

1. Consider the following functions.

$$f(x) = 6x - 2$$

$$g(x) = 3x$$

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

$$p(x) = 2$$

a. Determine $(f + g)(x)$

$$\begin{aligned} f(x) + g(x) \\ (6x - 2) + (3x) &= 9x - 2 \end{aligned}$$

b. Determine $(f + h)(x)$

$$\begin{aligned} f(x) + h(x) \\ (6x - 2) + (2^x + 3) &= 6x + 2^x + 1 \end{aligned}$$

c. Determine $(g - f)(x)$

$$\begin{aligned} g(x) - f(x) \\ (3x) - (6x - 2) \\ = 3x - 6x + 2 \\ = -3x + 2 \end{aligned}$$

d. Determine $(p \cdot g)(x)$

$$\begin{aligned} p(x) \cdot g(x) \\ (2) \cdot (3x) &= 6x \end{aligned}$$

e. Determine $(f \cdot g)(2)$

$$\begin{aligned} f(2) \cdot g(2) \\ 6(2) - 2 \quad 3(2) \\ 10 \cdot 6 &= 60 \end{aligned}$$

f. Determine $\left(\frac{f}{g}\right)(x)$

$$\frac{f(x)}{g(x)} = \frac{6x - 2}{3x} = \frac{6x}{3x} - \frac{2}{3x} = 2 - \frac{2}{3x}$$

2. Given the following partial set of values of function evaluate the following.

x	-1	0	1	2	3
f(x)	1	2	4	8	16
g(x)	-5	-3	-1	1	3

a. Determine $f(1) - 2 \cdot g(2)$

$$\begin{aligned} f(1) - 2 \cdot g(2) \\ f(1) = 4 \quad g(2) = 1 \\ 4 - 2 \cdot 1 \\ 4 - 2 \cdot 1 = 4 - 2 = 2 \end{aligned}$$

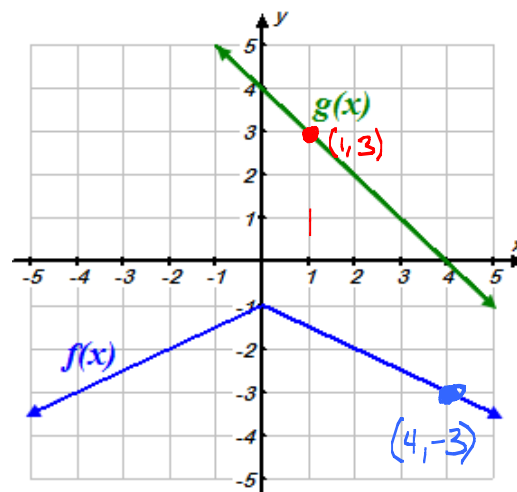
b. Determine $(f + g)(2)$

$$\begin{aligned} f(2) + g(2) \\ f(2) = 8 \quad g(2) = 1 \\ 8 + 1 = 9 \end{aligned}$$

3. Given the following partial set of values of function evaluate the following.

a. Determine $f(4) + 2 \cdot g(1)$

$$\begin{aligned} f(4) + 2 \cdot g(1) \\ f(4) = -3 \quad g(1) = 3 \\ -3 + 2 \cdot 3 \\ -3 + 6 = 3 \end{aligned}$$



4. Consider the following functions.

$$f(x) = 6x - 2$$

$$g(x) = 3x$$

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

$$p(x) = 2$$

a. Determine $(f \circ h)(1)$

$$\begin{aligned} f(h(1)) &= f(5) = 6(5) - 2 \\ &= 30 - 2 \\ &= 28 \end{aligned}$$

Handwritten work shows: $h(1) = 2^1 + 3 = 2 + 3 = 5$, then $f(5) = 6(5) - 2 = 30 - 2 = 28$.

b. Determine $(g \circ f)(2)$

$$\begin{aligned} g(f(2)) &= g(10) = 3(10) \\ &= 30 \end{aligned}$$

Handwritten work shows: $f(2) = 6(2) - 2 = 12 - 2 = 10$, then $g(10) = 3(10) = 30$.

c. Determine $(f \circ g)(x)$

$$\begin{aligned} f(g(x)) &= f(3x) = 6(3x) - 2 \\ &= 18x - 2 \end{aligned}$$

d. Determine $(g \circ h)(x)$

$$\begin{aligned} g(h(x)) &= g(2^x + 3) = 3(2^x + 3) \\ &= 3 \cdot 2^x + 9 \end{aligned}$$

5. Given the following partial set of values of function evaluate the following.

x	-1	0	1	2	3
$f(x)$	1	2	4	8	16
$g(x)$	-5	-3	-1	1	3

a. Determine $(f \circ g)(2)$

$$\begin{aligned} f(g(2)) &= f(1) = 4 \end{aligned}$$

Handwritten work shows: $g(2) = 1$, then $f(1) = 4$.

