.5 or $2\frac{1}{2}$ or $\frac{5}{2}$	
							Total 4 marks

2.		$7 = 4x + 10$ or $-4x = 10 - 7$ $4x = -3$ or $-4x = 3$	 $-\frac{3}{4}$ or −0.75	**3**	M1 M1 A1	may be implied by second M1 Condone $\frac{3}{-4}$
						Total 3 marks

3.			reflection $y = 3$	**2**	M1 A1	Accept reflect, reflected, reflex etc Accept e.g. 'in dotted line'
						Total 2 marks

4.	(a)	9 + 12	 21	**2**	M1 A1	for 9 or + 12 cao	−9 − 12 = 21 scores M0 A0
	(b)	(i) (ii)	p^8 q^6	**2**	B1 B1	cao cao	
							Total 4 marks

5.	(a)	1,1,1,1,1,1,2,2,2,3,4,5,5,5,5 or $7\frac{1}{2}$ or 8 seen 2		**2**	M1 A1	 cao
	(b)	1×6 + 2×3 + 3×1 + 4×1 + 5×4 or 6 + 6 + 3 + 4 + 20 or 39 "39" ÷ 15 2.6		**3**	M1 M1 A1	for at least 3 products (need not be evaluated or summed) (dep) for "39" ÷ 15 cao
						Total 5 marks

6.	(a)	$\frac{12}{15}$ or $\frac{2}{5}\times 2$ $\frac{4}{5}$		**2**	M1 A1	 cao Do not accept decimals
	(b)	$\frac{8}{3}\times\frac{6}{5}$ $3\frac{1}{5}$		**2**	M1 A1	for $\frac{8}{3}\times\frac{6}{5}$ may be implied by $\frac{48}{15}$ or $\frac{16}{5}$ but not by 3.2 cao Do not accept decimals
						Total 4 marks

7.		$7.5^2 - 7.2^2$ or 4.41 $\sqrt{7.5^2 - 7.2^2}$ 2.1		**3**	M1 M1 A1	for squaring and subtracting (dep) for square root cao
						Total 3 marks

8.		2 + 3 + 4 or 9 seen 24		**2**	M1 A1	for 2 + 3 + 4 or 9 seen or for 6 seen Accept 12 : 18 : 24
						Total 2 marks

9.			**R** shown	**3**	B3	B3 for correct **R** shaded in or out Condone omission of label B2 for single shaded shape with 3 correct boundaries or for parts of both regions unambiguously shown or for 3 or 4 correct lines + 0 incorrect B1 for single shaded shape with 2 correct boundaries or for square parts of both regions ambiguously shown or for 2, 3 or 4 correct lines + one or more incorrect **SC** B1 for region bounded by $1 \leq y \leq 3$ and $-4 \leq x \leq -2$
						Total 3 marks

10.	(a)		360 ÷ 32 or 32 × 11.25 = 360	**1**	B1	Accept also $\frac{180}{16}$ and $\frac{360}{11.25} = 32$ NB answer 11.25 is given
	(b)	$\frac{11.25}{2}$ or 180 − 11.25 = 168.75 **and** $\frac{180-"168.75"}{2}$	 5.625 84.375 or 95.625	**3**	M1 A1 A1	 may be stated or shown on diagram 5.625 seen scores M1 A1 Accept 84.4, 84.38, 84.37, 95.6, 95.62, 95.62
	(c)	π × 135	 424	**2**	M1 A1	 Accept any value rounding to 424
	(d)	"424" ÷ 0.26 **or** 1630 "1630" ÷ 60	 27	**3**	M1 M1 A1	for division for 0.26 (dep on first M1) for division by 60 for 27, 27.2 or answer truncating to 27.1 ft from answer to (c)
						Total 9 marks

11.		(i) (ii)	360 000 0.0029	**2**	B1 B1	cao Accept $\frac{29}{10000}$
						Total 2 marks

12.		eg $\frac{25}{15} = 1.67$ and $\frac{20}{10} = 2$ $\frac{15}{10} = 1.5$ and $\frac{25}{20} = 1.25$	"No" indicated	**3**	M1 M1 A1	e.g. for $\frac{25}{15}$ for $\frac{20}{10}$, consistent pairing dep on both M marks, inc. evaluation or simplest forms of ratios
						Total 3 marks

13.	(a)	$12x^2 + 21x - 20x - 35$	$12x^2 + x - 35$	**2**	M1 A1	for 4 correct terms ignoring signs or 3 correct terms with correct signs Accept $12x^2 + 1x - 35$	
	(b)		$8p^{12}$	**2**	B1 B1	for 8 for p^{12}	B2 for $8 \times p^{12}$ B1 for $8 \pm p^{12}$
	(c)		$16y^4$	**2**	B1 B1	for 16 for y^4	B2 for $16 \times y^4$ B1 for $16 \pm y^4$
							Total 6 marks

14.	(a)	(i) 0.3 + 0.6 (ii)	0.9 0.1	**3**	M1 A1 B1	ft 1 − "0.9"	
	(b)	0.3 × 0.3 0.6×0.4 or 0.6×0.3 + 0.6×0.1 or 0.24 or 0.6×0.3×2 or 0.36 or 0.6×0.1×2 or 0.12 "0.24" × 2 oe or 1 − (0.6× 0.6 + 0.4 × 0.4) or 1 − (0.36 + 0.16)	0.09 0.48 0.48	**5**	M1 A1 M1 M1 A1 M2 A1	 dep on previous M1 ft from "0.1"	The assumption that P(3) = P(4) = 0.5 makes the method incorrect and 0.48 cannot gain full marks but 0.6 × 0.3 × 2 still scores M1.
							Total 8 marks

