Further Pure Maths 1   Solution Bank

Exercise 4A

1 $x = 2t^2$, $y = 4t$, $t \in \mathbb{R}$

t	-4	-3	-2	-1	-0.5	0	0.5	1	2	3	4
$x = 2t^2$	32	18	8	2	0.5	0	0.5	2	8	18	32
$y = 4t$	-16	-12	-8	-4	-2	0	2	4	8	12	16
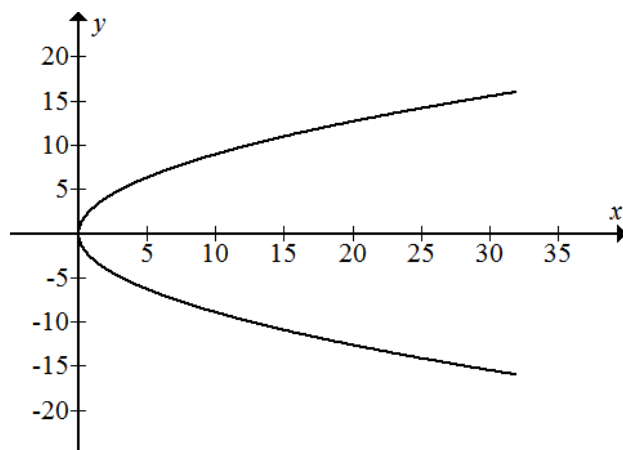
2 $x = 3t^2$, $y = 6t$, $t \in \mathbb{R}$

t	-3	-2	-1	-0.5	0	0.5	1	2	3
$x = 3t^2$	27	12	3	0.75	0	0.75	3	12	27
$y = 6t$	-18	-12	-6	-3	0	3	6	12	18
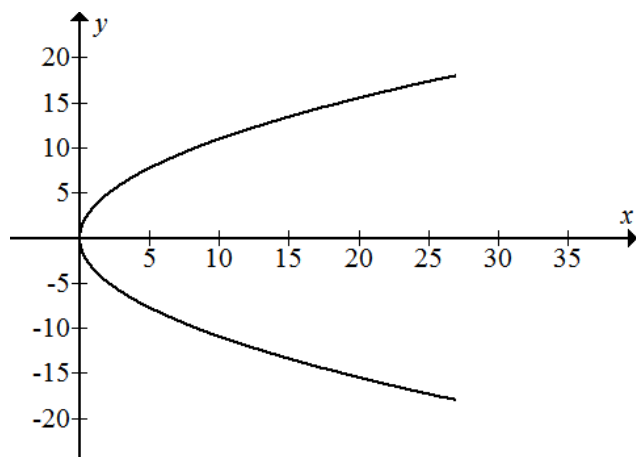
3 $x = 4t, \ y = \dfrac{4}{t}, \ t \in \mathbb{R}$

t	-4	-3	-2	-1	-0.5	0.5	1	2	3	4
$x = 4t$	-16	-12	-8	-4	-2	2	4	8	12	16
$y = \dfrac{4}{t}$	-1	$-\dfrac{4}{3}$	-2	-4	-8	8	4	2	$\dfrac{4}{3}$	1
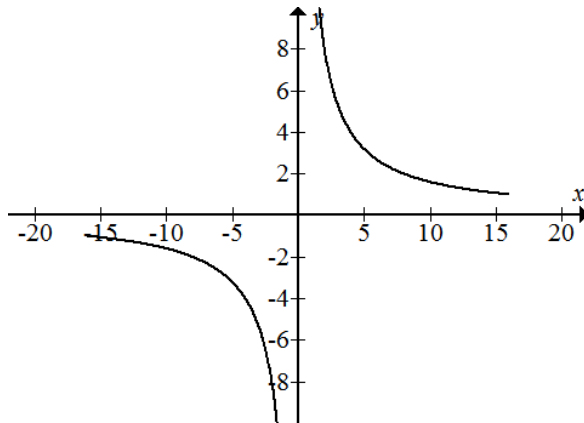
4 a $x = 5t^2, \ y = 10t \Rightarrow t = \dfrac{y}{10}$

Substituting $t = \dfrac{y}{10}$ into $x = 5t^2$ gives:

$$x = 5\left(\dfrac{y}{10}\right)^2$$

$$y^2 = 20x$$

b $x = \dfrac{1}{2}t^2, \ y = t$

Substituting $y = t$ into $x = \dfrac{1}{2}t^2$ gives:

$$x = \dfrac{1}{2}(y)^2$$

$$y^2 = 2x$$

c $x = 50t^2, \ y = 100t \Rightarrow t = \dfrac{y}{100}$

Substituting $t = \dfrac{y}{100}$ into $x = 50t^2$ gives:

$$x = 50\left(\dfrac{y}{100}\right)^2$$

$$y^2 = 200x$$

4 d $x = \dfrac{1}{5}t^2,\ y = \dfrac{2}{5}t \Rightarrow t = \dfrac{5y}{2}$

Substituting $t = \dfrac{5y}{2}$ into $x = \dfrac{1}{5}t^2$ gives:

