

ALGEBRA – SUBSTITUTION – PRACTICE QUESTIONS
CALCULATOR ALLOWED



1.

$$a = 2b + 3c$$

Find the value of a when $b = 5$ and $c = 2$.

2.

$$d = 5e - 2f$$

Find the value of d when $e = 4$ and $f = 6$.

3.

$$g = 4h - i$$

Find the value of g when $h = 2$ and $i = -5$.

4.

$$z = x^2 - 3y$$

Find the value of z when $x = 3$ and $y = -2$.

5.

$$t = 3s^2 - 4u$$

Find the value of t when $s = -3$ and $u = 4$.

6.

Below are four algebraic expressions.

$3x + y$

$2x^2$

$5y - x$

$y + 12$

Which expression gives the largest value when $x = 3$ and $y = 4$?

7.

Below are four algebraic expressions.

$5p + 2q$

$p^2 - 5$

$3(p - q)$

$q^2 + 9$

Which expression gives the largest value when $p = 4$ and $q = -2$?

8.

Below are four algebraic expressions.

$a^3 + 5$

$3a - 4b$

$a(5a + b)$

b^a

Which expression gives the smallest value when $a = 2$ and $b = -3$?

9.

$$p = r + at$$

Find the value of p when $r = 5$, $a = 2$ and $t = 6$.

10.

$$A = 5c - de$$

Find the value of A when $c = 4$, $d = 0.5$ and $e = 12$.

11.

$$w^2 = u^2 - 2vz$$

Find the value of w when $u = -6$, $v = 1$ and $z = 10$.

12.

$$x^2 = y^2 + 4wz$$

Find the value of x when $y = 3$, $w = 5$ and $z = 2$.

13.

$$L = 3m + n$$

Find the value of n when $L = 20$ and $m = 4$.

14.

$$A = 4b - 3d$$

Find the value of b when $A = 9$ and $d = 3$.

15.

$$w = 10z + 3t$$

Find the value of z when $w = 21$ and $t = -3$.

16.

$$r = 3p^2 + 2q$$

Find the value of q when $r = 10$ and $p = 2$.

17.

The formula below can be used to work out the cost in pounds (C) of hiring a bike for h hours.

$$C = 9h + 5$$

(a) Carla wants to hire a bike for 4 hours.

Work out how much Carla will pay.

(b) Darren also hired a bike.

He paid £50.

Work out how many hours Darren hired the bike for.

18.

The formula below can be used to convert temperatures between ° Celsius (C) and ° Fahrenheit (F).

$$F = 2C + 30$$

(a) The temperature in Athens is 28°C.

Work out the temperature in Athens in ° Fahrenheit.

(b) The temperature in Helsinki is 20°F.

Work out the temperature in Helsinki in ° Celsius.

19.

A taxi company uses this formula to calculate the cost (C) of a journey.

$$C = 5 + 1.5m + B$$

where m is the number of miles travelled and B is a booking fee.

- (a) Mae booked a taxi with the company.
She travelled 6 miles and paid £15.50.
Work out the booking fee.

- (b) Noreen also booked a taxi with the company.
She travelled 10 miles.
Work out how much Noreen paid.

20.

The formula below can be used to calculate the temperature in Celsius (T) at different heights on Mount Everest.

$$T = \frac{48}{h} - 36$$

where h is the height in kilometres.

- (a) A hiker has set up a base at a height of 1,500 metres.
Work out the temperature at the base.
- (b) The temperature at another base on the mountain is -20°C .
How high up the mountain is the base, in kilometres?

21.

The formula below is used to calculate the number of points (P) a football team has.

$$P = 3W + D$$

where W is the number of games won and D is the number of games drawn.

(a) Liverpool have won 24 games and drawn 8 games.

Everton have won 16 games and drawn 6 games.

How many more points do Liverpool have than Everton?

(b) Manchester United have played 38 games.

They have drawn 13 games and have 79 points.

How many games have Manchester United lost?

22.

Aaron works for a company selling car and home insurances.

His monthly pay in pounds (P) can be calculated using the formula below.

$$P = 1250 + \frac{C}{40} + \frac{3H}{100}$$

where C is the total value of the car insurances he sells and H is the total value of the home insurances he sells.

In June, Aaron sold 6 car insurances worth £260 each and 2 home insurances worth £350 each.

Work out Aaron's pay in June.

23.

Below are 5 numbers.

$$a + b$$

$$b^2$$

$$2a - b$$

$$a^2 - 1$$

$$5b + 9$$

(a) Find the mode of the numbers when $a = 5$ and $b = 3$.

(b) Find the median of the numbers when $a = 3$ and $b = 4$.

24.

The formula below can be used to calculate the final velocity in metres per second (v) of a journey.

$$v^2 = u^2 + 2as$$

where u is the initial velocity in metres per second, a is the acceleration in metres per second per second

(a) A car travelled from point A to point B.

The distance between point A and point B is 88 metres.

The car's initial velocity was 2 metres per second.

The car's acceleration was 0.75 metres per second per second.

Work out the car's final velocity, to 1 decimal place.

(b) Another car travelled from point C to point D.

The car's initial velocity was 3 metres per second.

The car's final velocity was 15 metres per second.

The car's acceleration was 1.02 metres per second.

Work out the distance travelled, to the nearest metre.