Composite Functions

ANSWERS

1

$f(x) = 3x$ $g(x) = x + 4$

Find $fg(2)$

$fg(2)$: g goes first



the letter next to the bracket goes first

$g(2) =$ 6

$f($ 6 $) =$ 18

Answer 18

2

$f(x) = x - 7$ $g(x) = 5x$

Find $fg(3)$

the letter next to the bracket goes first

$g(3) =$ 15

$f($ 15 $) =$ 8

Answer 8

3

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

Find $fg(4)$

the letter next to the bracket goes first

$g(4) =$ 16

$f($ 16 $) =$ 33

Answer 33

4

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

Find $gf(3)$

the letter next to the bracket goes first

$f(3) =$ 6

$g($ 6 $) =$ 7

Answer 7

5

$f(x) = 4x - 5$ $g(x) = x^2$

Find $fg(-3)$

$g(-3) = 9$, then $f(9) = 31$

Answer 31

6

$f(x) = 5x + 2$ $g(x) = x - 3$

Find $fg(x)$

$fg(x) = f($ $x - 3$ $)$

$=$ $5(x - 3) + 2$

Answer $5x - 13$

7

$f(x) = x + 6$ $g(x) = x^2$

Find $fg(x)$ and $gf(x)$.

Are they the same?

$fg(x) =$ $x^2 + 6$

$gf(x) =$ $(x + 6)^2$

Same? No

8

$f(x) = x + 3$ $g(x) = 4x$

Jo says

$fg(2) = f(2) \times g(2) = 5 \times 8 = 40$.

Explain Jo's mistake, then

find $fg(2)$.

fg means g first, then f. It is not a multiplication.

Answer 11

Composite Functions *further practice*

ANSWERS

9

$f(x) = 3x - 4$ $g(x) = x^2 + 2$

Find $gf(-1)$

$f(-1) = -7$, then $g(-7) = 51$

Answer 51

10

The table shows $f(x)$ and $g(x)$ for some values of x. Find $fg(2)$ and $gf(2)$.

x	1	2	3	4	5
$f(x)$	3	5	1	2	4
$g(x)$	4	3	5	1	2

$g(2) = 3$, $f(3) = 1$

$f(2) = 5$, $g(5) = 2$

Answer $fg(2) = 1$, $gf(2) = 2$

11

Here are the function machines for f and g. Find $fg(x)$.

f x → ×3 → +1 → ?

g x → −2 → ?

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

$fg(x) =$ $3x - 5$

12

In a sale, $g(x) = 0.8x$ takes 20% off a price of £x, and $f(x) = x + 4$ adds £4 delivery. A coat costs £65.

Work out $fg(65)$ and $gf(65)$.

Which is cheaper?

$fg(65) = f(52) = £56$

$gf(65) = g(69) = £55.20$

Answer $gf(65)$, £55.20

13

A square photo has sides of x cm.

A 1 cm border is put all round it.

$f(x) = x + 2$ gives the new side and

$g(x) = x^2$ gives the area of a square.

Find $gf(x)$, then the area when $x = 9$.

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

$gf(9) = 11^2 = 121$

Area = 121 cm²

14

$g(x) = x - 273$ changes kelvin to degrees Celsius. $f(x) = 1.8x + 32$ changes degrees Celsius to degrees Fahrenheit. Find $fg(x)$.

Use it to change 300 kelvin to degrees Fahrenheit.

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

$= 1.8x - 459.4$

$fg(300) = 80.6$

Answer 80.6 °F

15

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

Find $fg(x)$. Give your answer in the form $ax^2 + bx + c$.

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

$= 4x^2 - 12x + 9 + 1$

$fg(x) =$ $4x^2 - 12x + 10$

16

$f(x) = x + 4$. Find a function $g(x)$, not the same as $f(x)$, so that $fg(x) = gf(x)$.

Show that it works.

e.g. $g(x) = x + 1$

$fg(x) = x + 1 + 4 = x + 5$

$gf(x) = x + 4 + 1 = x + 5$

$g(x) =$ $x + 1$ (for example)