

**1. Simplify**

**(a)**  $(x - 8) + (x + 3)$

$$= x + -8 + x + 3$$

$$= x + x + -8 + 3$$

$$= 2x + -5$$

$$= 2x - 5$$

**(b)**  $(4x - 8) - (x + 5)$

$$= (4x + -8) + -1 \cdot (x + 5)$$

$$= 4x + -8 + -x + -5$$

$$= 4x + -x + -8 + -5$$

$$= 3x + -13$$

$$= 3x - 13$$

**2. Simplify**

**(a)**  $(x^2 + 6x - 5) + (x^2 + 3x - 2)$

$$= x^2 + 6x + -5 + x^2 + 3x + -2$$

$$= x^2 + x^2 + 6x + 3x + -5 + -2$$

$$= 2x^2 + 9x + -7$$

$$= 2x^2 + 9x - 7$$

**(b)**  $(x^2 + 5x - 5) - (x^2 + 6x - 2)$

$$= (x^2 + 5x + -5) + -1 \cdot (x^2 + 6x + -2)$$

$$= x^2 + 5x + -5 + -x^2 + -6x + 2$$

$$= x^2 + -x^2 + 5x + -6x + -5 + 2$$

$$= -x + -3$$

$$= -x - 3$$

**3. If  $x = 2$ , evaluate**

$$x^3 - 3x + 7$$

$$= 2^3 - 3 \cdot 2 + 7$$

$$= 8 - 3 \cdot 2 + 7$$

$$= 8 - 6 + 7$$

$$= 2 + 7$$

$$= 9$$

**4. If  $x = -2$ , evaluate**

$$5x^3 - 3x^2$$

$$= 5(-2)^3 - 3(-2)^2$$

$$= 5 \cdot (-8) - 3(4)$$

$$= -40 - 12$$

$$= -40 + -12$$

$$= -52$$

5. Simplify

(a)  $-10x^4 \cdot 3x^6$

$$\begin{aligned}
 &= -10 \cdot 3 \cdot x^4 \cdot x^6 \\
 &= -30 \cdot x^{4+6} \\
 &= -30x^{10}
 \end{aligned}$$

(b)  $-2x^5y(-5xy^3)$

$$\begin{aligned}
 &= -2 \cdot -5 \cdot x^5 \cdot x \cdot y \cdot y^3 \\
 &= 10 \cdot x^{5+1} \cdot y^{1+3} \\
 &= 10x^6y^4
 \end{aligned}$$

6. Simplify

(a)  $(2x^3y^4)^5$

$$\begin{aligned}
 &= 2^5 \cdot (x^3)^5 \cdot (y^4)^5 \\
 &= 32 \cdot x^{3 \cdot 5} \cdot y^{4 \cdot 5} \\
 &= 32x^{15}y^{20}
 \end{aligned}$$

(b)  $(-4xy^6)^2$

$$\begin{aligned}
 &= (-4)^2 \cdot (x)^2 \cdot (y^6)^2 \\
 &= 16 \cdot x^2 \cdot y^{6 \cdot 2} \\
 &= 16x^2y^{12}
 \end{aligned}$$

7. Simplify

$$\frac{45x^3y^5}{18x^2y^5} = \frac{\overset{5}{\cancel{45}} \cdot x^3 \cdot \overset{5}{\cancel{y^5}}}{\underset{2}{\cancel{18}} \cdot x^2 \cdot \overset{5}{\cancel{y^5}}}$$

$$= \frac{5}{2} \cdot x^{3-2} \cdot 1$$

$$= \frac{5}{2} \cdot x$$

$$= \frac{5}{2} \cdot \frac{x}{1}$$

$$= \frac{5x}{2}$$

8. Simplify

$$\left(\frac{3x^5}{18}\right)^2 = \left(\frac{\overset{1}{\cancel{3}}x^5}{\underset{6}{\cancel{18}}}\right)^2$$

$$= \left(\frac{x^5}{6}\right)^2$$

$$= \frac{(x^5)^2}{6^2}$$

$$= \frac{x^{10}}{36}$$

**9. Multiply**

$$\begin{aligned} \text{(a)} \quad & -6x(x+5) \\ &= -6x \cdot x + -6x \cdot 5 \\ &= -6x^2 + -30x \\ &= -6x^2 - 30x \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & 4x^2(x-2) \\ &= 4x^2 \cdot x - 4x^2 \cdot 2 \\ &= 4x^3 - 8x^2 \end{aligned}$$

**10. Multiply**

$$\begin{aligned} \text{(a)} \quad & 5x(x^2 - 6x + 7) \\ &= 5x \cdot x^2 - 5x \cdot 6x + 5x \cdot 7 \\ &= 5x^3 - 30x^2 + 35x \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & -3(x^2 - 4x + 5) \\ &= -3(x^2 + -4x + 5) \\ &= -3 \cdot x^2 + (-3) \cdot (-4x) + (-3) \cdot 5 \\ &= -3x^2 + 12x + -15 \\ &= -3x^2 + 12x - 15 \end{aligned}$$

**11. Multiply and simplify**

$$\begin{aligned} & 7 + 3(2x - 1) \\ &= 7 + 3(2x + -1) \\ &= 7 + 3 \cdot 2x + 3 \cdot (-1) \\ &= 7 + 6x + -3 \\ &= 6x + 7 + -3 \\ &= 6x + 4 \end{aligned}$$

