

Find the sum or difference.

1. $(3n^2 - 4n + 1) - (8n^2 - 4n + 17)$

$$\begin{array}{r} -8n^2 + 4n - 17 \\ \hline \end{array}$$

$$-5n^2 + 0n - 16$$

$$-5n^2 - 16$$

2. $(9x + 6x^3 - 8x^2) + (-5x^3 + 6x)$

$$\begin{array}{r} +6x - 5x^3 \\ \hline 15x + x^3 - 8x^2 \end{array}$$

$$x^3 - 8x^2 + 15x$$

1. $-5n^2 - 16$

2. $x^3 - 8x^2 + 15x$

3. $(-k^2 + 7k + 5) - (2k^4 + 3k^3 + 6)$

$$\begin{array}{r} -2k^4 + 3k^3 \\ \hline -2k^4 + 3k^3 - k^2 + 7k + 11 \end{array}$$

4. $(7a^3 - 4a^2 - 2a + 1) + (a^3 - 1)$

$$\begin{array}{r} a^3 \quad \quad \quad -1 \\ \hline 8a^3 - 4a^2 - 2a \end{array}$$

3. $-2k^4 + 3k^3 - k^2 + 7k + 11$

4. $8a^3 - 4a^2 - 2a$

Find the product.

5. $-5x(6x^2 - 4x + 7)$

$$-30x^3 + 20x^2 - 35x$$

6. $(3x - 2)(x + 4)$

$$\begin{array}{r} 3x^2 + 12x \\ -2x - 8 \\ \hline \end{array}$$

5. $-30x^3 + 20x^2 - 35x$

6. $3x^2 + 10x - 8$

7. $(5b^2 - b - 7)(b + 6)$

$$\begin{array}{r} 5b^3 + 30b^2 \\ -b^2 - 6b \\ -7b - 42 \\ \hline \end{array}$$

$$5b^3 + 29b^2 - 13b - 42$$

8. $(3x + 5)(3x - 5)$

$$\begin{array}{r} 9x^2 - 15x \\ +15x - 25 \\ \hline 9x^2 + 0x - 25 \end{array}$$

7. $5b^3 + 29b^2 - 13b - 42$

8. $9x^2 - 25$

9. $(x + 11)^2(x + 11)$

$$\begin{array}{r} x^2 + 11x \\ +11x + 121 \\ \hline \end{array}$$

$$x^2 + 22x + 121$$

10. $(4a - 3)^2(4a - 3)$

$$\begin{array}{r} 16a^2 - 12a \\ -12a + 9 \\ \hline \end{array}$$

$$16a^2 - 24a + 9$$

9. $x^2 + 22x + 121$

10. $16a^2 - 24a + 9$

Factor completely.

11. $x^2 + 2x - 24$

$$\begin{aligned} & \frac{*}{-24} \quad \frac{+}{2} \quad 4 \dot{\epsilon} -4 \\ & (x^2 + 6x) - 4(x - 24) \\ & x(x+6) - 4(x+6) \\ & (x-4)(x+6) \end{aligned}$$

13. $x^2 + 15x + 26$

$$\begin{aligned} & \frac{*}{26} \quad \frac{+}{15} \quad 13 \dot{\epsilon} 2 \\ & (x^2 + 13x) + 2(x + 26) \\ & x(x+13) + 2(x+13) \\ & (x+2)(x+13) \end{aligned}$$

15. $2x^2 - x - 21$

$$\begin{aligned} & \frac{*}{-42} \quad \frac{+}{-1} \quad -7 \dot{\epsilon} 4 \\ & 2x^2 + 6x - 7x - 21 \\ & 2x(x+3) - 7(x+3) \\ & (2x-7)(x+3) \end{aligned}$$

