

GCSE Maths: Letters, expressions and formulae (Higher): answers

GCSE Maths - Substitution and Formulae - Higher - Lesson 8.1

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch08-substitution-formulae/higher/letters-expressions-and-formulae/

Exercise 8A Words, expressions and formulae Non-calculator

1 Write down whether each of these is an **expression**, an **equation**, a **formula** or an **identity**.

(a) $4n - 7$

Answer: expression

(b) $4n - 7 = 21$

Answer: equation

(c) $3(n + 2) \equiv 3n + 6$

Answer: identity

(d) $2(l + w)$

Answer: expression

(e) $P = 2l + 2w$

Answer: formula

(f) $5 + 2x$

Answer: expression

2 Write each of these in the shortest algebra form.

(a) $3 \times n$

Answer: $3n$

(b) $n \times n$

Answer: n^2

(c) $4 \times a \times b$

Answer: $4ab$

(d) $b \times a \times 3$

Answer: $3ab$

(e) $x \div 5$

Answer: $\frac{x}{5}$

(f) $2 \times (n + 4)$

Answer: $2(n + 4)$

3 Write an expression for each statement. Use the letter n for the number.

(a) 5 more than n

Answer: $n + 5$

(b) 6 times n

Answer: $6n$

(c) 9 less than n

Answer: $n - 9$

(d) n shared equally between 4 people

Answer: $\frac{n}{4}$

(e) double n , then add 3

Answer: $2n + 3$

(f) take n away from 12

Answer: $12 - n$

4 Pens cost 35 pence each and a ruler costs 60 pence. Write an expression, in pence, for the cost of:

(a) n pens

Answer: $35n$

(b) n pens and one ruler

Answer: $35n + 60$

(c) the change from £5 when buying n pens and one ruler

Answer: $500 - (35n + 60)$

5 Ali is a years old. Ben is 3 years older than Ali. Cara is half as old as Ali. Write an expression for:

(a) Ben's age

Answer: $a + 3$

(b) Cara's age

Answer: $\frac{a}{2}$

(c) the total of their three ages (you do not need to simplify)

Answer: $a + (a + 3) + \frac{a}{2}$

6 Dan says, "4 more than n is $4n$." Show, using $n = 5$, that Dan is wrong, and write the correct expression.

Answer: 4 more than 5 is 9 but $4n = 20$; correct: $n + 4$

7 A taxi charges £3 to start, plus £2 for every mile. The cost is £ C for a journey of m miles.

(a) Write a formula for C in terms of m .

Answer: $C = 2m + 3$

- (b) Use your formula to work out the cost of a 5 mile journey.

Answer: £13

8 Write an expression for each description.

- (a) Add 3 to n , then double the result

Answer: $2(n + 3)$

- (b) Double n , then add 3

Answer: $2n + 3$

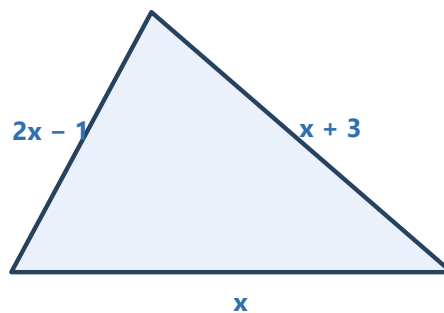
- (c) Multiply n by itself, then add 3

Answer: $n^2 + 3$

- (d) Add 3 to n , then multiply the result by itself

Answer: $(n + 3)^2$

9 The diagram shows a triangle. The lengths are in centimetres. Write down and simplify an expression for the perimeter.



Answer: $4x + 2$

10 Amir has £ a . Bea has £5 more than Amir. Cal has twice as much as Amir. Write an expression for the amount that:

- (a) Bea has

Answer: $a + 5$

- (b) Cal has

Answer: $2a$

- (c) all three have altogether, in its simplest form

Answer: £ $(4a + 5)$

11 n is a whole number. Write an expression for:

- (a) the next whole number after n

Answer: $n + 1$

- (b) the whole number just before n

Answer: $n - 1$

(c) the next even number after the even number $2n$

Answer: $2n + 2$

12 Tia says that $3(n + 2)$ is the same as $3n + 2$. Test her idea with $n = 1$ and $n = 4$. Is she right?

Answer: No: 9 and 5 for $n = 1$

13 A cinema sells adult tickets for £ a each and child tickets for £ c each. A family buys 3 adult tickets and 2 child tickets. Write an expression for the total cost in pounds.

Answer: $3a + 2c$

14 n is a whole number. Explain why $2n$ is always even and why $2n + 1$ is always odd.

Answer: $2n$ is a multiple of 2; $2n + 1$ is one more than a multiple of 2

15 n is an odd number. Show that the sum of n and the next two odd numbers is always a multiple of 3.

Answer: $3n + 6 = 3(n + 2)$

16 A rectangle has width w cm. Its length is 3 cm more than twice its width. Write and simplify an expression for the perimeter of the rectangle. Explain why the perimeter is always a multiple of 6.



Answer: $6w + 6$