

# Edexcel GCSE

## Mathematics (Linear) – 1MA0

# ALGEBRA: SUBSTITUTION

**Materials required for examination**

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.  
Tracing paper may be used.

**Items included with question papers**

Nil

**Instructions**

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Use black ink or ball-point pen.

Fill in the boxes at the top of this page with your name, centre number and candidate number.

Answer all questions.

Answer the questions in the spaces provided – there may be more space than you need.

Calculators may be used.

**Information**

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The marks for each question are shown in brackets – use this as a guide as to how much time to spend on **each** question.

Questions labelled with an **asterisk (\*)** are ones where the quality of your written communication will be assessed – you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.

**Advice**

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Read each question carefully before you start to answer it.

Keep an eye on the time.

Try to answer every question.

Check your answers if you have time at the end.

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

(a) Work out the value of  $P$ .

$$3 \times 6$$

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

(1)

$Q = 2c + d$   
 $c = 3$   
 $d = 2$

$$2 \times 3 + 2$$

(b) Work out the value of  $Q$ .

$$Q = \dots\dots\dots 8$$

(2)

(Total 3 marks)

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

(a) Work out the value of

$$4p + 3r$$

$$\begin{array}{r} 4 \times 5 \\ 20 \end{array} \quad \begin{array}{r} + \\ + \end{array} \quad \begin{array}{r} 3 \times 2 \\ 6 \end{array}$$

$$\dots\dots\dots 26$$

(2)

$n$  is an even number.

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

$$\dots\dots\dots \text{odd}$$

(1)

(Total 3 marks)

3.  $y = 5x - 3$

Find the value of  $y$  when  $x = 9$

$$\begin{array}{r} 5 \times 9 - 3 \\ 45 - 3 \end{array}$$

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

(2)

(Total 2 marks)

4.  $P = 4k - 10$

$k = 7$

(a) Work out the value of  $P$

$$\begin{array}{r} 4 \times 7 - 10 \\ 28 - 10 \end{array}$$

$$\dots\dots\dots 18$$

(2)

$y = 4n - 3d$

$n = 2$

$d = 5$

(b) Work out the value of  $y$ .

$$\begin{array}{r} 4 \times 2 - 3 \times 5 \\ 8 - 15 \end{array}$$

$$\dots\dots\dots -7$$

(2)

(Total 4 marks)

5.  $v = u + 10t$

Work out the value of  $v$  when

$u = 10$  and  $t = 7$

$$\begin{array}{r} 10 + 10 \times 7 \\ 10 + 70 \end{array}$$

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

(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.

$$c = \frac{30 \times 40}{150} = \frac{1200}{150} = 8$$

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

..... 8 ..... ml

(Total 2 marks)

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

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

$$\begin{array}{rcl} 3 \times 4 & + & 2 \times 4^2 \\ 12 & + & 2 \times 16 \\ 12 & + & 32 \end{array}$$

..... 44 .....

(Total 2 marks)

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

$$\begin{array}{r} 3 \times 5 + 4 \times -2 \\ 15 + -8 \\ 15 - 8 \end{array}$$

..... 8

(2)

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

$$11 = 4x - 3$$

$$14 = 4x$$

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

$$x = \dots\dots\dots 3.5$$

(3)

(Total 5 marks)

9. Work out the value of  $5x + 1$  when  $x = -3$

$$\begin{array}{r} 5 \times -3 + 1 \\ -15 + 1 \end{array}$$

..... -14

(2)

(Total 2 marks)

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

$$\begin{array}{r} 3 \times 3 - 4 \times 2 \\ 9 - 8 \end{array}$$

..... 1

(2)

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

$$\frac{2 \times (-7 - 3)}{4} = \frac{2 \times -10}{4} = \frac{-20}{4} = -5$$

..... -5

(3)

(Total 5 marks)

11.  $S = 2p + 3q$

$p = -4$

$q = 5$

$$S = 2 \times -4 + 3 \times 5$$

$$= -8 + 15$$

(a) Work out the value of  $S$ .

$$S = \dots\dots\dots -7$$

(2)

$T = 2m + 30$

$T = 40$

$$40 = 2m + 30$$

$$10 = 2m$$

$$5 = m$$

(b) Work out the value of  $m$ .

$$m = \dots\dots\dots 5$$

(2)

(Total 4 marks)

12.  $A = 4bc$

$A = 100$

$b = 2$

Work out the value of  $c$ .

$$100 = 4 \times 2 \times c$$

$$100 = 8 \times c$$

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

$$12.5 = c$$

$$c = \dots\dots\dots 12.5$$

(2)

(Total 2 marks)

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

$$\begin{array}{r} 2 \times 5 + 5 \times -3 \\ 10 + -15 \\ 10 - 15 \end{array}$$

$$\begin{array}{r} -5 \\ \hline \end{array}$$

(2)

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

$$\begin{array}{r} 5 \times 4^2 - 7 \\ 5 \times 16 - 7 \\ 80 - 7 \end{array}$$

$$\begin{array}{r} 73 \\ \hline \end{array}$$

(3)

(Total 5 marks)

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

$$A = 27$$

$$h = 4$$

Work out the value of  $x$

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

$$54 = 4(x+10)$$

$$54 = 4x + 40$$

$$14 = 4x$$

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

$$x = \frac{14}{4} = 3\frac{1}{2}$$

(Total 3 marks)

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

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

$$\begin{array}{rcl} 5 \times (-2)^2 & + & 2 \\ 5 \times 4 & + & 2 \\ 20 & + & 2 \end{array}$$

$$\begin{array}{r} 22 \\ \hline \end{array} \quad (3)$$

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

$$\begin{array}{rcl} 47 & = & 5 \times t^2 + 2 \\ 45 & = & 5 \times t^2 \\ 9 & = & t^2 \\ 3 & = & t \end{array}$$

$$\begin{array}{r} 3 \text{ (or } -3) \\ \hline \end{array} \quad (3)$$

(Total 5 marks)

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

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

$$\begin{array}{rcl} 3 \times -4 + 2 \times (-4)^2 & & \\ -12 + 2 \times 16 & & \\ -12 + 32 & & \end{array}$$

$$\begin{array}{r} 20 \\ \hline \end{array} \quad (3)$$

(Total 3 marks)