Ch. 0 Chapter R: Review

0.1 Real Numbers

1 Work with Sets

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use U = universal set = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}, A = {1, 2, 3, 5, 8}, B = {2, 3, 5, 7}, and C = {1, 4, 9} to find the set.

1) $B \cup C$
A) {1, 2, 3, 4, 5, 7, 9} B) { } C) {0} D) {1, 2, 3, 5, 7, 9}

2) $A \cup C$
A) {1, 2, 3, 4, 5, 8, 9} B) {4, 6, 7, 9} C) {1} D) {1, 2, 3, 5, 7, 9}

3) $A \cap B$
A) {2, 3, 5} B) {1, 2, 3, 5, 7, 8} C) {2, 3, 5, 7} D) {1, 2, 3, 5, 8}

4) $A \cap C$
A) {1} B) {1, 2, 3, 4, 5, 7, 8, 9}
C) {4, 6, 7, 9} D) {1, 2, 3, 5, 7, 9}

5) $(A \cap B) \cup C$
A) {1, 2, 3, 4, 5, 9} B) {1, 2, 3, 5} C) {1, 2, 3} D) {2, 3, 5}

6) $(B \cup C) \cap A$
A) {1, 2, 3, 5} B) {1, 2, 3, 4, 5, 7, 9} C) { } D) {1, 2, 3}

7) $\overline{B}$
A) {0, 1, 4, 6, 8, 9} B) {1, 4, 6, 8, 9} C) {0, 1, 4, 6, 7, 8, 9} D) {0, 1, 4, 6, 9}

8) $\overline{A \cup B}$
A) {0, 4, 6, 9} B) {4, 6, 9} C) {1, 4, 6, 8, 9} D) {1, 2, 3, 5, 7, 8}

9) $\overline{A \cap C}$
A) {0, 2, 3, 4, 5, 6, 7, 8, 9} B) {1}
C) {1, 2, 3, 4, 5, 7, 8, 9} D) {1, 2, 3, 4, 5, 6, 7, 8, 9}

10) $\overline{B} \cap \overline{C}$
A) {0, 6, 8} B) {6, 8} C) {1, 2, 3, 4, 5, 7, 9} D) { }

2 Classify Numbers

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

List all the elements of B that belong to the given set.

1) $B = \left\{16, \sqrt{8}, -4, 0, \frac{8}{9}, -\frac{9}{8}, 7.5\right\}$
Integers
A) {16, −4, 0} B) {16, 0} C) {16, −4} D) {16, 0, $\sqrt{8}$}

2) B = $\left\{19, \sqrt{7}, -9, 0, \frac{1}{3}, -3, 4.4\right\}$

Natural numbers

A) {19} B) $\{19, 0, -3\}$ C) {19, 0} D) {−9, 0, 19}

3) B = $\left\{20, \sqrt{7}, -20, 0, \frac{0}{1}\right\}$

Real numbers

A) $\left\{20, \sqrt{7}, -20, 0, \frac{0}{1}\right\}$ B) {20, −20, 0} C) $\left\{20, -20, 0, \frac{0}{1}\right\}$ D) $\{20, -20\}$

4) B = $\left\{14, \sqrt{7}, -17, 0, \frac{0}{7}, 0.47\right\}$

Rational numbers

A) $\left\{14, -17, 0, \frac{0}{7}, 0.47\right\}$ B) {14, 0}

C) $\{\sqrt{7}\}$ D) $\left\{\sqrt{7}, \frac{0}{7}, 0.47\right\}$

5) B = $\left\{20, \sqrt{7}, -6, 0, \frac{0}{6}, 0.79\right\}$

Irrational numbers

A) $\{\sqrt{7}\}$ B) $\{\sqrt{7}, 0.79\}$ C) $\left\{\sqrt{7}, \frac{0}{6}\right\}$ D) $\left\{\sqrt{7}, \frac{0}{6}, 0.79\right\}$

6) B = $\{6, \sqrt{6}, -21, 0, \frac{3}{8}, -\frac{8}{3}, 4.5, 4\pi, 0.464646...\}$

Integers

A) {6, −21, 0} B) {6, 0} C) {6, −21} D) $\{6, 0, \sqrt{6}\}$

7) B = $\{5, \sqrt{8}, -15, 0, \frac{4}{9}, -\frac{9}{4}, 7.4, 8\pi, 0.848484...\}$

Natural numbers

A) {5} B) $\left\{5, 0, -\frac{9}{4}\right\}$ C) {5, 0} D) {−15, 0, 5}

8) B = $\{11, \sqrt{7}, -3, 0, \frac{0}{7}, \sqrt{25}, 0.38, -7\pi, 0.252525...\}$

