Revision – Direct and Inverse Proportionality - Answers

1.

(a) $q \propto \frac{1}{t^2}$

$q = \frac{k}{t^2}$

Sub $t = 4$ and $q = 8.5$

$8.5 = \frac{k}{4^2}$

$8.5 \times 16 = k$

$k = 136$

$q = \frac{136}{t^2}$

(b) Sub $t = 5$

$q = \frac{136}{5^2}$

$q = \frac{136}{25} = 5.44$

2.

(a) $M \propto L^3$

$M = kL^3$

Sub $L = 2$ and $M = 160$

$160 = k \times 2^3$

$160 = 8k$

$k = 20$

$M = 20L^3$

(b) Sub $L = 3$

$M = 20 \times 3^3$

$M = 20 \times 27$

$M = 540$

3.

(a) $T \propto R^2$

$T = kR^2$

Sub $R = 120$ and $T = 32$

$32 = k \times 120^2$

$32 = 14400k$

$k = \frac{32}{14400} = \frac{1}{450}$

$T = \frac{R^2}{450}$

(b) Sub $R = 150$

$$T = \frac{150^2}{450}$$

$$T = \frac{22500}{450}$$

$$T = 50$$

4.

$$h \propto \frac{1}{r^2}$$

$$h = \frac{k}{r^2}$$

Sub $r = 5$ and $h = 3.4$

$$3.4 = \frac{k}{5^2}$$

$$3.4 \times 25 = k$$

$$k = 85$$

$$h = \frac{85}{r^2}$$

Sub $r = 8$

$$h = \frac{85}{8^2}$$

$$h = \frac{85}{64} = 1.328125$$

5.

$$y \propto x^2$$

$$y = kx^2$$

Sub $x = 3$ and $y = 36$

$$36 = k \times 3^2$$

$$36 = 9k$$

$$k = 4$$

$$y = 4x^2$$

Sub $x = 5$

$$y = 4 \times 5^2$$

$$y = 4 \times 25$$

$$y = 100$$

6.

$p \propto \frac{1}{t}$

$p = \frac{k}{t}$

Sub $t = 4$ and $p = 12$

$12 = \frac{k}{4}$

$12 \times 4 = k$

$k = 48$

$p = \frac{48}{t}$

Sub $t = 6$

$p = \frac{48}{6}$

$p = 8$

7.

$I \propto \frac{1}{d^2}$

$I = \frac{k}{d^2}$

Sub $d = 2$ and $I = 30$

$30 = \frac{k}{2^2}$

$30 \times 4 = k$

$k = 120$

$I = \frac{120}{d^2}$

Sub $d = 10$

$I = \frac{120}{10^2}$

$I = \frac{120}{100}$

$I = 1.2$
