1 F is inversely proportional to the square of v.

Given that $F = 6.5$ when $v = 4$

find a formula for F in terms of v.

$F \propto \frac{1}{v^2}$

$F = \frac{k}{v^2}$ (1)

when $F = 6.5$ and $v = 4$,

$6.5 = \frac{k}{4^2}$

$k = 6.5 \times 16$

$= 104$ (1)

$\therefore F = \frac{104}{v^2}$ (1)

$F = \frac{104}{v^2}$

(Total for Question 1 is 3 marks)

2 P is inversely proportional to y^2
When $y = 4$, $P = a$

(a) Find a formula for P in terms of y and a

$P = \frac{k}{y^2}$ (1)

$a = \frac{k}{4^2}$ (1)

$k = 16a$

$P = \frac{16a}{y^2}$ (1)

$P = \frac{16a}{y^2}$

(3)

Given also that y is directly proportional to $\sqrt{x}$
and when $x = a$, $P = 4a$

(b) find a formula for P in terms of x and a

$y = m\sqrt{x}$

$4a = \frac{16a}{m^2 a}$ (1)

$4am^2 = 16$

$m = \sqrt{\frac{4}{a}}$ (1)

$y = \sqrt{\frac{4x}{a}}$

$P = \frac{16a}{\frac{4x}{a}}$

$= \frac{16a^2}{4x} = \frac{4a^2}{x}$ (1)

$P = \frac{4a^2}{x}$

(3)

(Total for Question 2 is 6 marks)

3 y is inversely proportional to $\sqrt{x}$

$y = c^4$ when $x = c^2$ where c is a positive constant.

Find a formula for y in terms of x and c
Give your answer in its simplest form.

$y = \frac{k}{\sqrt{x}}$ (1)

$c^4 = \frac{k}{\sqrt{c^2}}$ (1)

$k = c^4(c)$

$= c^5$

$y = \frac{c^5}{\sqrt{x}}$ (1)

$y = \frac{c^5}{\sqrt{x}}$

(Total for Question 3 is 3 marks)