



**Bishops
Online
Tutoring**



Education Consultancy

Edexcel GCSE Mathematics

ALGEBRA: SUBSTITUTION

Materials Required:

- Pen
- HB Pencil
- Ruler (in centimetres and millimetres)
- Protractor
- Compass

Instructions:

- Use a black ink pen to answer all questions
- Fill your name in the section below
- Answer the questions in the spaces provided
- Show your working out for all answers

Information:

- The marks allocated for each question are displayed within brackets – utilise this information to gauge the appropriate amount of time to dedicate to each question
- Questions marked with an asterisk (*) will assess your written communication; be careful of spelling, punctuation and grammar with these questions

Advice:

- Carefully read the question before attempting to answer it
- Be vary of time and try to answer every question
- If you have enough time in the end, go back and check your answers. A good way to check your answers is to retry the question with the hope of getting the same answer as before without looking at your working out from before

NO CALCULATOR ALLOWED

NAME:

1. $P = 3n$
 $n = 6$

(a) Work out the value of P .

$$P = 3(6)$$

$$P = 18$$

$$P = \underline{\quad 18 \quad}$$

(1)

$$Q = 2c + d$$

$$c = 3 \quad d = 2$$

(b) Work out the value of Q .

$$Q = 2(3) + 2$$

$$Q = 6 + 2$$

$$Q = 8$$

$$Q = \underline{\quad 8 \quad}$$

(2)

(Total 3 marks)

2. $p = 5$
 $r = 2$

(a) Work out the value of

$$4p + 3r$$

$$4(5) + 3(2)$$

$$= 20 + 6$$

$$= 26$$

$$\underline{\quad 26 \quad}$$

(2)

n is an even number.

(b) What type of number is $n + 1$?

An odd number

(1)

(Total 3 marks)

3. $y = 5x - 3$

Find the value of y when $x = 9$

$$y = 5(9) - 3$$

$$y = 45 - 3$$

$$y = 42$$

$$y = \dots\dots\dots 42 \dots\dots\dots$$

(2)

(Total 2 marks)

4. $P = 4k - 10$

$$k = 7$$

(a) Work out the value of P .

$$P = 4(7) - 10$$

$$P = 28 - 10$$

$$P = 18$$

$$\dots\dots\dots P = 18 \dots\dots\dots$$

(2)

$$y = 4n - 3d$$

$$n = 2 \quad d = 5$$

(b) Work out the value of y .

$$y = 4(2) - 3(5)$$

$$y = 8 - 15$$

$$y = -7$$

$$\dots\dots\dots y = -7 \dots\dots\dots$$

(2)

(Total 4 marks)

5. $v = u + 10t$

Work out the value of v when

$$u = 10 \text{ and } t = 7$$

$$V = 10 + 10(7)$$

$$V = 10 + 70$$

$$V = 80$$

$$v = \dots\dots\dots 80 \dots\dots\dots$$

(Total 2 marks)

6.



Take two 5 ml spoons full
twice a day

You can work out the amount of medicine, c ml, to give to a child by using the formula

$$c = \frac{ma}{150}$$

m is the age of the child, in months. a is an adult dose, in ml.

A child is 30 months old.

An adult's dose is 40 ml.

Work out the amount of medicine you can give to the child.

$$c = \frac{30(40)}{150}$$

$$c = \frac{1200}{150}$$

$$c = 8$$

..... 8 ml

(Total 2 marks)

7. $V = 3b + 2b^2$

Find the value of V when $b = 4$

$$V = 3(4) + 2(4^2)$$

$$V = 12 + 32$$

$$V = 44$$

..... $V = 44$

(Total 2 marks)

8. (a) Work out the value of $3p + 4q$ when $p = 5$ and $q = -2$

$$\begin{aligned}
 & 3(5) + 4(-2) \\
 & = 15 - 8 \\
 & = 7
 \end{aligned}
 \qquad \dots\dots\dots 7 \dots\dots\dots$$

(2)

