

Direct Proportion

t is directly proportional to r

$t \propto r$, $t = kr$

As t increases r increases and vice versa

Example : More air blown into a balloon greater is the size of the balloon

Inverse Proportion

b is inverse proportional to m

$b \propto \frac{1}{m}$, $b = \frac{k}{m}$

As b increases m decreases and vice versa

Example : more workers on a job would reduce the time to complete the task

1. $y \propto x - 4$.
   When x = 16, y = 3.
   Find y in terms of x. [2]
   0580/22/F/M/19 Q9)

2. A ball falls d metres in t seconds.
   d is directly proportional to the square of t.
   The ball falls 44.1m in 3 seconds.
   (a) Find a formula for d in terms of t. [2]
   (b) Calculate the distance the ball falls in 2 seconds. [1]
   0580/22/M/J/18 Q18)

3. The braking distance, d, of a car is directly proportional to the square of its speed, v.
   When d = 5, v = 10.
   Find d when v = 70 [3]
   0580/21/O/N/09 Q10)

4. y is proportional to the square of $(x - 7)$.
   When $x = 12, y = 2$.
   Find y when $x = 17$.
   0580/23/O/N/22 Q17)

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5. y is directly proportional to $(x - 1)^2$
   When $x = 5$, $y = 4$.
   Find y when $x = 7$. [3]
   0580/21/M/J/18 Q15)

6. y is directly proportional to $(x - 1)^2$
   When $x = 3$, $y = 24$.
   Find y when $x = 6$. [3]
   0580/23/M/J/18 Q19)

7. y is directly proportional to the square root of x
   When $x = 9$ $y = 6$, .
   Find y when $x = 25$. [3]
   0580/23/O/N/18 Q17)

8. y is directly proportional to the positive square root of x.
   When $x = 9$, $y = 12$.
   Find y when $x = 1/4$ [3]
   0580/21/M/J/16 Q21)

9. y is directly proportional to the square root of $(x + 2)$.
   When $x = 7$, $y = 2$.
   Find y when $x = 98$. [3]
   0580/21/O/N/16 Q14)

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10. $y \propto \frac{1}{\sqrt{x}}$

    When $y = 8, x = 4$.

    Find y when $x = 49$. [3]

    0580/02/SP/25 Q20)

11. y is inversely proportional to x and

    y = 8 when x = 2.

    Find,

    (i) an equation connecting y and x, [2]

    (ii) y when x = 1/2 [1]

    0580/41/O/N/10 Q8(b)

12. y is inversely proportional to x.

    When x = 9, y = 8.

    Find y when x = 6 [3]

    0580/22/F/M/18 Q10)

13. y is inversely proportional to x^3.

    When x = 2, y = 0.5 .

    Find y in terms of x .[2]

    0580/21/O/N/18 Q7)

14. y is inversely proportional to $(x + 1)^2$

    y = 50 when x = 0.2 .

    (a) Write y in terms of x. [2]

    (b) Find the value of y when x = 0.5 .[1]

    0580/21/O/N/17 Q17)

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15. The speed, v, of a wave is inversely proportional to the square root of the depth, d, of the water.
v = 30 when d = 400. Find v when d = 25. [3]
0580/22/O/N/13 Q11)

16. y is inversely proportional to the square of (x +1) .
y = 0.875 when x = 1.
Find y when x = 4. [3]
0580/23/M/J/19 Q18)

17. y is inversely proportional to x^2.
When x = 4, y = 2.
Find y when x = 1/2 [3]
0580/21/O/N/19 Q15)

18. p is inversely proportional to the square of (q + 4).
p = 2 when q = 2.
Find the value of p when q = – 2 [3]
0580/21/M/J/15 Q12)

19. y is inversely proportional to the square root of (x + 1).
When x = 8, y = 2.
Find y when x = 99. [3]
0580/21/M/J/19 Q16)

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20. t is inversely proportional to the square of $(x + 1)$.
When $x = 2$, t = 5.
(a) Write t in terms of x. [2]
(b) When t = 1.8, find the positive value of x [2]
0580/23/O/N/19 Q20)

21. The force of attraction, *F* Newtons, between two magnets is inversely proportional to the square of the distance, *d* cm, between the magnets.
When *d* = 1.5 , *F* = 48.
(a) Find an expression for *F* in terms of *d*. [2]
(b) When the distance between the two magnets is doubled the new force is *n* times the original force.
Work out the value of *n*. [1]
0580/22/M/J/21 Q21)

22. (a) y is directly proportional to the cube root of $(x + 1)$.
When $x = 7, y = 1$.
Find the value of y when $x = 124$. [3]
(b) F is inversely proportional to the square of d.
Explain what happens to F when d is halved. [1]
0580/22/M/J/22 Q18)

23. The energy of a moving object is directly proportional to the square of its speed.
The speed of the object is increased by 30%.
Calculate the percentage increase in the energy of the object.[2]
0580/42/O/N/21

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24. g is inversely proportional to the square of d.
When d is halved, the value of g is multiplied by a factor n. Find n. [2]
0580/42/O/N/22 Q6(f)(ii)

25. y is inversely proportional to $\sqrt{x}$ and x is directly proportional to w^2.
When $w = 12, y = 12$.
Find y in terms of w.
0580/21/O/N/22 Q23)

Answers on next page

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Answers

Q1) 0580/22/F/M/19 Q9) y = (x - 4)/4

Q2) 0580/22/M/J/18 Q18)(a) d = 4.9t^2 (b) 19.6

Q3) 0580/21/O/N/09 Q10) 245

Q4) 0580/23/O/N/22 Q17) 8

Q5) 0580/21/M/J/18 Q15) 9

Q6) 0580/23/M/J/18 Q19) 150

Q7) 0580/23/O/N/18 Q17) 10

Q8) 0580/21/M/J/16 Q21) 2

Q9) 0580/21/O/N/16 Q14) $6\frac{2}{3}$

Q10) 0580/02/SP/25 Q20) $2\frac{2}{7}$ or $\frac{16}{7}$

Q11) 0580/41/O/N/10 Q8(b)(i)y = 16/ x (ii)32

Q12) 0580/22/F/M/18 Q10) 12

Q13) 0580/21/O/N/18 Q7) 4/x^3

Q14) 0580/21/O/N/17 Q17)(a)y = 72/(x +1)^2 (b)32

Q15) 0580/22/O/N/13 Q11)120

Q16) 0580/23/M/J/19 Q18) 0.14

Q17) 0580/21/O/N/19 Q15) 128

Q18) 0580/21/M/J/15 Q12)18

Q19) 0580/21/M/J/19 Q16) [±] 0.6

Q20) 0580/23/O/N/19 Q20)(a)45/(x + 1)^2 (b)4

Q21) 0580/22/M/J/21 Q21)

$(a)\ [F =] \frac{108}{d^2}$ (b) $[n =] \frac{1}{4}$

Q22) 0580/22/M/J/22 Q18)

(a)$\frac{x+8}{7}$ (b)4

Q23) 0580/42/O/N/21 69%

Q24) 0580/42/O/N/22 Q6(f)(ii)4

Q25) 0580/21/O/N/22 Q23)$\frac{144}{w}$

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