

Warm Up

$$1. 1\sqrt{3} + 5\sqrt{3}$$

$6\sqrt{3}$

$$2. 4\sqrt{8} + 3\sqrt{2}$$

$8\sqrt{2} + 3\sqrt{2}$
 $11\sqrt{2}$

$\sqrt{8} = \begin{matrix} 8 \\ 4 \cdot 2 \\ \circledast \end{matrix}$

$$3. \sqrt[3]{4} \cdot \sqrt[3]{6}$$

$\sqrt[3]{4 \cdot 6} = \sqrt[3]{24}$
 $2\sqrt[3]{3}$

$\begin{matrix} 24 \\ 4 \cdot 6 \\ \circledast \end{matrix}$

$$4. \frac{\sqrt[4]{32}}{\sqrt[4]{2}}$$

$\sqrt[4]{\frac{32}{2}}$
 $\sqrt[4]{16} = 2$

$\begin{matrix} 16 \\ 4 \cdot 4 \\ \circledast \end{matrix}$

$$5. \frac{2\sqrt{3}}{\sqrt{3}} \cdot \sqrt{3}$$

$\frac{2\sqrt{3}}{3}$

$$6. \frac{\sqrt{2}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{3}} \cdot \frac{\sqrt{10}}{5}$$

$\sqrt{a} \cdot \sqrt{a} = a$

$\begin{matrix} 10 \\ 2 \cdot 5 \end{matrix}$

Combination of Functions

If $f(x)$ and $g(x)$ both exist, the sum, difference, product, quotient and composition of two functions f and g are defined by

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

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

$$(f \cdot g)(x) \quad (fg)(x) = f(x) \cdot g(x)$$

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} \text{ where } g(x) \neq 0$$

Sum, Difference, Product, and Quotient of Functions

Let f and g be two functions with overlapping domains. Then, for all x common to both domains, the *sum*, *difference*, *product*, and *quotient* of f and g are defined as follows.

1. *Sum*: $(f + g)(x) = f(x) + g(x)$
2. *Difference*: $(f - g)(x) = f(x) - g(x)$
3. *Product*: $(fg)(x) = f(x) \cdot g(x)$
4. *Quotient*: $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}, \quad g(x) \neq 0$

Find (a) $(f + g)(x)$, (b) $(f - g)(x)$, (c) $(fg)(x)$, and $(f/g)(x)$

$$f(x) = 2x - 5, \quad g(x) = 1 - x$$

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

$$b.) (f - g)(x) = 2x - 5 - (1 - x) = 3x - 6$$

$$c.) (fg)(x) = (2x - 5)(1 - x)$$

$$2x - 2x^2 - 5 + 5x$$

$$(fg)(x) = -2x^2 + 7x - 5$$

$$\left(\frac{f}{g}\right)(x) = \frac{2x - 5}{1 - x}$$

Sum, Difference, Product, and Quotient of Functions

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2. *Difference:* $(f - g)(x) = f(x) - g(x)$

3. *Product:* $(fg)(x) = f(x) \cdot g(x)$

4. *Quotient:* $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}, \quad g(x) \neq 0$

Let $f(x) = x^2 + 1$ and $g(x) = 3x + 5$

$$(f - g)(x)$$

$$(f - g)(-3)$$

$$(f - g)(x) = x^2 + 1 - (3x + 5)$$

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

$$(-3)^2 - 3(-3) - 4$$

$$9 + 9 - 4$$

$$(f \cdot g)(-3) = 14$$

Sum, Difference, Product, and Quotient of Functions

Let f and g be two functions with overlapping domains. Then, for all x common to both domains, the *sum*, *difference*, *product*, and *quotient* of f and g are defined as follows.

1. *Sum:* $(f + g)(x) = f(x) + g(x)$

2. *Difference:* $(f - g)(x) = f(x) - g(x)$

3. *Product:* $(fg)(x) = f(x) \cdot g(x)$

4. *Quotient:* $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}, \quad g(x) \neq 0$

Let $f(x) = x^2 + 1$ and $g(x) = 3x + 5$

$$\begin{aligned}
 (f \cdot g)(5) &= (x^2 + 1)(3x + 5) \\
 &= 3x^3 + 5x^2 + 3x + 5 \\
 &= 3(5)^3 + 5(5)^2 + 3(5) + 5 \\
 &= 375 + 125 + 15 + 5 \\
 &= 520
 \end{aligned}$$

Perform the indicated operation.

$$1) \begin{aligned} h(n) &= 2n + 1 \\ g(n) &= n^2 + 4n \\ \text{Find } h(n) + g(n) \end{aligned}$$

$$n^2 + 6n + 1$$

$$2) \begin{aligned} h(t) &= t + 3 \\ g(t) &= t^2 + 1 \\ \text{Find } h(t) - 2g(t) \end{aligned}$$

$$-2t^2 + t + 1$$

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

$$3) \begin{aligned} g(n) &= -n^2 - 3 \\ h(n) &= 3n + 2 \\ \text{Find } g(n) \cdot h(n) \end{aligned}$$

$$-3n^3 - 2n^2 - 9n - 6$$

$$(-n^2 - 3)(3n + 2)$$

$$4) \begin{aligned} g(a) &= -a + 5 \\ h(a) &= a^3 + 4 \\ \text{Find } g(a) + h(a) \end{aligned}$$

$$a^3 - a + 9$$

$$-a + 5 + a^3 + 4$$

$$\begin{aligned} 5) \quad f(x) &= -2x - 3 \\ g(x) &= x^3 + 3 \\ \text{Find } f(x) \cdot g(x) \end{aligned}$$

$$-2x^4 - 3x^3 - 6x - 9$$

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

$$x^2 + 5x - 1$$

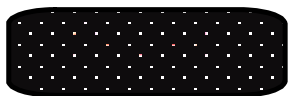
$$\begin{aligned} 7) \quad g(n) &= n - 2 \\ h(n) &= -n^2 + 5n \\ \text{Find } g(n) + h(n) \end{aligned}$$

$$-n^2 + 6n - 2$$

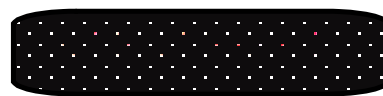
$$\begin{aligned} 8) \quad h(a) &= a^2 + 5 \\ g(a) &= 3a - 5 \\ \text{Find } h(a) \cdot g(a) \end{aligned}$$

$$3a^3 - 5a^2 + 15a - 25$$

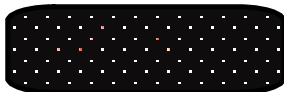
9) $g(t) = 2t + 2$
 $h(t) = t^2 - 3t$
Find $g(t) + h(t)$



10) $h(t) = 4t + 3$
 $g(t) = 2t^3 + 1$
Find $h(t) \cdot g(t)$



11) $f(x) = x - 5$
 $g(x) = 2x$
Find $f(x) \cdot g(x)$



12) $h(x) = -x + 1$
 $g(x) = x^2 - 1$
Find $2h(x) - g(x)$