17. $\sqrt{4z^2 - 49}$

$$(2z+7)(2z-7)$$

12. $x^2 - 5x - 14$ $\frac{*}{-14} \quad \frac{+}{-5}$

$$\begin{aligned} & (x^2 - 7x) + 2(x - 14) \quad 7 \dot{\epsilon} 2 \\ & x(x-7) + 2(x-7) \\ & (x+2)(x-7) \end{aligned}$$

11. $(x-4)(x+6)$

14. $-x^2 - 4x + 32$

$$\begin{aligned} & \frac{*}{-32} \quad \frac{+}{-4} \\ & (-x^2 - 8x) + 4(x + 32) \quad 8 \dot{\epsilon} 4 \\ & -x(x+8) + 4(x+8) \\ & (-x+4)(x+8) \end{aligned}$$

12. $(x+2)(x-7)$

16. $4x^2 - 10x - 24$

$$\begin{aligned} & 2(2x^2 - 5x - 12) \\ & \frac{*}{-24} \quad \frac{+}{-5} \quad -8 \dot{\epsilon} 3 \\ & 2[(2x^2 - 8x) + 3(x - 12)] \\ & 2[2x(x-4) + 3(x-4)] \\ & 2[(2x+3)(x-4)] \end{aligned}$$

13. $(x+2)(x+13)$

18. $9h^2 + 24h + 16$

$$\begin{aligned} & \frac{*}{144} \quad \frac{+}{24} \quad 12 \dot{\epsilon} 12 \\ & (9h^2 + 12h) + 12(h + 16) \\ & 3h(3h+4) + 4(3h+4) \\ & (3h+4)(3h+4) \end{aligned}$$

