4400 IGCSE Mathematics
May 2006
Paper 4H

1.		½(180 – 38)	71 seen Isosceles Corresponding	**4**	M1 A1 B1 B1	Allow on diag **or** <s on st line & interior <s. Not "F" **or** vert opp <s & alt <s
						Total 4 marks

2.	(a)		$x(3x - 2)$	**1**	B1	
	(b)		$y^4 - 4y^3$	**2**	B1B1	Incorr subs wking: - B1. Corr fact'n ISW
	(c)	$30 = 5 + 10t$	$t = 2.5$	**2**	M1 A1	**or** $(30 - 5)/10$
						Total 5 marks

3.	(a)	$4x$		**1**	B1	**or** $4 \times x$ **or** $x4$. Ignore "$y =$ ", not "$x=$"
	(b)	$4x - 6$ **or** $x + 6$	$4x - 6 = x + 6$	**2**	M1 A1	
	(c)	$3x - 6 = 6$ **or** $4x = x + 12$	4	**2**	M1 A1	correctly collect either xs or consts ft (b) (if ≥ 3 terms, lin = lin): M1 only cao Allow $x = 4$
						Total 5 marks

4.	(a)	4/8 or 0.5 oe $\sin x^o = 4/8$ oe	30	**3**	M1 M1 A1	
	(b)	$\cos 32^o = ML/12$ $12 \times \cos 32^o$	10(.17..) **or** 10.2	**3**	M1 M1 A1	May be implied **or** $12^2 - (12\sin 32)^2$ **or** $\sqrt{(12^2 - (12\sin 32)^2)}$ Allow 10 with working
						Total 6 marks

5.	(a)	(i) (ii)	Parallelograms Rectangles	**1** **1**	B1 B1	 Allow "Squares & rectangles"
	(b)	(i) (ii)	Ø **or** {} **or** empty oe Yes. 10 ∈ Q **or** 10 is mult of 5 **or** 3, 5, 6, 9, 10 listed	**1** **1**	B1 B1	Allow "Intersection of P & Q" oe
						Total 4 marks

6.	(a)		2 + 3 x 4 **or** 2 x (3 + 4)	**1**	B1	**or** 2 + (3 x 4) or 2(3 + 4)
	(b)		(2 + 3) ÷ 4 **or** 2 – 3 ÷ 4	**1**	B1	**or** 2 – (3 ÷ 4)
	(c)		2 ÷ 3 x 4 **or** 2 ÷ (3 ÷ 4)	**1**	B1	**or** (2 ÷ 3) x 4
						Total 3 marks

7.	(a)	4 x 6 – (3 + 7 + 10)	 4	 **2**	M1 A1	**or** 3 + 7 + 10 + x = 4 x 6 embedded: M1A0
	(b)		5, 5, 8	 **2**	B2	B1: 3 nos with mode 5 **or** mean 6 **or** 5, 5, x: B1
	(c)		7, 7, 5, (any no < 5)	**2**	B2	B1: 4 nos with mode 7 **OR** median 6
						Total 6 marks

8.	(a)	$3x + 12 = 27$ $3x = 15$	 5	 **3**	M1 A1 A1	 $x + 4 = 9$: M1A1
	(b)	$(y - 12)(y + 10)$ **or** $\frac{2 \pm \sqrt{((-2)^2-4x(-120))}}{2}$	 $y = 12$ **or** –10	 **3**	 M1 A1A1	allow $(y \pm 12)(y \pm 10)$ correct subst'n NB corr ans from inc wking: A0A0 T & I: 3mks or 0 mks
						Total 6 marks

9.	(a)	$35^2 - 10^2$			M1	$20^2 = 35^2+35^2 - 2x35x35x\cos A$ or $\sin x = 10/35$	$35^2 = 35^2+20^2 - 2x35x20x\cos B$ or $\cos B = 10/35$
		33 to 34			A1	33(.2)	73(.4)
		½ x 20 x"ht"			M1	½ x 35^2 x sin"33.2"	½ x 35 x 20 x sin "73.4"
			335	**4**	A1		
	(b)	$40^2 = 20^2 + 30^2 - 2 \times 20 \times 30\cos x$			M1	May be implied	
		$\cos x = \frac{20^2 + 30^2 - 40^2}{2 \times 20 \times 30}$ (= -0.25)			M1	**or** $\cos x = \frac{-300}{1200}$ oe	
			104 to 105	**3**	A1	Scale drawing: M0A0	
							Total 7 marks

10.	(a)	60 x 20/100 **or** 12 sec **or** 1.2 min seen	72	**2**	M1 A1		
	(b)	5 / 72 x 60 **or** 5 / 1.2	4.16 to 4.17	**2**	M1 A1f	or 5/6 x 5 or4 or 4.2 with wking (eg 5:72 = *x*:60) ft only if wking NB!!! 80% of 5 = 4	
	(c)	"4.167"/5 x 100 100 – "83.3…" | 5 – "4.167" "0.833.."/5 x 100	16.6% to 17%	**3**	M1 M1 A1	 ft M mks only if wking cao	
							Total 7 marks

11.	(a)		80 to 81 incl	**1**	B1		Consistent use of total = 50 in (abc): (a) B0
	(b)	Read graph at 70(±1) & 92 – 94 eg marks on curve or *x*-axis	21 - 24	**2**	M1 A1		(b) Read at 72(±1) & 109-111: M1A0
	(c)		20 cao	**1**	B1		(c) 25 cao: B1
	(d)	Read graph at 100 (±1)	6 or 7	**1**	M1 A1	eg 34(±1) seen	
							Total 6 marks