**12. Multiply and simplify**

$$\begin{aligned} & x(x+6) + 4(x+5) \\ &= x \cdot x + x \cdot 6 + 4 \cdot x + 4 \cdot 5 \\ &= x^2 + 6x + 4x + 20 \\ &= x^2 + 10x + 20 \end{aligned}$$

**13.** Multiply and simplify.

$$(x + 1)(x + 2)$$

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

	$x$	$2$
$x$	$x^2$	$2x$
$1$	$x$	$2$

**14.** Multiply and simplify.

$$(x - 8)(x + 9)$$

$$= x^2 + x - 72$$

	$x$	$9$
$x$	$x^2$	$9x$
$-8$	$-8x$	$-72$

**15.** Multiply and simplify.

$$(3x + 4)(5x - 6)$$

$$= 15x^2 + 2x - 24$$

	$5x$	$-6$
$3x$	$15x^2$	$-18x$
$4$	$20x$	$-24$

**16.** Multiply and simplify.

$$(2x + 1)(3x^2 - 4x + 6)$$

$$= 6x^3 - 5x^2 + 8x + 6$$

	$3x^2$	$-4x$	$6$
$2x$	$6x^3$	$-8x^2$	$12x$
$1$	$3x^2$	$-4x$	$6$

17. Divide.

$$\begin{array}{r}
 x+5 \overline{)x^2+6x+5} \\
 \underline{x^2+5x} \phantom{+5} \\
 x+5 \\
 \underline{x+5} \\
 0
 \end{array}$$

18. Divide.

$$(x^3 + 2x - 3) \div (x + 3)$$

$$\begin{array}{r}
 x^2 - 3x + 11 - \frac{36}{x+3} \\
 x+3 \overline{)x^3+0x^2+2x-3} \\
 \underline{x^3+3x^2} \phantom{+2x-3} \\
 -3x^2+2x \phantom{-3} \\
 \underline{-3x^2-9x} \phantom{-3} \\
 11x-3 \\
 \underline{11x+33} \\
 -36
 \end{array}$$

19. Write in scientific notation

(a) 0.0732  
 $= 7.32 \times 10^{-2}$

(b) 8,450,000,000  
 $= 8.45 \times 10^9$

20. Write in standard form

(a)  $9.54 \times 10^5$   
 (move decimal point 5 places to the right)  
 $= 954,000$

(b)  $1.57 \times 10^{-6}$   
 (move decimal point 6 places to the left)  
 $= 0.00000157$

21. Simplify.

$$\begin{aligned} \text{(a)} \quad & -a^0 - b^0 \\ & = -1 - 1 \\ & = -1 + -1 \\ & = -2 \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & 2^0 - 2 \\ & = 1 - 2 \\ & = 1 + -2 \\ & = -1 \end{aligned}$$

22. Simplify. Write your answer using positive exponents only.

$$\begin{aligned} \text{(a)} \quad & 5x^6 \cdot 4y^{-2} \\ & = 5 \cdot 4 \cdot x^6 \cdot y^{-2} \\ & = 20 \cdot x^6 \cdot \frac{1}{y^2} \\ & = \frac{20x^6}{y^2} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & 20x^{-8}y^5 \cdot x^2 \\ & = 20 \cdot x^{-8} \cdot x^2 \cdot y^5 \\ & = 20 \cdot x^{-6} \cdot y^5 \\ & = 20 \cdot \frac{1}{x^6} \cdot y^5 \\ & = \frac{20y^5}{x^6} \end{aligned}$$

23. Simplify. Write your answer using positive exponents only.

$$\begin{aligned} \text{(a)} \quad & \frac{x^8}{x^{-5}} = x^{8-(-5)} \\ & = x^{8+5} \\ & = x^{13} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & \frac{3x^{-2}x^4}{x^{-9}x^0} = \frac{3x^{-2+4}}{x^{-9+0}} \\ & = \frac{3}{1} \cdot \frac{x^2}{x^{-9}} \\ & = \frac{3}{1} \cdot x^{2-(-9)} \\ & = 3 \cdot x^{2+9} \\ & = 3x^{11} \end{aligned}$$

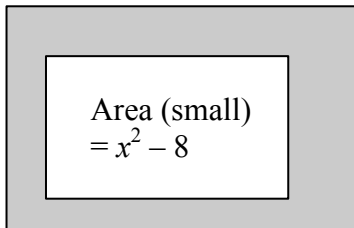
24. Simplify. Write your answer using positive exponents only.

$$\begin{aligned} \text{(a)} \quad & \left(\frac{x^9}{9}\right)^{-2} = \left(\frac{9}{x^9}\right)^2 \\ & = \frac{9^2}{(x^9)^2} \\ & = \frac{81}{x^{18}} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & (3x^{-7})^{-3} = 3^{-3}(x^{-7})^{-3} \\ & = 3^{-3} \cdot x^{21} \\ & = \frac{1}{3^3} \cdot x^{21} \\ & = \frac{1}{27} \cdot \frac{x^{21}}{1} \\ & = \frac{x^{21}}{27} \end{aligned}$$

25. Find the area of the shaded region.

$$\text{Area (large)} = 8x^2 + 4x - 2$$



$$= (8x^2 + 4x - 2) - (x^2 - 8)$$

$$= (8x^2 + 4x - 2) + -1 \cdot (x^2 - 8)$$

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

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

$$= 7x^2 + 4x + 6$$