15.	(a)		1, 4, 6, 8	**1**	B1	cao
	(b)		2,3,5 or 2,3,7 or 2,5,7 or 3,5,7	**2**	B2	B1 if one condition satisfied but do not award B1 for 2,3,5,7
						Total 3 marks

16.	(a)		1, −5	**1**	B1	Allow ± 0.1 for *y*-coordinate	
	(b)	Points of intersection of curve and *x*-axis indicated 3.2 −1.2		**2**	M1 A1	May be implied by one correct solution for both values seen Allow ± 0.1 Condone coordinates	Allow solutions to **> 1dp** unless there is clear evidence that the formula has been used
	(c)	$x^2 - 2x - 4 = x + 2$ or $y = x + 2$ seen line $y = x + 2$ drawn 4.4 −1.4		**3**	M1 M1 A1	may be implied by 2nd M1 Allow ± 0.1 Do not accept coordinates	
	(d)	2 × 6 − 2 (or 10 seen)	2*x* − 2 10	**4**	B2 M1 A1	B1 each term (−B1 each extra term) may be awarded if at least B1 above cao	
						Total 10 marks	

17.	(a)	(i)	e.g. 9	**2**	B1	Accept any multiple of 9 inc 45, 90, … Must be positive whole number
		(ii)	multiple of 9		B1	Accept ‘in 9 times table’ oe
	(b)	1.3777… and 1.4222…	 1.4 and agree to 2 sf or 1 dp oe	**2**	M1 A1	for converting to decimals with at least 2 dp rounded or truncated 1.4 **and** correct explanation needed
						Total 4 marks

18.		$2.3\sin 62^\circ$ 2.030... $\tan 74^\circ = \frac{"2.030"}{BQ}$ or $\tan 16^\circ = \frac{BQ}{"2.030"}$ $BQ = \frac{"2.030"}{\tan 74^\circ}$ or $BQ = "2.030"\tan 16^\circ$	 0.582	**5**	M1 A1 M1 M1 A1	 At least 3 sf May be implied by correct final answer for 0.582 or better (0.582316...) Award full marks for 0.58 if all preceding M marks scored ft from "2.030" (ft from $AD = 2 \rightarrow 0.5734...$)
						Total 5 marks

19.	(a)		45 75	**2**	B2	B1 for each
	(b)		bar 17sq high, 10 sq wide bar 16 sq high, **5** sq wide	**2**	B2	B1 for each NB $80 < t \leq$ **90**
						Total 4 marks

20.		$A = \pi(R^2 - r^2)$ or $\frac{A}{\pi} = (R+r)(R-r)$ $A = \pi R^2 - \pi r^2$ or $\frac{A}{\pi} = R^2 - r^2$ $R^2 = \frac{A + \pi r^2}{\pi}$ or $R^2 = \frac{A}{\pi} + r^2$	$\sqrt{\frac{A + \pi r^2}{\pi}}$ or $\sqrt{\frac{A}{\pi} + r^2}$ oe	**4**	M1 M1 M1 A1	for $R^2 - r^2$ seen or division by π for $A = \pi R^2 - \pi r^2$ or $\frac{A}{\pi} = R^2 - r^2$ for $R^2 = \frac{A + \pi r^2}{\pi}$ or $R^2 = \frac{A}{\pi} + r^2$ Condone omission of ± Do not award if followed by further incorrect 'simplifying'	This M1 also implies the first M1 ft if $(R + r)(R - r)$ expanded as $R^2 - r$ to a maximum of 3 marks
							Total 4 marks

21.			46 6	**2**	B1 B1	Condone $6\sqrt{5}$	Award B1 + B1 for $46 + 6\sqrt{5}$ seen and isw
							Total 2 marks

22.		$\pi \times 30^2 \times 5$ or $\pi \times 30^2 \times 41 - \pi \times 30^2 \times 36$ or 14123 - 14151 $"\pi \times 30^2 \times 5" = \frac{4}{3}\pi r^3$ $r^3 = \frac{3 \times "\pi \times 30^2 \times 5"}{4\pi}$ or $\frac{15 \times 30^2}{4}$ $\sqrt[3]{\frac{3 \times "\pi \times 30^2 \times 5"}{4\pi}}$ oe 15		**5**	M1 M1 M1 M1 A1	 dep on previous M1 dep on previous M1 dep on previous M1 for 15 or for answer rounding to 15.0
						Total 5 marks

23.		$(2x + 3)^2 = x^2$ $4x^2 + 12x + 9 = x^2$ or $4x^2 + 6x + 6x + 9 = x^2$ $3x^2 + 12x + 9 = 0$ $(x + 1)(x + 3)$ **OR** $(2x + 3)^2 = x^2$ $2x + 3 = \pm x$ $x + 3 = 0$ or $3x + 3 = 0$	 −1 −3 −1 −3	**5** **5**	M1 M1 M1 M1 A1 M1 M2 M1 A1	for $(2x + 3)^2$ seen Accept $(3x + 3)(x + 3)$ & $(3x + 9)(x + 1)$ or $\frac{-12 \pm 6}{6}$ or $\frac{-4 \pm 2}{2}$ for both solutions isw Condone coordinates (M1 for $2x + 3 = x$) for both for both solutions isw Condone coordinates
						Total 5 marks **PAPER TOTAL 100 MARKS**