Date:

- 1. Rewrite the statement connecting each pair of variables using a constant k instead of ' \propto '. (c) $x \propto z^2$
 - (a) $S \propto e$ (b) $v \propto t$
 - (e) $T \propto \sqrt{L}$ (d) $y \propto \sqrt{x}$
- **2.** y varies as t. If y = 6 when t = 4, calculate: (a) the value of y, when t = 6(b) the value of t, when y = 4.
- 3. z is proportional to m. If z = 20 when m = 4, calculate:
 - (a) the value of z, when m = 7
 - (b) the value of m, when z = 55.
- 4. A varies directly as r^2 . If A = 12, when r = 2, calculate:
 - (a) the value of A, when r = 5
 - (b) the value of r, when A = 48.
- 5. Given that $z \propto x$, copy and complete the table.

;	ĸ	1	3		$5\frac{1}{2}$
:	z	4		16	

6. Given that $V \propto r^3$, copy and complete the table.

r	1	2		$l\frac{1}{2}$
V	4		256	

- 7. The pressure of the water P at any point below the surface of the sea varies as the depth of the point below the surface d. If the pressure is 200 newtons/cm² at a depth of 3 m, calculate the pressure at a depth of 5 m.
- 8. The distance d through which a stone falls from rest is proportional to the square of the time taken t. If the stone falls 45 m in 3 seconds, how far will it fall in 6 seconds? How long will it take to fall 20 m?
- 9. The energy E stored in an elastic band is proportional to the square of the extension x. When the elastic is extended by 3 cm, the energy stored is 243 joules. What is the energy stored when the extension is 5 cm? What is the extension when the stored energy is 36 joules?
- 10. The resistance to motion of a car is proportional to the square of the speed of the car. If the resistance is 4000 newtons at a speed of 20 m/s, what is the resistance at a speed of 30 m/s?
 - At what speed is the resistance 6250 newtons?

11. In an experiment, measurements of w and p were taken.

w	2	5	7
р	1.6	25	68.6

Which of these laws fits the results?

 $p \propto w$, $p \propto w^2$, $p \propto w^3$.

Exercise B

- 1. Rewrite the statements connecting the variables using a constant of variation, k.
 - (a) $x \propto \frac{1}{y}$ (b) $s \propto \frac{1}{t^2}$ (c) $t \propto \frac{1}{\sqrt{q}}$
 - (d) m varies inversely as w
 - (e) z is inversely proportional to t^2 .
- 2. T is inversely proportional to m. If T = 12 when m = 1, find:
 (a) T when m = 2
 (b) T when m = 24.
- 3. L is inversely proportional to x. If L = 24 when x = 2, find:
 (a) L when x = 8
 (b) L when x = 32.
- 4. b varies inversely as e. If b = 6 when e = 2, calculate:
 (a) the value of b when e = 12
 (b) the value of e when b = 3.
- 5. x is inversely proportional to y². If x = 4 when y = 3, calculate:
 (a) the value of x when y = 1
 (b) the value of y when x = 2¼.
- 6. p is inversely proportional to \sqrt{y} . If p = 1.2 when y = 100, calculate:
 - (a) the value of p when y = 4
 - (b) the value of y when p = 3.
- 7. Given that $z \propto \frac{1}{v}$, copy and complete the table:

у	2	4		$\frac{1}{4}$
Z^{*}	8	-	16	

8. Given that $v \propto \frac{1}{t^2}$, copy and complete the table:

t	2	5		10
v	25		$\frac{1}{4}$	

- 9. e varies inversely as (y-2). If e = 12 when y = 4, find: (a) e when y = 6(b) y when $e = \frac{1}{2}$.
- 10. The volume V of a given mass of gas varies inversely as the pressure P. When $V = 2 \text{ m}^3$, $P = 500 \text{ N/m}^2$. Find the volume when the pressure is 400 N/m^2 . Find the pressure when the volume is 5 m^3 .
- 11. The number of hours N required to dig a certain hole is inversely proportional to the number of men available x.



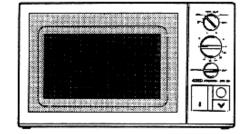
When 6 men are digging, the hole takes 4 hours. Find the time taken when 8 men are available. If it takes $\frac{1}{2}$ hour to dig the hole, how many men are there?

- 12. The force of attraction F between two magnets varies inversely as the square of the distance d between them. When the magnets are 2 cm apart, the force of attraction is 18 newtons. How far apart are they if the attractive force is 2 newtons?
- 13. The number of tiles, n, that can be pasted using one tin of tile paste is inversely proportional to the square of the side d, of the tile. One tin is enough for 180 tiles of side 10 cm. How many tiles of side 15 cm can be pasted using one tin?
- 14. The life expectancy L of a rat varies inversely as the square of the density d of poison distributed around his home. When the density of poison is 1 g/m^2 the life expectancy is 50 days. How long will he survive if the density of poison is (a) 5 g/m^2 ? (b) $\frac{1}{2} \text{ g/m}^2$?



15. When cooking snacks in a microwave oven, a French chef assumes that the cooking time is inversely proportional to the power used. The five levels on his microwave have the powers shown in the table.

Level	Power used
Full	600 W
Roast	400 W
Simmer	200 W
Defrost	100 W
Warm	50 W



- (a) Escargots de Bourgogne take 5 minutes on 'Simmer'. How long will they take on 'Warm'?
- (b) Escargots à la Provençale are normally cooked on 'Roast' for 3 minutes. How long will they take on 'Full'?

Exercise C

P is inversely proportional to *V*.

When V = 8, P = 5

(a) Find a formula for P in terms of V.



.....

(1)

(b) Calculate the value of P when V = 2

2.

y is directly proportional to x.

When x = 500, y = 10

(a) Find a formula for y in terms of x.

y =(3)

(b) Calculate the value of y when x = 350

 $y = \dots$ (1)

D is proportional to S².

D = 900 when S = 20

Calculate the value of D when S = 25

D =

4.

q is inversely proportional to the square of t.

When t = 4, q = 8.5

(a) Find a formula for q in terms of t.

q =(3)

(b) Calculate the value of q when t = 5

(1)