Rational numbers

A) $\left\{11, -3, 0, \frac{0}{7}, \sqrt{25}, 0.38, 0.252525...\right\}$ B) $\left\{11, -3, 0, \frac{0}{7}, 0.38\right\}$

C) $\left\{11, -3, 0, \frac{0}{7}, 0.38, 0.252525...\right\}$ D) $\left\{11, -3, 0, \frac{0}{7}, \sqrt{25}, 0.38, -7\pi, 0.252525...\right\}$

9) B = {12, $\sqrt{8}$, −22, 0, $\frac{0}{4}$, , 0.09, −8π, 0.252525...}

Irrational numbers

A) {$\sqrt{8}$, −8π}

B) {$\sqrt{8}$}

C) $\left\{\sqrt{8}, \frac{0}{4}, -8\pi\right\}$

D) {$\sqrt{8}$, −8π, 0.252525...}

Approximate the number rounded to three decimal places, and truncated to three decimal places.

10) 4.4814

A) 4.481
4.481

B) 4.482
4.481

C) 4.481
4.482

D) 4.480
4.482

11) 0.38461538

A) 0.385
0.384

B) 0.386
0.384

C) 0.385
0.385

D) 0.384
0.385

12) $\frac{13}{9}$

A) 1.444
1.444

B) 1.445
1.444

C) 1.444
1.445

D) 1.445
1.445

3 Evaluate Numerical Expressions

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Write the statement using symbols.

1) The sum of 18 and 9 is 27.

A) 18 + 9 = 27

B) $\frac{18}{9} = 2$

C) 18 · 9 = 162

D) 18 − 9 = 9

2) The difference 35 less 7 equals 28.

A) 35 − 7 = 28

B) $\frac{35}{7} = 5$

C) 35 + 7 = 42

D) 35 · 7 = 245

3) The product of 40 and 8 equals 320.

A) 40 · 8 = 320

B) $\frac{40}{8} = 5$

C) 40 + 8 = 48

D) 40 − 8 = 32

4) The quotient 30 divided by 6 is 5.

A) $\frac{30}{6} = 5$

B) 30 · 6 = 180

C) 30 + 6 = 36

D) 30 − 6 = 24

5) The sum of four times x and 5 decreased by 7 is 8.

A) 4x + 5 − 7 = 8

B) 4(x + 5) − 7 = 8

C) 7 − (4x + 5) = 8

D) 4(x + 5 − 7) = 8

6) Three times the difference of x and 8 is −10.

A) 3(x − 8) = −10

B) 3 − x − 8 = −10

C) 3x − 8 = −10

D) 3 + x − 8 = −10

7) The quotient of x and the sum of 5 and x.

A) $\frac{x}{5 + x}$

B) x + 5 + x

C) x(5 + x)

D) $\frac{x + 5}{x}$

Evaluate the expression.

8) $1 + 9 + 7$

A) 17 B) 3 C) −1 D) −15

9) $2 + \frac{5}{8}$

A) $\frac{21}{8}$ B) $\frac{16}{8}$ C) $\frac{21}{5}$ D) $\frac{16}{5}$

10) $5 \cdot [5(5 - 2) - 3]$

A) 60 B) 30 C) 0 D) 26

11) $2 \cdot [5 + 2 \cdot (8 + 5)]$

A) 62 B) 182 C) 36 D) 178

12) $6 - (-2 + 4 \cdot 4 - 8)$

A) 0 B) 12 C) −16 D) −4

13) $\frac{45}{30} \cdot \frac{5}{9}$

A) $\frac{5}{6}$ B) $\frac{6}{5}$ C) $\frac{3}{2}$ D) $\frac{2}{3}$

14) $\frac{3}{2} \cdot \left(\frac{3}{2} + \frac{3}{8}\right)$

A) $\frac{45}{16}$ B) $\frac{9}{4}$ C) $\frac{15}{16}$ D) $\frac{45}{8}$

15) $\frac{1}{5} \cdot \left(8 - \frac{1}{2}\right) + 7$

A) $\frac{17}{2}$ B) $\frac{81}{10}$ C) $\frac{29}{2}$ D) $\frac{11}{5}$

16) $\frac{7 + 2}{5 + 5}$

A) $\frac{9}{10}$ B) $\frac{1}{2}$ C) $\frac{9}{0}$ D) $\frac{5}{0}$

17) $\frac{4 - 10}{10 - 4}$

A) −1 B) $\frac{2}{5}$ C) $-\frac{2}{5}$ D) −6

18) $\frac{1}{11} + \frac{4}{15}$

A) $\frac{59}{165}$ B) $\frac{5}{26}$ C) $\frac{1}{33}$ D) $\frac{59}{26}$

19) $\frac{6}{9} - \frac{1}{7}$

A) $\frac{11}{21}$ B) $\frac{5}{63}$ C) $\frac{5}{9}$ D) $\frac{11}{3}$

20) $\frac{\frac{1}{4}}{\frac{3}{14}}$

A) $\frac{7}{6}$ B) $\frac{6}{7}$ C) $\frac{3}{56}$ D) $\frac{56}{3}$

21) $\frac{1}{8} + \frac{1}{3} \cdot \frac{1}{4}$

A) $\frac{5}{24}$ B) $\frac{11}{96}$ C) $\frac{7}{6}$ D) $\frac{1}{48}$

4 Work with Properties of Real Numbers

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use the Distributive Property to remove the parentheses.

