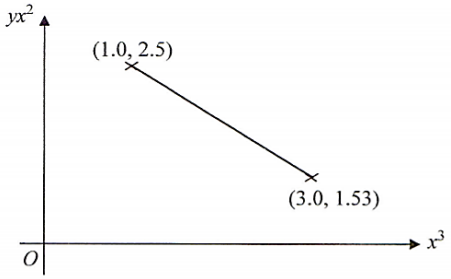
5 MUST KNOW QUESTIONS TO CONQUER

LINEAR LAW

1	The equation $y = \frac{x+c}{x+d}$, where c and d are constants, can be represented by a straight line when $xy - x$ is plotted against y. The line passes through the points $(0, 4)$ and $(0.2, 0)$. (i)Find the value of c and of d, (ii)If $(2.5, a)$ is a point on the straight line, find the value of a. Ans: i) $c = 4, d = 20$ ii) $a = -46$
2	The diagram shows the straight line obtained by plotting yx^2 against x^3. Variables x and y are related by an equation $y = \frac{p}{x^2} + qx$, where p and q are constants.  (i) Find (a) the value of p and of q, (b) the coordinates of the point on the line at which $y = \frac{3}{2x^2}$. (ii) If the graph of $\frac{y}{x}$ is plotted against $\frac{1}{x^3}$ instead, state the values of the gradient and the $\frac{y}{x}$ - intercept for this graph. Ans: (i) (a) p = 2.985 (b) $(3.06, \frac{3}{2})$ (ii) -0.485
3	The variables x and y are such that when the values of xy are plotted against $\sqrt{x}$, a straight line is obtained. It is given that $y = \frac{1}{2}$ when $x = 1$, and that $y = -\frac{1}{4}$ when $x = 4$. **(i)** Express y in terms of x. **(ii)** Find the value of y when $x = 16$. Answers: (i) $y = \frac{4-3\sqrt{x}}{2x}$ (ii) $y = -\frac{1}{4}$

4 The table shows experimental values of two variables x and y. The two variables are related by the equation $b\sqrt{y} = ab + ax^2$, where a and b are non-zero constants. One of the y values have been misprinted.

x	1	1.5	2	2.5	3	3.5
y	5.23	6.98	7.88	14.3	20.9	30.3

(i) Using a scale of 1 cm to 1 unit on the x^2 axis and 2 cm to 1 unit on the $\sqrt{y}$ axis, plot x^2 against $\sqrt{y}$ and draw a straight line graph on the grid provided.

(ii) Use your graph to estimate the value of a and of b.

(iii) Using your graph, identify the abnormal reading and estimate its correct value.

Answers:

(i)

x^2	1	2.25	4	6.25	9	5.50
$\sqrt{y}$	2.29	2.64	2.81	3.87	4.57	12.25

(ii) $a = 2, b = 7.06$

(iii)

Abnormal reading when $x^2 - 4, \sqrt{y} = 2.81$

5 The table shows experimental values of two variables x and y, which are known to be connected by the equation $yx^n = A$, where n and A are constants.

x	1.0	1.5	2.0	2.5	3.0
y	22.0	13.0	8.9	6.9	5.3

(i) Plot lg y against lg x and draw a straight line graph.

(ii) Use your graph to estimate the value of A and of n.

(iii) On the same diagram, draw the line representing the equation $y = x^2$ and hence find the value of x which satisfied the equation $x^{n+2} = A$.

Answers:

(i)

lg x	0	0.176	0.301	0.398	0.477
lg y	1.34	1.11	0.949	0.839	0.724

(ii) $n = 1.28, A = 21.9$

(iii) $x = 2.57$