- (b) Given that $y = 4x - 3$, work out the value of x when $y = 11$

$$\begin{aligned}
 11 &= 4x - 3 \\
 11 + 3 &= 4x \\
 4x &= 14 \\
 x &= \frac{14}{4} = \frac{7}{2} = 3.5
 \end{aligned}
 \qquad x = \dots\dots\dots 3.5 \dots\dots\dots$$

(3)
(Total 5 marks)

9. Work out the value of

$5x + 1$ when $x = -3$

$$\begin{aligned}
 & 5(-3) + 1 \\
 & -15 + 1 \\
 & = -14
 \end{aligned}
 \qquad \dots\dots\dots -14 \dots\dots\dots$$

(2)
(Total 2 marks)

10. (a) Work out the value of $3x - 4y$ when $x = 3$ and $y = 2$

$$\begin{aligned}
 & 3(3) - 4(2) \\
 & = 9 - 8 \\
 & = 1
 \end{aligned}
 \qquad \dots\dots\dots 1 \dots\dots\dots$$

(2)

- (b) Work out the value of $\frac{p(q-3)}{4}$ when $p = 2$ and $q = -7$

$$\begin{aligned}
 & \frac{2(-7-3)}{4} = \frac{-20}{4} \\
 & = \frac{2(-10)}{4} = -5
 \end{aligned}
 \qquad \dots\dots\dots -5 \dots\dots\dots$$

(3)
(Total 5 marks)

11.

$$S = 2p + 3q$$

$$p = -4$$

$$q = 5$$

$$S = 2(-4) + 3(5)$$

$$S = -8 + 15$$

$$S = 7$$

(a) Work out the value of S .

$$S = \dots\dots\dots 7 \dots\dots\dots \quad (2)$$

$$T = 2m + 30$$

$$T = 40$$

(b) Work out the value of m .

$$40 = 2m + 30$$

$$2m = 40 - 30$$

$$2m = 10$$

$$m = \frac{10}{2} = 5$$

$$m = \dots\dots\dots 5 \dots\dots\dots \quad (2)$$

(Total 4 marks)

12. $A = 4bc$

$$A = 100$$

$$b = 2$$

Work out the value of c .

$$100 = 4(2c)$$

$$100 = 8c$$

$$c = \frac{100}{8}$$

$$c = 12.5$$

$$c = \dots\dots\dots 12.5 \dots\dots\dots \quad (2)$$

(Total 2 marks)

13. (a) Work out the value of $2a + ay$ when $a = 5$ and $y = -3$

$$\begin{aligned} & 2(5) + (5 \times -3) \\ &= 10 - 15 \\ &= -5 \end{aligned}$$

..... - 5 (2)

(b) Work out the value of $5t^2 - 7$ when $t = 4$

$$\begin{aligned} & 5(4^2) - 7 \\ &= 5 \times 16 - 7 \\ &= 80 - 17 \\ &= 63 \end{aligned}$$

..... 63 (3)
(Total 5 marks)

14. $A = \frac{h(x+10)}{2}$

$$A = 27$$

$$h = 4$$

Work out the value of x

$$27 = \frac{4(x+10)}{2}$$

$$27 = \frac{4x+40}{2}$$

$$27 \times 2 = 4x + 40$$

$$54 = 4x + 40$$

$$4x = 54 - 40$$

$$4x = 14$$

$$x = \frac{14}{4} = \frac{7}{2}$$

$$x = 3.5$$

$x =$ 3.5 (Total 3 marks)

15. $h = 5t^2 + 2$

(i) Work out the value of h when $t = -2$

$$h = 5(-2^2) + 2$$

$$h = 20 + 2$$

$$h = 22$$

..... 22 (3)

(ii) Work out a value of t when $h = 47$

$$47 = 5t^2 + 2$$

$$t = \sqrt{9}$$

$$47 - 2 = 5t^2$$

$$t^2 = \frac{45}{5}$$

$$t = 3$$

..... 3 (3)

$$t^2 = 9$$

(Total 5 marks)

16. $V = 3b + 2b^2$

Find the value of V when $b = -4$

$$V = 3(-4) + 2(-4^2)$$

(3)

$$V = -12 + 32$$

$$V = 20$$

..... 20 (Total 3 marks)