June 04 P1 Q12 O

12 OR

x	2	4	6	8	10
y	9.8	19.4	37.4	74.0	144.4
lgy	0.99	1.29	1.57	1.87	2.16

(i) Finds values of lgy	M1	Knows what to do.
		Don't penalise incorrect scale.
Draws graph accurately.	A1 [2]	Points correct to ½ small square.
(ii) lgy = lgA + xlgb	B1	Anywhere – even if no graph
m = lgb → b = 1.4 (± 0.05)	M1 A1	Gradient measured + equated to lgb.
c = lgA → A = 5.0 (± 0.2)	M1 A1 [5]	Intercept measured + equated to lgA.
(iii) lgy = xlg2	B1	Even if no line – give if line correct.
i.e Straight line Y = 0.301x	M1	Must be a line.
x = 4.5 (± 0.2)	A1 [3]	To this accuracy.

Use of simultaneous eqns in part (ii) gets B1 only, unless both points used are on his line, in which case allow marks if to correct accuracy.

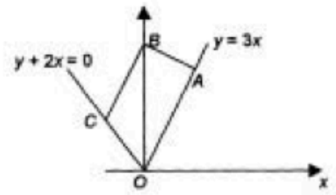
June 04 P2 Q 10

10 [10]	**(i)** $m_{BC} = 3/5$ Equation of *AD* is $y - 4 = 3/5(x + 2)$	B1 M1 A1
	$m_{AC} = -¼$ Equation of *CD* is $y - 2 = 4(x - 6)$	B1 M1 A1
	(ii) Solve $x = 8, y = 10$	M1 A1
	(iii) Length of *AC* = Length of *CD* = $\sqrt{68}$	M1 A1

Nov 04 P2 Q9

9	**[7]**	**(i)** $Y = \log y$, $X = x$ $m = \log b$, $c = \log a$	B1 DB1
		(ii) $Y = \log y$, $X = \log x$ $m = k$, $c = \log A$	B1 DB1
		(iii) $Y = 1/y$, $X = 1/x$ $\begin{cases} c = 1/p \\ m = -9/p \end{cases}$	M1 A1 A1
		[Other valid alternatives acceptable	
		Y y y/x x x/y $1/x$	
		X y/x y x/y x $1/y$	
		m q $1/q$ p $1/p$ $-p/q$	
		c p $-p/q$ q $-q/p$ $1/q$]	

Nov 04 P2 Q 11

11	**[10]**		
		Let A be (x, y) i.e. $(x, 3x)$	B1
		Length of OA = $\sqrt{x^2 + 9x^2} = \sqrt{250} \Rightarrow x = 5$, A is (5, 15)	M1 A1
		($\sqrt{x^2 + y^2} = \sqrt{250}$ enough for M1)	
		Gradient of AB is $-\frac{1}{3}$	B1
		Equation of AB is $y - 15 = -\frac{1}{3}(x - 5) \Rightarrow B$ is $(0, 16\frac{2}{3})$	M1 A1
		AND substitute $x = 0$ for M1 Decimals 16.6 or 16.7, – 1 p.a.	
		Gradient of BC is 3	B1
		Equation of BC is $y = 3x + 16\frac{2}{3}$	M1
		Meets $y + 2x = 0$ when $-2x = 3x + 16\frac{2}{3} \Rightarrow x = -3\frac{1}{3}$,	M1
		C is $(-3\frac{1}{3}, 6\frac{2}{3})$ but accept (–3.32, 6.64), (–3.34, 6.68)	A1
		In essence, scheme is 3 marks for each of A, B, C. Possible to find B before A e.g.	
		$A\hat{O}X = \tan^{-1} 3 = 71.565°$ B1 $OB = \sqrt{250} / \sin 71.565°$ M1 $\Rightarrow 16\frac{2}{3}$ A1	
		Gradient of AB is $-\frac{1}{3}$ B1 Solve $y - 16\frac{2}{3} = -\frac{1}{3}x$ with $y = 3x$ M1 $\Rightarrow$ (5,15) A1	

