

Unit 2D

Algebra — Direct and Inverse Variations

1. y is inversely proportional to $(x + 2)$.
- (a) Write down an expression for y in terms of x and a constant k .
- (b) It is given that $y = 4$ when $x = 3$.
Find y when $x = 8$.
- (N2001/1/15)

2. y is inversely proportional to $(x - 3)$.
- (a) Write down an expression for y in terms of x and a constant k .
- (b) It is given that $y = 6$ when $x = 5$. Find y when $x = 11$. (Int'l Exam N2001/1/15)

3. V varies inversely as P . When $P = 3$, $V = 1$.
- (a) Express V in terms of P .
- (b) Complete the Table.

P	3	5	
V	1		9

(J2002/1/20)

4. The force of attraction between two magnets is F Newtons. This force is inversely proportional to the square of the distance, d centimetres, between the magnets.
- (a) When the magnets are a certain distance apart, the force is 10 Newtons. What is the force when this distance is doubled?
- (b) (i) Write down a formula connecting F , d and a constant k .
- (ii) When the magnets are 3 cm apart, the force is 2 Newtons. Find the force when they are 5 cm apart.
- (N2002/1/19)
5. (a) y is directly proportional to x^2 . It is known that $y = 10$ for a particular value of x . Find the value of y when this value of x is halved.
- (b) Seven men can paint a bridge in 15 days.
- (i) How long would it take 3 men?
- (ii) The bridge was painted in t days. Write down an expression, in terms of t , for the number of men needed to paint the bridge.
- (N2003/1/10)
6. (a) y is directly proportional to x^2 .
It is known that $y = 6$ for a particular value of x .
Find the value of y when this value of x is halved.
- (b) Five people can build a wall in 12 days.
- (i) How long would it take 4 people?
- (ii) The wall was built in t days.
Write down an expression, in terms of t , for the number of people needed to build the wall.
- (Int'l Exam N2003/1/9)

15. y is directly proportional to the square of x .
Given that $y = 50$ when $x = 5$, find the value of y when $x = 3$.

(N2010/1/7)

16. y is directly proportional to the square of x .
Given that $y = 2$ when $x = 4$, find y when $x = 10$.

(J2011/1/8)

17. y is inversely proportional to x .
The table shows some values of x and y .

x	3	4	q	n
y	20	p	5	m

(a) Find p .

(b) Find q .

(c) Express m in terms of n .

(N2011/1/13)

18. y is inversely proportional to the square of x .

Given that $y = 2$ when $x = 6$, find the value of y when $x = 2$.

(J2012/1/5)

19. y is directly proportional to the square of x .

Given that $y = 32$ when $x = 4$, find y when $x = 3$.

(N2012/1/12)

20. P is directly proportional to the square of Q .

When $P = 9$, $Q = 6$.

(a) Find the formula for P in terms of Q .

(b) Find the values of Q when $P = 25$.

(J2013/1/15)

21. y is inversely proportional to x .

Given that $y = 20$ when $x = 2$, find y when $x = 5$.

(N2013/1/6)

22. The cost of a mirror is directly proportional to the square of its width.

A mirror of width 40 cm costs \$24.

Work out the cost of a mirror of width 60 cm.

(J2014/1/7)

23. y is inversely proportional to x .

Given that $y = 9$ when $x = 8$, find y when $x = 6$.

(N2014/1/10)

24. y is inversely proportional to the square of x .

Given that $y = 24$ when $x = 2$, find y when $x = 8$.

(J2015/1/7)

25. y varies directly as the square root of x .

Given that $y = 18$ when $x = 9$, find y when $x = 4$.

(N2015/1/3)

7. (a) p is proportional to q^3 .
It is known that $p = 24$ for a particular value of q .
Find the value of p when this value of q is halved.
- (b) y is inversely proportional to x^2 .
 $y = 4$ when $x = 3$.
Find y when $x = 10$. (N2004/1/15)
8. It is given that $p = \frac{12}{\sqrt{q}}$.
- (a) Describe the relationship between p and q in words by completing the sentence:
 p is proportional to the square root of q . (J2006/1/6)
- (b) Calculate q when $p = 4$.
9. (a) When an object is falling, the air resistance varies as the square of the speed.
At a certain speed, the resistance is 30 newtons.
What is the resistance at twice this speed?
- (b) y is inversely proportional to x .
Given that $y = 6$ when $x = 4$, find the value of y when $x = 3$. (N2007/1/12)
10. It is given that y is directly proportional to the square of x and that $y = 1$ when $x = \frac{1}{2}$.
Find
- (a) the formula for y in terms of x ,
- (b) the values of x when $y = 9$. (J2008/1/10)
11. T is inversely proportional to the square of L .
Given that $T = 9$ when $L = 2$, find
- (a) the formula for T in terms of L ,
- (b) the values of L when $T = 25$. (N2008/1/10)
12. y is directly proportional to the square root of x .
Given that $y = 12$ when $x = 36$,
find
- (a) the formula for y in terms of x ,
- (b) the value of x when $y = 10$. (J2009/1/12)
13. y is inversely proportional to x .
Given that $y = 250$ when $x = 4$, find y when $x = 80$. (N2009/1/6)
14. It is given that y is inversely proportional to the square of x and that $y = 48$ when
 $x = \frac{1}{2}$.
Find
- (a) the formula for y in terms of x ,
- (b) the values of x when $y = 3$. (J2010/1/12)