12.	(a)		$2x(5x - 1)$	**2**	B2	B1 for $2(5x^2 - x)$ **or** $x(10x - 2)$
	(b)		$(x - 3)(x + 3)$	**1**	B1	
	(c)		$(3x - 1)(x - 4)$	**2**	B2	B1 for $(3x \pm 1)(x \pm 4)$ ISW
						Total 5 marks

13.	(a)	2^3 seen	$2^{3/2}$ or $2^{1.5}$ or $2^{1\frac{1}{2}}$	**2**	M1 A1	
	(b)	$9^{1/2}$ seen	$9^{1/4}$ or $9^{0.25}$	**2**	M1 A1	
	(c)	$\frac{1}{2^2 \times 2^{½}}$ | $\frac{1}{\sqrt{32}}$ | $\frac{\sqrt{2}}{8}$ $\frac{1}{2^{5/2}}$ | $\frac{1}{\sqrt{2^5}}$ | $\frac{2^{0.5}}{2^3}$	$2^{-5/2}$ or etc	**3**	M1 M1 A1	or $2^{-2} \times 2^{-1/2}$: M2
						Total 7marks

14.	(a)		$\begin{pmatrix}5\\2\end{pmatrix}$	**1**	B1	Ignore fraction lines thro'out	
	(b)	(i)	$k\begin{pmatrix}5\\2\end{pmatrix}$ oe	**1**	B1f	or $k\overrightarrow{OB}$ oe	Not x or 0.5 for k
		(ii)	$-\begin{pmatrix}1\\2\end{pmatrix} + k\begin{pmatrix}5\\2\end{pmatrix}$ oe	**1**	B1f	or $-\overrightarrow{OA} + k\overrightarrow{OB}$ oe	Allow without brackets or arrows
		(iii)	$\begin{pmatrix}4\\0\end{pmatrix} - k\begin{pmatrix}5\\2\end{pmatrix}$ oe	**1**	B1f	or $-k\overrightarrow{OB} + \overrightarrow{OC}$ oe	
	(c)	$-\begin{pmatrix}1\\2\end{pmatrix} + k\begin{pmatrix}5\\2\end{pmatrix} = \begin{pmatrix}4\\0\end{pmatrix} - k\begin{pmatrix}5\\2\end{pmatrix}$ oe	$k = ½$	**2**	M1 A1	or $-1 + 5k = 4 - 5k$ ft(b) for M1 only or $-2 + 2k = -2k$ No wking, $k = 0.5$: M1A1	
	(d)		$k = ½ \Rightarrow X$ is midpt of OB		B1	No marks unless (c) 2 mks "$k = ½ \Rightarrow X$ is midpt of OB & AC" **or** "$k = ½ \Rightarrow X$ is midpt of //m" : B1	

			$\overrightarrow{AX} = \overrightarrow{XC} \Rightarrow$ X is midpt of AC	**2**	B1	Allow without arrows
						Total 8 marks

15.	(a)	$x = kt^2$ **or** $19.6 = k \times 2^2$ $k = 4.9$	 $x = 4.9t^2$ oe	 **3**	M1 A1 A1	oe Allow $x \propto 4.9t^2$ for A1
	(b)	$3^2 \times 4.9$	$x = 44.1$	**2**	M1 A1f	Follow her (a) if of form kt^2
	(c)	$10 = 4.9t^2$ $t^2 = 10 / 4.9$ or 2.04…	 1.43 **or** 1.4 with wking	 **3**	M1 M1 A1	 Follow her (a) if of form kt^2 cao
						Total 8 marks

16.		$^5/_6 \times {}^1/_6 \times {}^1/_6$ oe x 3 $^1/_6 \times {}^1/_6 \times {}^1/_6$ oe	 $^2/_{27}$ **or** $^{16}/_{216}$ **or** 0.074…	 **4**	M1 M1 M1 A1	 **or** $15x^1/_6x^1/_6x^1/_6$: M2 **or** $16x^1/_6x^1/_6x^1/_6$: M3	Dep on 1 – : $(^5/_6)^2 \times {}^1/_6$ x 3 $(^5/_6)^3$
							Total 4 marks

17.		$x^2 + (2x + 1)^2 = 13$ $x^2 + 4x^2 + 2x + 2x + 1 = 13$ $(5x^2 + 4x - 12 = 0)$ $(5x - 6)(x + 2) = 0$ or $x = \frac{-4 \pm \sqrt{(4^2 - 4x5x(-12))}}{2 \times 5}$ $x = -2$ and $x = 1.2$ Subst two values of x into eqn	 $x = -2$ & $y = -3$ $x = 1.2$ & $y = 3.4$	 **6**	M1 M1 M1 A1 M1 A1	Follow similar scheme for subst for x or further simplified condone without "= 0" oe must be correct dep M2 For incorr x must see wking paired, eg by alignment or coords T & I: 6 mks or 0 mks
						Total 6 marks

18.		Attempt differentiate once $-20t^{-2}$ or $-20/t^2$	 $40t^{-3}$ or $40/t^3$	 **3**	M1 A1 A1	NB $20/t^2$ check whether attempt diff
						Total 3 marks
						PAPER TOTAL 100 MARKS