Hwa Chong Institution 华侨中学
Mathematics (SMTP)

Name: _____ ( ) Class: _____ Date: _____

MA303.2.1 – Linear Conversion

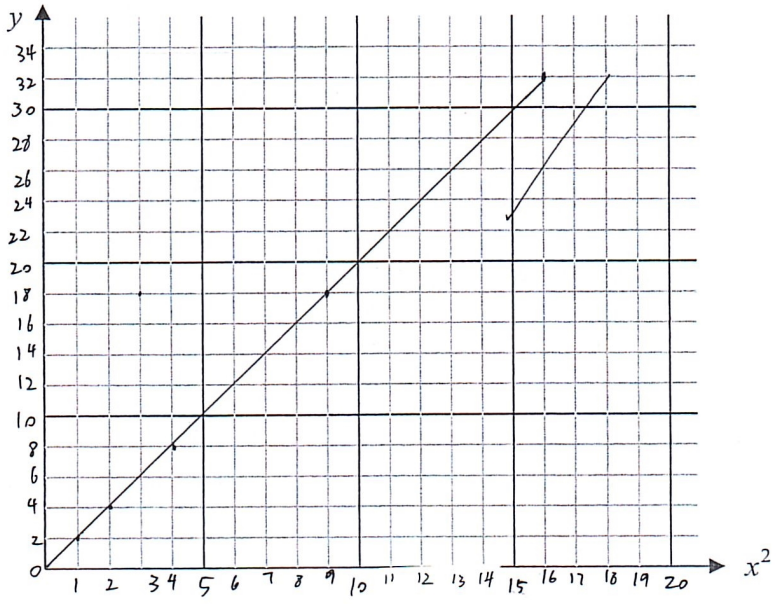
At the end of this unit, you should be able to

- **convert non-linear equations into linear form $Y = mX + c$**
- **solve unknown parameters using linear law**

E1. Fill in the table below given that $y = 2x^2$.

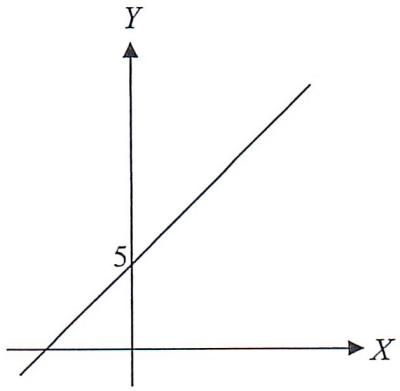
x	0	1	2	3	4
x^2					
y					

Draw a graph of y against x^2, plotting the points accurately. Describe the graph.



Let x and y be two variables related such that $F(x, y) = m \cdot G(x, y) + c$, where m and c are constants and $F(x, y)$, $G(x, y)$ being functions involving x and y. If the graph of $F(x, y)$ is drawn against $G(x, y)$, it will be a straight line of gradient m and a vertical intercept of value c.

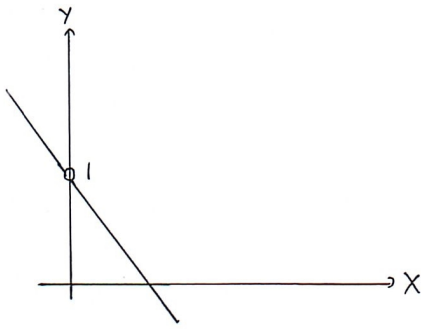
E2. The equation $xy^2 = \frac{2}{x} + 5$ involving x and y, if drawn with xy^2 against $\frac{1}{x}$, is a straight line with gradient 2 and vertical intercept 5.



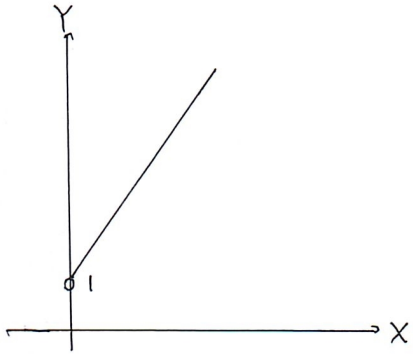
To see how, let $Y = xy^2$ and let $X = \frac{1}{x}$, the equation then becomes $xy^2 = 2\left(\frac{1}{x}\right) + 5 \Rightarrow Y = 2X + 5$. The latter equation is a straight line if drawn with Y against X, and the value of m is 2 and the value of c is 5.

