

GCSE MATHS

Expressions and substitution

Worked Solutions

Q1

**

$$x + 5$$

Add 5 to the starting number.

$$\frac{x + 5}{3}$$

Divide the whole sum by 3.

Q2

**

(a) $2(a + b)$

Add the two numbers before doubling the whole sum.

(b) $2a + b$

Double only a , then add b .

Q3

**

$$(x + 3)^2$$

The brackets include both terms in the square.

Q4

**

$$4 + 3d$$

Add the fixed charge to the distance charge.

Q5

**

$$np$$

Multiply the number of boxes by the number of pencils in each box.

$$3 \times 24 = 72$$

Find the number of pencils given out.

$$np - 72$$

Subtract the pencils given out from the total bought.

Q6

**

$$\begin{aligned}n \\n + 2 \\n + 4 \\n + (n + 2) + (n + 4) = 3n + 6\end{aligned}$$

Consecutive odd numbers differ by 2.

Add the three numbers and collect like terms.

Q7

**

(a) $3(-2) + 8 = -6 + 8 = 2$

Multiply before adding 8.

(b) $3(-2 + 8) = 3(6) = 18$

Calculate inside the brackets before multiplying.

Q8

**

$5(-2) - 2(3) = -10 - 6 = -16$

Keep the negative sign attached to a.

Q9

**

$(-4)^2 + 2(-4) = 16 - 8 = 8$

The square is positive; the linear term is negative.

Q10

**

$(7 - 1)/3 = 2$

Add the numerator before dividing.

Q11

**

$2(-8) - 9 = -25$

A negative cube stays negative; a negative square is positive.

Q12

$\sqrt{49 - 24} = \sqrt{25} = 5$

Work inside the root first.

Q13

**

$$(4 + 2)a + (3 - 8)$$

Collect the terms in a separately from the numbers.

$$6a - 5$$

Add the coefficients and simplify the constant term.

Q14

**

$$(4 - 7)x + (3 + 5)y = -3x + 8y$$

Collect each letter separately.

Q15

**

$$(6 + 3)p^2 + (-2 + 7)p = 9p^2 + 5p$$

Separate the square and linear terms.

Q16

**

$$3 \times 4 \times a \times a \times b = 12a^2b$$

Multiply coefficients and combine repeated factors.

Q17

**

$$(18/6)x^{3-1}y^{1-1} = 3x^2$$

Divide coefficients and subtract powers.

Q18

$$6ab - 4ab + 5ab = 7ab$$

First write every product in the same form.

Q19

**

$$P = 2(2x + 3) + 2(x - 1)$$

Add twice each side.

$$P = 6x + 4 \text{ cm}$$

Collect the terms.

Q20

**

$$v = 12 + (-1.5)(8) = 0$$

Multiply the acceleration by time.

Q21

**

$$s = 3(5) + \frac{1}{2}(2)(5^2)$$

Substitute all three values.

$$s = 15 + 25 = 40$$

Square the time before multiplying.

Q22

**

$$E = \frac{1}{2}(4)(49 - 25) = 2(24) = 48$$

Subtract the squares inside the brackets.

Q23

**

$$A - B = (3n + 2) - (2n + 5)$$

Subtract the whole expression for B .

$$A - B = 3n + 2 - 2n - 5 = n - 3$$

Change both signs in the second bracket.

Q24

$$A = n^2 + 2n + 1$$

Expand both expressions.

$$B = n^2 + 2n$$

$$A - B = 1$$

The difference is positive and does not depend on n .