14. $(-x+4)(x+8)$

15. $(2x-7)(x+3)$

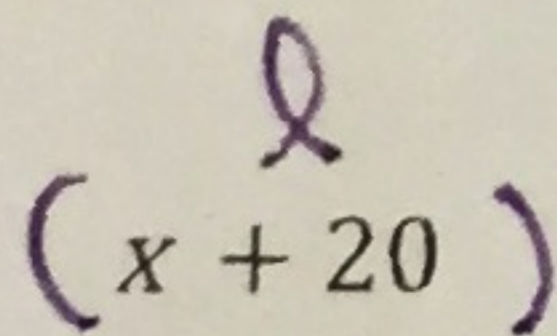
16. $2[(2x+3)(x-4)]$

17. $(2z+7)(2z-7)$

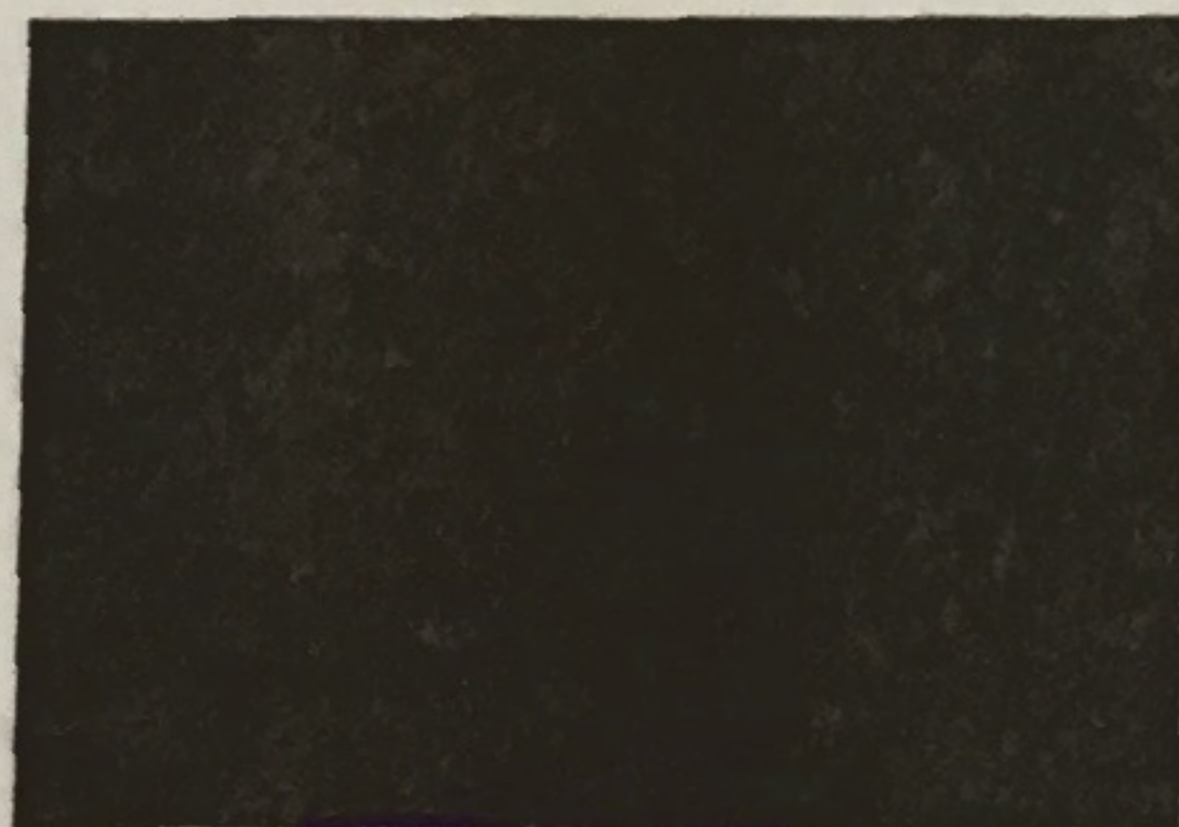
18. $(3h+4)(3h+4)$
or $(3h+4)^2$

Use the figure below to help solve.

19. A rectangular backyard is 20 feet longer than it is wide. The area is 4800 sq. feet. Find the length and width.



$$A = l \cdot w$$



$$A = x(x+20)$$

$$4800 = x^2 + 20x$$

$$\begin{aligned} & -4800 \quad -4800 \\ & 0 = x^2 + 20x - 4800 \quad -60 \dot{\epsilon} 80 \end{aligned}$$

$$\begin{aligned} & (x^2 - 60x) + 80(x - 60) = 0 \\ & x(x-60) + 80(x-60) = 0 \\ & (x+80)(x-60) = 0 \end{aligned}$$

$$\begin{aligned} & x+80=0 \\ & x=-80 \end{aligned}$$

length $60+20=80$ $x+20$

width 60 x

$$\begin{aligned} & x-60=0 \\ & +60+60 \\ & x=60 \end{aligned}$$

Factor and solve.

20. $(x+5)(3x-4) = 0$

$$\begin{array}{r} x+5=0 \\ -5 \quad -5 \\ \hline x = -5 \end{array} \quad \begin{array}{r} 3x-4=0 \\ +4 \quad +4 \\ \hline 3x = 4 \\ \frac{3}{3} \quad \frac{3}{3} \\ \hline x = \frac{4}{3} \end{array}$$

21. $x^2 + 10x + 24 = 0$ $\frac{+}{24} \frac{+}{10} \text{ } \& \text{ } +$

$$(x^2 + 6x) + (4x + 24) = 0$$

$$x(x+6) + 4(x+6) = 0$$

$$(x+6)(x+4) = 0$$

$$\begin{array}{r} x+4=0 \\ -4 \quad -4 \\ \hline x = -4 \end{array} \quad \begin{array}{r} x+6=0 \\ -6 \quad -6 \\ \hline x = -6 \end{array}$$

20. $x = -5 \text{ \& } \frac{4}{3}$

21. $x = -4 \text{ \& } -6$

22. $x^2 - 2x - 15 = 0$

$$\frac{*}{-15} \frac{+}{-2} \quad -5 \text{ \& } 3$$

$$(x^2 - 5x) + (3x - 15) = 0$$

$$x(x-5) + 3(x-5) = 0$$

$$(x+3)(x-5) = 0 \quad \begin{array}{r} x-5=0 \\ +5 \quad +5 \\ \hline x = 5 \end{array}$$