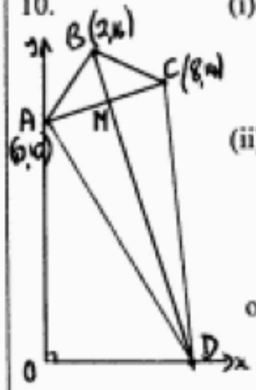
June 05 P1 Q 8

8 lg$x$ 1 2 3 4 lg$y$ 3.28 2.40 1.49 0.60		For part **(ii)** – use of sim eqns is ok if points used are on line, not from table.
(i) Knows what to do. Pts within ½ square.	**M1 A2,1** **[3]**	Knows what to do. Accuracy within ½ square.
(ii) Gradient = $\pm n$ $n = -0.88$ to -0.92 log k = y-intercept k = 14 000 to 16 000	**B1 A1** **B1 A1** **[4]**	B1 even if just stated without graph. B1 even if just stated without graph.

June 05 P2 Q12 E

12 E	$DC = BD$ [**or** D (5, 6) midpoint of C (x, y), B(8, 8)] $\Rightarrow$ C is (2, 4)	**M1 A1**	
	$m_{DE} = m_{AC} = 7/4$ $m_{CE} = -1/m_{AC} = -4/7$	**B1√ B1√**	
	Equation of DE is $y - 6 = 7/4\ (x - 5)$	**A1√**	
	Equation of CE is $y - 4 = -4/7\ (x - 2)$	**M1**(either) **A1√**	
	Solve for E $\Rightarrow$ $x = 3.4$, $y = 3.2$	**M1 A1**	
	Complete method for entire area $\rightarrow$ 15.6	**M1 A1**	**[11]**

Nov 05 P1 Q10

10. (i) Pythagoras → $AB=\sqrt{40}$. $BC=\sqrt{40}$	M1 A1 [2]	Or by vectors
 (ii) m of $AC = ½$.	B1	Anywhere
m of $BD = -2$	M1	Use of $m_1m_2 = -1$
eqn BD → $y+2x=20$	M1	Not necessary to have eqn since $y=0$
→ $D(10, 0)$	A1 [4]	may be used.
or $M(4,12)$ → $m = -2$		Finds M→m of −2 equivalent to B1M1.
(iii) Area of ABC : Area of ACD		
$BM : MD$	M1	Realises that only heights are needed.
$= \sqrt{20} : \sqrt{180} = 1:3$	M1 A1 [3]	Pythagoras – any form ok for A mark.
(or finds each area by "matrix" or $½bh$)		M1 ABC (40) M1 ACD (120) A1 1:3.

Nov 05 P1 Q 12E

12 EITHER

x	1.5	2	2.5	3	3.5
y	7.3	3.5	2.0	1.3	0.9
lgx	0.18	0.30	0.40	0.48	0.54
lgy	0.86	0.54	0.30	0.11	−0.05

(i) Draws graph of lg$y$ against lg$x$.	M1	Knows what to do.
Accuracy of points and line.	A2,1,0 [3]	Within ½ square.
(ii) $n = 2.45$ to 2.60	M1 A1	Needs $m = \pm n$ for M. Co for +ve only.
$a = 19.5$ to 21.0	M1 A1 [4]	Needs lg$a$ = intercept on y axis.
(iii) $y = x^2$ → lg$y$ = 2lg$x$.	M1	Allow M1 for statement in log form.
→ Line of gradient 2.	A1	Reasonable attempt at line of $m = 2$ through (0,0).
$y = x^2$ intersects $yx^n = a$ where the lines meet. → $x = 1.90$ to 2.00	A1 [3]	Co.
(or solves $y = x^2$ with $yx^{2.5} = 20$ alg)		