

# GCSE Maths: Substituting negative numbers (Higher): answers

GCSE Maths - Substitution and Formulae - Higher - Lesson 8.3

**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/substituting-negative-numbers/](https://websink.site/gcse/maths/ch08-substitution-formulae/higher/substituting-negative-numbers/)

## Exercise 8C Substituting negative numbers Non-calculator

**1** Work out each of these. They revise the rules for negative numbers.

(a)  $5 + (-3)$

**Answer:** 2

(b)  $-4 - (-6)$

**Answer:** 2

(c)  $3 \times (-4)$

**Answer:** -12

(d)  $-2 \times (-7)$

**Answer:** 14

(e)  $12 \div (-3)$

**Answer:** -4

(f)  $-20 \div (-4)$

**Answer:** 5

**2** Work out the value of each expression when  $x = -2$ .

(a)  $x + 5$

**Answer:** 3

(b)  $3x$

**Answer:** -6

(c)  $4 - x$

**Answer:** 6

(d)  $x - 1$

**Answer:** -3

(e)  $2x + 7$

**Answer:** 3

(f)  $10 + 3x$

**Answer:** 4

**3** Work out the value of each expression when  $a = -3$  and  $b = 4$ .

(a)  $a + b$

Answer: 1

(b)  $ab$

Answer: -12

(c)  $a - b$

Answer: -7

(d)  $2a + 3b$

Answer: 6

(e)  $b - a$

Answer: 7

4 Work out the value of each expression when  $x = -5$ .

(a)  $x^2$

Answer: 25

(b)  $-x^2$

Answer: -25

(c)  $(-x)^2$

Answer: 25

(d)  $x^2 + 3$

Answer: 28

(e)  $3x^2$

Answer: 75

5 The formula to change a temperature from degrees Celsius to degrees Fahrenheit is  $F = \frac{9C}{5} + 32$ . Work out  $F$  when

(a)  $C = -10$

Answer: 14°F

(b)  $C = -5$

Answer: 23°F

(c)  $C = -40$

Answer: -40°F

6 Work out the value of each expression when  $a = -2$  and  $b = -3$ .

(a)  $ab$

Answer: 6

(b)  $a^2b$

**Answer:** -12

(c)  $a^2 + b^2$

**Answer:** 13

(d)  $a - b$

**Answer:** 1

(e)  $ab^2$

**Answer:** -18

(f)  $(a + b)^2$

**Answer:** 25

7 Lena says, "When  $x = -3$ ,  $x^2 = -9$ ." Is she correct? Explain.

**Answer:** No:  $x^2 = 9$

8 Jo has £40 in her bank account and spends £25 each month with no money coming in. After  $t$  months her balance is  $B = 40 - 25t$  pounds.

(a) Work out  $B$  when  $t = 1$ .

**Answer:** £15

(b) Work out  $B$  when  $t = 2$ .

**Answer:** -£10

(c) Work out  $B$  when  $t = 3$ .

**Answer:** -£35

(d) What does your answer to part (c) mean for Jo?

**Answer:** She is £35 overdrawn

9 Work out the value of each expression when  $x = -4$  and  $y = 6$ .

(a)  $\frac{x+y}{2}$

**Answer:** 1

(b)  $\frac{y}{x}$

**Answer:** -1.5

(c)  $\frac{3x}{y}$

**Answer:** -2

(d)  $\frac{x^2}{y+2}$

**Answer:** 2

- 10 When  $x = -2$ , put these expressions in order, starting with the smallest value:  $x^2$ ,  $2x$ ,  $x^3$ ,  $-x$ .

**Answer:**  $x^3$ ,  $2x$ ,  $-x$ ,  $x^2$

- 11 Work out the value of each expression when  $x = -1$ .

(a)  $(x - 3)^2$

**Answer:** 16

(b)  $3(2 - x)$

**Answer:** 9

(c)  $(x + 4)(x - 2)$

**Answer:** -9

(d)  $5 - (x + 2)$

**Answer:** 4

- 12 Show that  $x^2 + 2x + 1 = 0$  when  $x = -1$ .

**Answer:** 0

- 13 Work out the value of  $2x^2 - 3xy + y^2$  when

(a)  $x = -2$  and  $y = 3$

**Answer:** 35

(b)  $x = 3$  and  $y = -2$

**Answer:** 40

- 14 (a) Work out  $x^2 - y^2$  when  $x = -3$  and  $y = -5$ . (b) Work out  $(x - y)(x + y)$  for the same values. (c) What do you notice? Why?

(a)  $x^2 - y^2$

**Answer:** -16

(b)  $(x - y)(x + y)$

**Answer:** -16

(c) What do you notice? Why?

**Answer:** They are equal (-16), because  $x^2 - y^2 = (x - y)(x + y)$

- 15 Two different numbers  $x$  satisfy  $x^2 = 16$ . Find both numbers and show that each one works.

**Answer:**  $x = 4$  or  $x = -4$