23. $x^2 + 7x - 8 = 0$

$$\frac{*}{-8} \frac{+}{7} \quad 8 \text{ \& } -1$$

$$(x^2 + 8x) - (x - 8) = 0$$

$$x(x+8) - 1(x+8) = 0$$

$$(x-1)(x+8) = 0$$

$$\begin{array}{r} x-1=0 \\ +1 \quad +1 \\ \hline x = 1 \end{array} \quad \begin{array}{r} x+8=0 \\ -8 \quad -8 \\ \hline x = -8 \end{array}$$

22. $x = -3, 5$

23. $x = 1, -8$

24. $5x^2 + 10x = 0$

$$\begin{array}{r} x+2=0 \\ -3 \quad -3 \\ \hline x = -3 \end{array} \quad \begin{array}{r} 5x^2 + 10x = 0 \\ \hline 5x(x+2) = 0 \end{array}$$

$$\begin{array}{r} 5x=0 \\ \frac{5}{5} \quad \frac{5}{5} \\ \hline x = 0 \end{array} \quad \begin{array}{r} x+2=0 \\ -2 \quad -2 \\ \hline x = -2 \end{array}$$

25. $3y^2 - 8y + 5 = 0$

$$\frac{*}{15} \frac{+}{-8} \quad -5 \text{ \& } -3$$

$$(3y^2 - 3y) - (5y - 5) = 0$$

$$3y(y-1) - 5(y-1) = 0$$

$$(3y-5)(y-1) = 0$$

$$\begin{array}{r} 3y-5=0 \\ +5 \quad +5 \\ \hline 3y = 5 \\ \frac{3}{3} \quad \frac{3}{3} \\ \hline y = \frac{5}{3} \end{array} \quad \begin{array}{r} y-1=0 \\ +1 \quad +1 \\ \hline y = 1 \end{array}$$

24. $x = 0, -2$

25. $y = \frac{5}{3}, 1$

26. $2x^2 + 13x + 15 = 0$

$$\frac{*}{30} \frac{+}{13} \quad 3 \text{ \& } 10$$

$$(2x^2 + 10x) + (3x + 15) = 0$$

$$2x(x+5) + 3(x+5) = 0$$

$$(2x+3)(x+5) = 0$$

$$\begin{array}{r} 2x+3=0 \\ -3 \quad -3 \\ \hline 2x = -3 \\ \frac{2}{2} \quad \frac{2}{2} \\ \hline x = -\frac{3}{2} \end{array} \quad \begin{array}{r} x+5=0 \\ -5 \quad -5 \\ \hline x = -5 \end{array}$$

$$\begin{array}{r} 2x = -3 \\ \frac{2}{2} \quad \frac{2}{2} \\ \hline x = -\frac{3}{2} \end{array}$$

$$x = -\frac{3}{2}$$

27. $x^2 - 4x + 9 = 5$

$$\frac{3y}{3} = \frac{5}{3} \quad \begin{array}{r} x^2 - 4x + 9 = 5 \\ -5 \quad -5 \\ \hline x^2 - 4x + 4 = 0 \end{array}$$

$$\frac{*}{4} \frac{+}{-4} \quad -2 \text{ \& } -2$$

$$(x^2 - 2x) - (2x - 4) = 0$$

$$x(x-2) - 2(x-2) = 0$$

$$(x-2)(x-2) = 0$$

$$\begin{array}{r} x-2=0 \\ +2 \quad +2 \\ \hline x = 2 \end{array} \quad \begin{array}{r} x-2=0 \\ +2 \quad +2 \\ \hline x = 2 \end{array}$$

$$x = 2, 2$$

26. $x = -\frac{3}{2}, -5$

27. $x = 2$