

## 4.1 Adding and Subtracting Polynomials

## Solutions

Simplify by combining like terms.	
<p>1. <math>3x + 23x</math>  <math>= (3 + 23)x = \boxed{26x}</math></p>	<p>2. <math>15x + 5x</math></p>
<p>3. <math>2x + 7 + 8x + 3</math>  <math>= 2x + 8x + 7 + 3 = \boxed{10x + 10}</math></p>	<p>4. <math>3x + 2 + 5x + 12</math></p>
<p>5. <math>3x^2 - x + 5x^2 + 12 + 3x - 6</math>  <math>= 3x^2 + 5x^2 + (-x) + 3x + (-6) + 12</math>  <math>= \boxed{8x^2 + 2x + 6}</math></p>	<p>6. <math>-5x^2 + 4x + 8x^2 - 8 + 2x - 4</math></p>
Simplify by adding the polynomials.	
<p>7. <math>(5x + 3) + (-8x + 7)</math>  <math>= 5x + -8x + 3 + 7</math>  <math>= \boxed{-3x + 10}</math></p>	<p>8. <math>(8x - 3) + (4x + 6)</math></p>
<p>9. <math>(2x^2 + 5x - 11) + (4x^2 - x + 7)</math>  <math>= 2x^2 + 5x + -11 + 4x^2 + -x + 7</math>  <math>= 2x^2 + 4x^2 + 5x + -x + -11 + 7</math>  <math>= 6x^2 + 4x + -4</math>  <math>= \boxed{6x^2 + 4x - 4}</math></p>	<p>10. <math>(3x^2 - 7x - 4) + (x^2 + 3x + 5)</math></p>
Answers: 1. $26x$ ; 3. $10x + 10$ ; 5. $8x^2 + 2x + 6$ ; 7. $-3x + 10$ ; 9. $6x^2 + 4x - 4$	

Simplify by subtracting the polynomials

11.  $(7x + 8) - (2x + 3)$

$$= (7x + 8) + -(2x + 3)$$

$$= 7x + 8 + -2x + -3$$

$$= 7x + -2x + 8 + -3$$

$$= 5x + 5$$

12.  $(3x - 2) - (2x + 1)$

13.  $(3x^2 + 5x + 2) - (x^2 + x - 3)$

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

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

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

$$= 2x^2 + 4x + 5$$

14.  $(4x^2 - 3x + 6) - (2x^2 + 2x - 1)$

Find the indicated sum or difference

15. Find the sum of

$(3x^2 - 8x + 1)$  and  $(x^2 + 8x - 4)$

$$= (3x^2 - 8x + 1) + (x^2 + 8x - 4)$$

$$= 3x^2 + -8x + 1 + x^2 + 8x + -4$$

$$= 3x^2 + x^2 + -8x + 8x + 1 + -4$$

$$= 4x^2 + -3$$

$$= 4x^2 - 3$$

16. Find the sum of

$(-4x^2 + 7x - 5)$  and  $(4x^2 + x - 10)$

17. Find the difference of

$(3x^2 - 5x - 4)$  and  $(x^2 + 5x - 4)$

$$= (3x^2 - 5x - 4) - (x^2 + 5x - 4)$$

$$= (3x^2 + -5x + -4) + -(x^2 + 5x + -4)$$

$$= 3x^2 + -5x + -4 + -x^2 + -5x + 4$$

$$= 3x^2 + -x^2 + -5x + -5x + -4 + 4$$

$$= 2x^2 + -10x$$

$$= 2x^2 - 10x$$

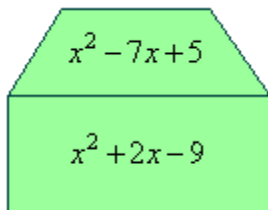
18. Find the difference of

$(4x^2 + x - 9)$  and  $(-4x^2 + 7x - 5)$

Answers: 11.  $5x + 5$ ; 13.  $2x^2 + 4x + 5$ ; 15.  $4x^2 - 3$ ; 17.  $2x^2 - 10x$

Simplify.

19. Find the total area of the shape below.

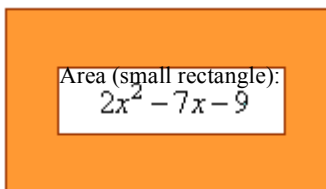


Total area of shaded region =

$$\begin{aligned} \text{Area} &= (x^2 - 7x + 5) + (x^2 + 2x - 9) \\ &= x^2 - 7x + 5 + x^2 + 2x - 9 \\ &= x^2 + x^2 - 7x + 2x + 5 - 9 \\ &= 2x^2 - 5x - 4 \end{aligned}$$

20. Find the area of the shaded region below.

Area (large rectangle):  $2x^2 + 13x + 15$



Area of shaded region =

21. A lawn mower manufacturer can approximate its costs for producing  $x$  lawn mowers in one week as follows:

Material cost:  $-0.003x^2 + 20x$

Labor cost:  $0.002x^2 + 18x + 200$

(a) Write the polynomial that represents the total material and labor costs.

$$\begin{aligned} &= -0.003x^2 + 20x + 0.002x^2 + 18x + 200 \\ &= -0.003x^2 + 0.002x^2 + 20x + 18x + 200 \\ &= -0.001x^2 + 38x + 200 \end{aligned}$$

(b) Calculate the cost of producing 100 lawn mowers.

$$\begin{aligned} &= -0.001x^2 + 38x + 200 \\ &= -0.001 \cdot 100^2 + 38 \cdot 100 + 200 \\ &= -0.001 \cdot 10000 + 3800 + 200 \\ &= -10 + 3800 + 200 \\ &= \$3990 \end{aligned}$$

(c) Calculate the cost of producing 200 lawn mowers.

$$\begin{aligned} &= -0.001x^2 + 38x + 200 \\ &= -0.001 \cdot 200^2 + 38 \cdot 200 + 200 \\ &= -0.001 \cdot 40000 + 7600 + 200 \\ &= -40 + 7600 + 200 \\ &= \$7760 \end{aligned}$$

22. A vacuum cleaner manufacturer can approximate its costs producing for  $x$  vacuum cleaners in one week as follows:

Cost:  $0.01x^2 + 51.5x + 250$

Revenue:  $-0.17x^2 + 350x$

(a) Write the polynomial that represents the profit.

(b) Calculate the profit from producing 10 vacuum cleaners.

(c) Calculate the profit from producing 20 vacuum cleaners.

Answers: 19.  $2x^2 - 5x - 4$ ; 21. (a)  $-0.001x^2 + 38x + 200$ , (b) \$3990, (c) \$7760