$x = \dfrac{1}{5}\left(\dfrac{5y}{2}\right)^2$

$\quad = \dfrac{25y^2}{20}$

$y^2 = \dfrac{4}{5}x$

e $x = \dfrac{5}{2}t^2,\ y = 5t \Rightarrow t = \dfrac{y}{5}$

Substituting $t = \dfrac{y}{5}$ into $x = \dfrac{5}{2}t^2$ gives:

$x = \dfrac{5}{2}\left(\dfrac{y}{5}\right)^2$

$\quad = \dfrac{5y^2}{50}$

$y^2 = 10x$

f $x = \sqrt{3}t^2,\ y = 2\sqrt{3}t \Rightarrow t = \dfrac{y}{2\sqrt{3}}$

Substituting $t = \dfrac{y}{2\sqrt{3}}$ into $x = \sqrt{3}t^2$ gives:

$x = \sqrt{3}\left(\dfrac{y}{2\sqrt{3}}\right)^2$

$\quad = \dfrac{\sqrt{3}y^2}{12}$

$y^2 = \dfrac{12}{\sqrt{3}}x$

$\quad = 4\sqrt{3}x$

g $x = 4t \Rightarrow t = \dfrac{x}{4},\ y = 2t^2$

Substituting $t = \dfrac{x}{4}$ into $y = 2t^2$ gives:

$y = 2\left(\dfrac{x}{4}\right)^2$

$y = \dfrac{1}{8}x^2$

4 h $x = 6t \Rightarrow t = \dfrac{x}{6}$, $y = 3t^2$

Substituting $t = \dfrac{x}{6}$ into $y = 3t^2$ gives:

$$y = 3\left(\dfrac{x}{6}\right)^2$$

$$y = \dfrac{1}{12}x^2$$

5 a $x = t$, $y = \dfrac{1}{t}$, $t \neq 0$

Substituting $x = t$ into $y = \dfrac{1}{t}$ gives:

$$y = \dfrac{1}{x} \text{ or } xy = 1, \ x \neq 0, y \neq 0$$

b $x = 7t$, $y = \dfrac{7}{t} \Rightarrow t = \dfrac{7}{y}$, $t \neq 0$

Substituting $t = \dfrac{7}{y}$ into $x = 7t$ gives:

$$x = 7\left(\dfrac{7}{y}\right)$$

$$y = \dfrac{49}{x} \text{ or } xy = 49, \ x \neq 0, y \neq 0$$

c $x = 3\sqrt{5}t$, $y = \dfrac{3\sqrt{5}}{t} \Rightarrow t = \dfrac{3\sqrt{5}}{y}$, $t \neq 0$

Substituting $t = \dfrac{3\sqrt{5}}{y}$ into $x = 3\sqrt{5}t$ gives:

$$x = 3\sqrt{5}\left(\dfrac{3\sqrt{5}}{y}\right)$$

$$y = \dfrac{45}{x} \text{ or } xy = 45, \ x \neq 0, y \neq 0$$

d $x = \dfrac{t}{5}$, $y = \dfrac{1}{5t} \Rightarrow t = \dfrac{1}{5y}$, $t \neq 0$

Substituting $t = \dfrac{1}{5y}$ into $x = \dfrac{t}{5}$ gives:

$$x = \dfrac{1}{5}\left(\dfrac{1}{5y}\right)$$

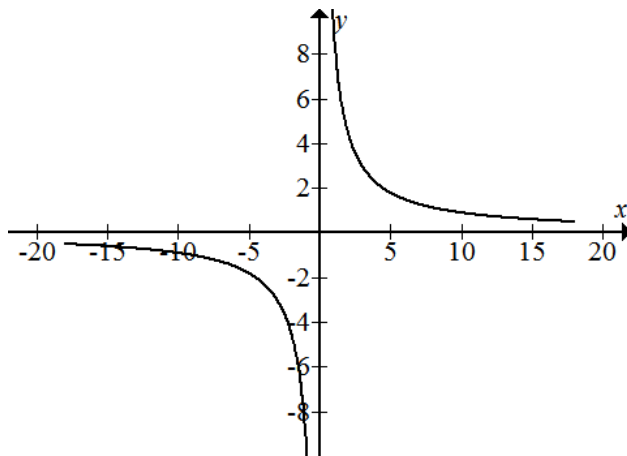$$y = \dfrac{1}{25x} \text{ or } xy = \dfrac{1}{25}, \ x \neq 0, y \neq 0$$

6 a $x = 3t, y = \dfrac{3}{t} \Rightarrow t = \dfrac{3}{y}, \ t \in \mathbb{R}, \ t \neq 0$

Substituting $t = \dfrac{3}{y}$ into $x = 3t$ gives:

$x = 3\left(\dfrac{3}{y}\right)$

$y = \dfrac{9}{x}$ or $xy = 9, \ x \neq 0, y \neq 0$

b

7 a $x = \sqrt{2}t, y = \dfrac{\sqrt{2}}{t} \Rightarrow t = \dfrac{\sqrt{2}}{y}, \ t \in \mathbb{R}, \ t \neq 0$

Substituting $t = \dfrac{\sqrt{2}}{y}$ into $x = \sqrt{2}t$ gives:

$x = \sqrt{2}\left(\dfrac{\sqrt{2}}{y}\right)$

$y = \dfrac{2}{x}$ or $xy = 2, \ x \neq 0, y \neq 0$

b