

Composite Functions

ANSWERS

1

$$f(x) = 4x \quad g(x) = x + 5$$

Find $fg(4)$

$fg(4)$: g goes first



the letter next to the bracket goes first

$$g(4) = 9$$

$$f(9) = 36$$

Answer 36

2

$$f(x) = 3x - 2 \quad g(x) = x^2$$

Find $fg(2)$

the letter next to the bracket goes first

$$g(2) = 4$$

$$f(4) = 10$$

Answer 10

3

$$f(x) = x + 5 \quad g(x) = 4x$$

Find $fg(3)$

the letter next to the bracket goes first

$$g(3) = 12$$

$$f(12) = 17$$

Answer 17

4

$$f(x) = x^2 \quad g(x) = x - 1$$

Find $fg(6)$

the letter next to the bracket goes first

$$g(6) = 5$$

$$f(5) = 25$$

Answer 25

5

$$f(x) = 2x + 1 \quad g(x) = x + 3$$

Find $gf(4)$

$$f(4) = 9$$

$$g(9) = 12$$

Answer 12

6

$$f(x) = 3x \quad g(x) = x^2 + 1$$

Find $gf(2)$

$$f(2) = 6$$

$$g(6) = 37$$

Answer 37

7

$$f(x) = 2x + 1 \quad g(x) = x + 3$$

Find $fg(x)$

Answer $2x + 7$

8

$$f(x) = x^2 \quad g(x) = 3x - 1$$

Find $fg(x)$

Answer $(3x - 1)^2$

Composite Functions *further practice*

ANSWERS

9

$$f(x) = 3x - 2 \quad g(x) = x^2 + 1$$

Find $gf(x)$. Give your answer in its simplest form.

$$(3x - 2)^2 + 1$$

Answer $9x^2 - 12x + 5$

10

$f(x) = 1.05x$ gives the value, after one year, of £ x put in a savings account. Find $ff(x)$ and say what it gives.

$$f(1.05x) = 1.05 \times 1.05x$$

Answer $1.1025x$, the value after 2 years

11

$$f(x) = x^2 \quad g(x) = x + 3$$

Solve $fg(x) = 49$

$$(x + 3)^2 = 49$$

$$x + 3 = 7 \text{ or } x + 3 = -7$$

Answer $x = 4 \text{ or } x = -10$

12

$$f(x) = ax + 1 \quad g(x) = x + 4$$

$fg(2) = 25$. Find the value of a .

$$g(2) = 6$$

$$6a + 1 = 25$$

Answer $a = 4$

13

In a sale, $f(x) = 0.8x$ takes 20% off a price of £ x . A voucher takes £10 off: $g(x) = x - 10$. Which gives the lower price, $fg(x)$ or $gf(x)$? By how much?

$$fg(x) = 0.8(x - 10) = 0.8x - 8$$

$$gf(x) = 0.8x - 10$$

Answer $gf(x)$, by £2

14

$g(x) = x - 273$ changes x kelvin to °C. $f(x) = 1.8x + 32$ changes x °C to °F. Find a single function that changes kelvin to °F. Use it to change 300 kelvin to °F.

$$fg(x) = 1.8(x - 273) + 32$$

$$1.8 \times 300 - 459.4 = 80.6$$

Answer $fg(x) = 1.8x - 459.4$, 80.6 °F

15

$$f(x) = 2x + 1 \quad g(x) = x^2$$

Solve $fg(x) = gf(x)$

$$2x^2 + 1 = (2x + 1)^2$$

$$2x^2 + 4x = 0, \text{ so } 2x(x + 2) = 0$$

Answer $x = 0 \text{ or } x = -2$

16

Jay says $fg(x)$ and $gf(x)$ are always different. Is he right for $f(x) = 3x + 10$ and $g(x) = 2x + 5$? Explain.

$$fg(x) = 3(2x + 5) + 10 = 6x + 25$$

$$gf(x) = 2(3x + 10) + 5 = 6x + 25$$

Answer No, both are $6x + 25$