P1. For each of the following, express in the form $Y = mX + c$, where both X and Y are in terms of x and/or y, ensuring that m and c are constants.

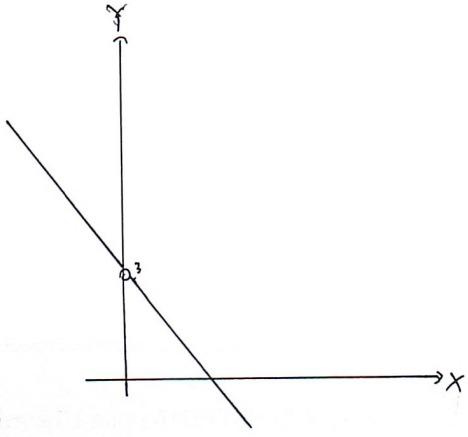
(a) $y = x^2 - 2x^3$



(b) $y = 2x + \frac{1}{x}$

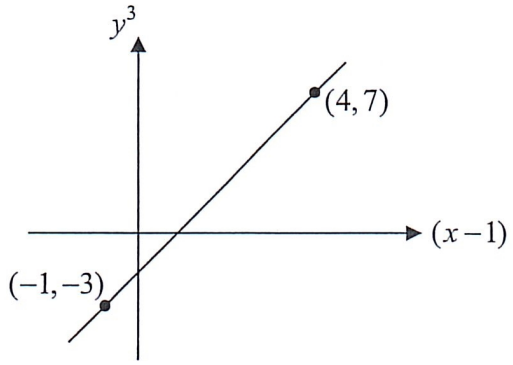


(c) $y^2 = 3\sqrt{x} - \frac{y}{x}$



E3. A straight line graph of y^3 drawn against $(x-1)$ passes through the points $(-1,-3)$ and $(4,7)$.

(a) Find the gradient of the line.

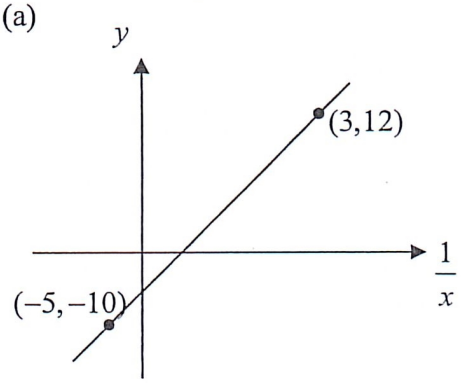


(b) By letting $Y = y^3$ and $X = x-1$, find the equation of straight line in terms of X and Y.

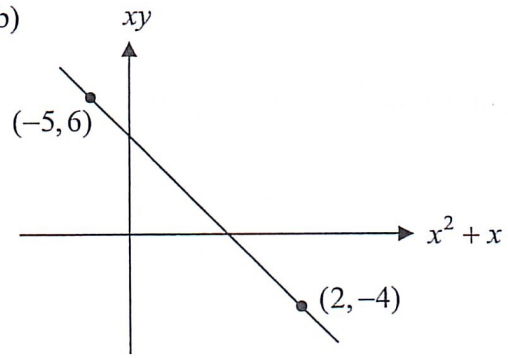
(c) Hence, determine the equation relating x and y. Find the value of y when $x = 2$.

P2. In the following straight-line graphs, find y in terms of x.

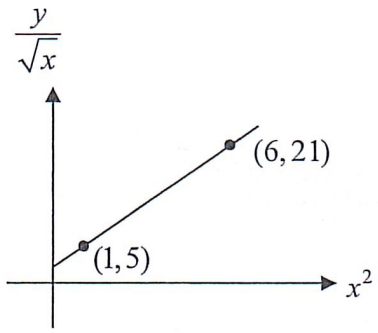
(a)



(b)



(c)



P3. The variables x and y are related by the equation $y = \dfrac{a}{bx-1}$. When the graph of $\dfrac{1}{y}$ is drawn against x, it shows a straight line passing through $(5,3)$ and $(-1,-1)$. Find the values of a and b.