

Warm Up-

If $f(x) = 3x + 4$ and $g(x) = x - 7$ find the following:

$$1. (f+g)(x) = f(x) + g(x) \quad h(x) = 2x[f-g](x) = f(x) - g(x)$$

$$= 3x + 4 + x - 7 \quad (f \cdot h)(x) = (3x + 4)2x = 3x + 4 - (x - 7)$$

$$= \boxed{4x - 3} = \boxed{6x^2 + 8x} = 3x + 4 - x + 7$$

$$= \boxed{2x + 11}$$

$$3. (g-f)(x) = x - 7 - (3x + 4)$$

$$= x - 7 - 3x - 4$$

$$= \boxed{-2x - 11}$$

$$4. [f+g](x) + 10 = 4x - 3 + 10 = \boxed{4x + 7}$$

Example 1: Find the GCF of each of the following.

GCF: greatest common factor

A. 18, 36

18

B. 16x, 30x

2x

C. 5xy, 40y

5y

D. 999x, 9

9

E. 11xyz, 87xz

xz

D. $24x^2$, $12x$

12x

Example 2: Factor each of the following.

Factor: a way to break up an expression using the GCF of both terms

A. $6x + 12$ GCF: 6

$6(x + 2)$

B. $45x - 9$

$9(5x - 1)$

C. $12g + 40$

$4(3g + 10)$

D. $55z - 45$

$5(11z - 9)$

Operation	Notation	Example: $f(x) = 6x + 12$, $g(x) = 2x + 8$	Does order matter?	
Division	$\left(\frac{f}{g}\right)(x)$ $= \frac{f(x)}{g(x)}$	$\left(\frac{f}{g}\right)(x)$ $= \frac{6x + 12}{2x + 8}$ $= \frac{2(3x + 6)}{2(x + 4)}$ $= \frac{3x + 6}{x + 4}$	$\left(\frac{g}{f}\right)(x)$ $= \frac{2x + 8}{6x + 12}$ $= \frac{2(x + 4)}{2(3x + 6)}$ $= \frac{x + 4}{3x + 6}$	YES

Example 3: Let $f(x) = 3x + 6$, $g(x) = 3x$, $h(x) = 6x + 2$, and $k(x) = 6$.

$$\begin{aligned} \text{A. } \left(\frac{f}{g}\right)(x) &= \frac{3x+6}{3x} \\ &= \frac{3(x+2)}{3(x)} \\ &= \frac{x+2}{x} \end{aligned}$$

$$\text{B. } \left(\frac{h}{f}\right)(x) = \frac{6x+2}{3x+6}$$

$$\text{C. } \left(\frac{g}{h}\right)(x) = \frac{3x}{6x+2}$$

$$\begin{aligned} \text{D. } \left(\frac{g}{f}\right)(x) &= \frac{3x}{3x+6} \\ &= \frac{3(x)}{3(x+2)} \\ &= \frac{x}{x+2} \end{aligned}$$

$$\text{E. } \left(\frac{f}{h}\right)(x) = \frac{3x+6}{6x+2}$$

$$\begin{aligned} \text{F. } \left(\frac{h}{k}\right)(x) &= \frac{6x+2}{6} \\ \left(\frac{f}{f}\right)(x) &= 1 = \frac{2(3x+1)}{2(3)} \\ &= \frac{3x+1}{3} \end{aligned}$$

Practice:

$$\begin{aligned} f(x) &= 4x + 8 & g(x) &= -5x + 15 \\ h(x) &= 4x & k(x) &= 20 \end{aligned}$$

A. $4[f(x)] =$

B. $(k \cdot g)(x) =$

C. $\left(\frac{f}{h}\right)(x) =$

D. $6[g(x)] + 2 =$

E. $2[g+k](x) =$

F. $\left(\frac{g}{g}\right)(x) =$

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

H. $\left(\frac{g}{k}\right)(x) =$