

Algebra 2 6.1

Find the sum, difference, product, and quotient of functions*

Find the composition of functions

function

sum $+$

difference $-$

product $\times$

quotient $\div$

Is it ever ok to divide by zero? no

composition

Whiteboards

*a little bit in Algebra 1



DIVIDING BY ZERO

I'm Allowed To

CantItBeSaturdayNow.com

sum $(x+2) + (x-1)$ $2x + 1$
difference $(x+2) - (x-1) = 2 - (-1) = 3$
product $(x+2)(x-1)$ $x^2 + x - 2$
quotient $\frac{(x+2)}{(x-1)}$ $\neq 1$

(is there anything that is illegal?)

$$1 - 1 = 0$$

$$f \times g$$

KeyConcept Operations on Functions

Operation	Definition
Addition	$(f + g)(x) = f(\underline{x}) + \underline{g(x)}$
Subtraction	$(f - g)(x) = f(x) - g(x)$
Multiplication	$(f \cdot g)(x) = f(x) \cdot g(x)$
Division	$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{\underline{g(x)}}, g(x) \neq 0$

Distrib prop.

EWE

Don't divide by 0

Write it out first.... $(f+g)(x) = f(x) + g(x)$

Example 1 Add and Subtract Functions

Given $f(x) = x^2 - 4$ and $g(x) = 2x + 1$, find each function. Indicate any restrictions in the domain or range.

a. $(f + g)(x) = (x^2 - 4) + (2x + 1)$

$$= x^2 + 2x - 3$$

b. $(f - g)(x) = (x^2 - 4) - (2x + 1)$
 $x^2 - 2x - 5$

Guided Practice

Given $f(x) = x^2 + 5x - 2$ and $g(x) = 3x - 2$, find each function.

1A. $(f + g)(x)$

$$x^2 + 8x - 4$$

1B. $(f - g)(x)$

$$x^2 + 2x$$

ewe...multiply

is it ever OK to divide by zero?

Example 2 Multiply and Divide Functions

Given $f(x) = x^2 + 7x + 12$ and $g(x) = 3x - 4$, find each function. Indicate any restrictions in the domain or range.

a. $(f \cdot g)(x)$

$$x \neq \frac{4}{3}$$



$$\frac{x^2 + 7x + 12}{3x - 4}$$

$$3x - 4 = 0$$

$$3x = 4$$

$$x = \frac{4}{3}$$

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

► **Guided Practice** Given $f(x) = x^2 - 7x + 2$ and $g(x) = x + 4$, find each function.

2A. $(f \cdot g)(x)$

2B. $\left(\frac{f}{g}\right)(x)$ $\frac{x^2 - 7x + 2}{x + 4}$ $x \neq -4$

$V() \rightarrow C()$

Yellow dot sale at American Eagle:

All prices marked 50% off

Additional coupon discount 40%

Original price \$99

$$99 - (.5 \cdot 99)$$

$$99 - 49.5$$

49.50

$$49.50 (0.4)$$

19.80

Composition...

$$\begin{array}{r} 49.50 \\ - 19.80 \\ \hline 29.70 \end{array}$$

Try vertical columns
 What to do first?
 Alternate notation: Order of operations.... () first

Composition

Example 3 Compose Functions

For each pair of functions, find $[f \circ g](x)$ and $[g \circ f](x)$, if they exist. State the domain and range for each composed function.

a. $f = \{(1, 8), (0, 13), (15, 11), (14, 9)\}$, $g = \{(8, 15), (5, 1), (10, 14), (9, 0)\}$ $(5, 6)$

input	g	f
8	15	11
5	1	8
10	14	9
9	0	13
5		

$(8, 11)$
 $(5, 8)$
 $(10, 9)$
 $(9, 13)$

$D = 8, 5, 10, 9$
 $R = 11, 8, 9, 13$

input	f	g
1	8	15
0	13	
15	11	
14	9	0

$D = 1, \cancel{12}, 14$
 $R = 15, 0$

Guided Practice

3A. $f(x) = \{(3, -2), (-1, -5), (4, 7), (10, 8)\}$, $g(x) = \{(4, 3), (2, -1), (9, 4), (3, 10)\}$

$$f(x) = 2x + 3$$

$$f(5) = 10 + 3 = 13$$

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

$$g(3) = 9 - 4 = 5$$

$$(f \circ g)(x) = 8x - 5 \quad (g \circ f)(x)$$

b. $f(\underline{3}) = 2a - 5, g(x) = 4a$