b. Determine $(g \circ f)(0)$

$$\begin{aligned} g(f(0)) &= g(2) = 1 \end{aligned}$$

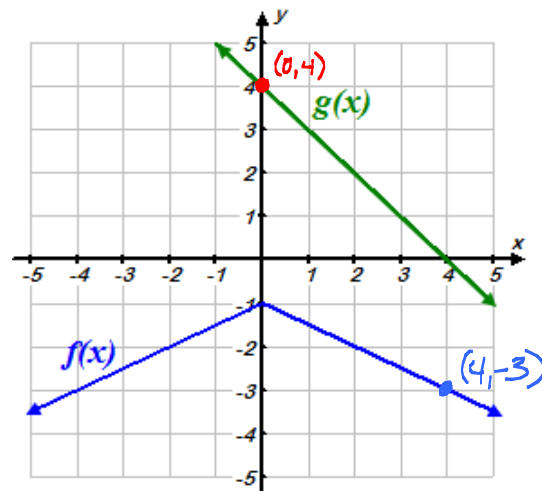
Handwritten work shows: $f(0) = 2$, then $g(2) = 1$.

6. Given the following partial set of values of function evaluate the following.

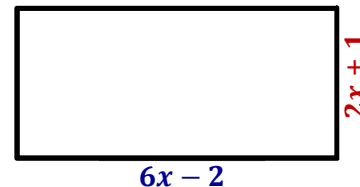
a. Determine $(f \circ g)(0)$

$$\begin{aligned} f(g(0)) &= f(4) = -3 \end{aligned}$$

Handwritten work shows: $g(0) = 4$, then $f(4) = -3$.



7. Given the **length** of a rectangle can be described by the function $f(x) = 6x - 2$ and the **width** of the same rectangle can be described by $g(x) = 2x + 1$



- a. Determine $(f \cdot g)(x)$ and tell what it would represent as far as the rectangle is concerned.

$$f(x) \cdot g(x) = (6x-2) \cdot (2x+1)$$

AREA OF RECTANGLE

$$12x^2 + 6x - 4x - 2$$

$$12x^2 + 2x - 2 \text{ Sq UNITS}$$

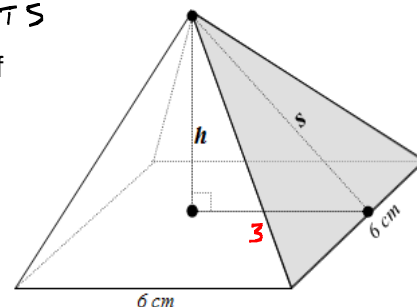
- b. Determine an expression that represents the perimeter of the rectangle.

$$f(x) + g(x) + f(x) + g(x)$$

$$(6x-2) + (2x+1) + (6x-2) + (2x+1)$$

$$16x - 2 \text{ UNITS}$$

8. A pyramid is created from a square base where each side is 6 cm. The volume of the pyramid can be given by the function, $V(h) = 12h$.



The function to calculate the height of the same square based pyramid given the slant height could be described by $H(s) = \sqrt{s^2 - 9}$ where 's' is the slant height in cm.

- a. Evaluate $V(H(5)) = V(4) = 12(4)$

$$H(5) = \sqrt{5^2 - 9}$$

$$= \sqrt{25 - 9}$$

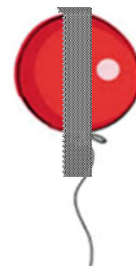
$$= \sqrt{16} = 4$$

$$= 48 \text{ cm}^3$$

- b. Explain what $V(H(5))$ represents.

IT REPRESENTS THE VOLUME OF THE PYRAMID WHEN THE SLANT HEIGHT IS 5 CM.

9. After being filled a party balloon's volume is dependent of the temperature in the room. The volume of the balloon can be modeled by $V(c) = 4100 + 15c$ where the volume, V, is measured in cubic centimeters and the temperature, c, is measured in degrees Celsius.



A function that enables you to change from degrees Celsius ($^{\circ}\text{C}$) to degrees Fahrenheit ($^{\circ}\text{F}$) is

$$C(F) = \frac{5}{9}(F - 32).$$

Show the composition of function required to determine the volume of the balloon when the temperature is 98°F .

$$V(C(98)) = V(36.\bar{6}) = 4100 + 15(36.\bar{6})$$

$$= 4650 \text{ cm}^3$$

$$C(98) = \frac{5}{9}(98 - 32) = 36.\bar{6}$$

$$\begin{aligned} & (\frac{5}{9})(98-32) \\ & 36.66666667 \\ & 4100 + 15(\text{Ans}) \\ & 4650 \end{aligned}$$

10. A square is increased by doubling one side and decreasing the other side by 3 units. Let x be the length of a side of the square.

$$\text{CHANGE IN AREA} = \text{TRANSFORM AREA} - \text{ORIGINAL AREA}$$

Create a function that would represent a change in the area of the rectangle after the transformation.

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

$$= 2x^2 - 6x - x^2 = x^2 - 6x$$

CHANGE IN AREA