1) $8(x + 9)$

A) $8x + 72$ B) $8x + 9$ C) $x + 72$ D) $72x$

2) $6x(x + 8)$

A) $6x^2 + 48x$ B) $6x^2 + 8$ C) $x^2 + 48x$ D) $48x^2$

3) $10(2x + 3)$

A) $20x + 30$ B) $12x + 13$ C) $20x + 3$ D) $50x$

4) $4\left(\frac{1}{2}x - \frac{1}{8}\right)$

A) $2x - \frac{1}{2}$ B) $2x - \frac{1}{4}$ C) $2x - \frac{1}{8}$ D) $\frac{1}{2}x - \frac{1}{2}$

5) $(x - 5)(x + 2)$

A) $x^2 - 3x - 10$ B) $x^2 - 10x - 3$ C) $x^2 - 4x - 10$ D) $x^2 - 3x - 3$

6) $(x - 5)(x + 10)$

A) $x^2 + 5x - 50$ B) $x^2 - 50x + 5$ C) $x^2 + 4x - 50$ D) $x^2 + 5x + 5$

7) $(x + 1)(x - 1)$

A) $x^2 - 1$ B) $x^2 - 2$ C) $x^2 - 2x - 1$ D) $x^2 + 2x - 1$

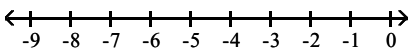
0.2 Algebra Essentials

1 Graph Inequalities

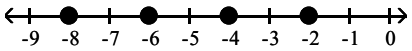
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

On the real number line, label the points with the given coordinates.

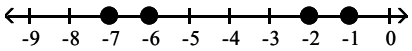
1) −8, −6, −4, −2



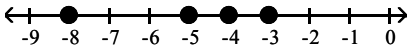
A)



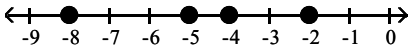
B)



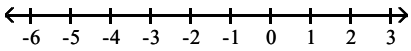
C)



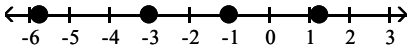
D)



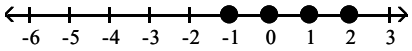
2) −5.75, −3, −1, 1.25



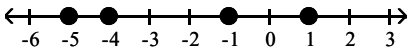
A)



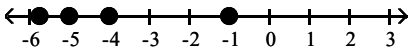
B)



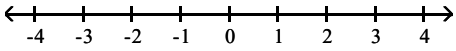
C)



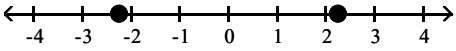
D)



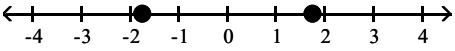
3) $\frac{9}{4}, -\frac{9}{4}$



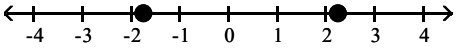
A)



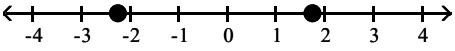
B)



C)



D)



Insert <, >, or = to make the statement true.

4) 7 ____ −6

A) > B) < C) =

5) −6.4 ____ −8.2

A) > B) < C) =

6) −47 ____ −85

A) > B) < C) =

7) 18 ___ −18

A) > B) < C) =

8) $\frac{1}{3}$ ___ 0.33

A) > B) < C) =

9) 2.64 ___ $\sqrt{7}$

A) < B) > C) =

10) 3.14 ___ π

A) < B) > C) =

Write the statement as an inequality.

11) y is negative

A) $y < 0$ B) $y > 0$ C) $y \leq 0$ D) $y \geq 0$

12) y is greater than −91

A) $y > -91$ B) $y < -91$ C) $y \geq -91$ D) $y \leq -91$

13) y is greater than or equal to 40

A) $y \geq 40$ B) $y > 40$ C) $y < 40$ D) $y \leq 40$

14) z is less than or equal to −8

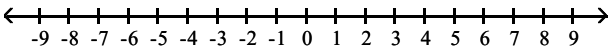
A) $z \leq -8$ B) $z < -8$ C) $z > -8$ D) $z = -8$

15) x is less than 4

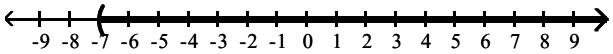
A) $x < 4$ B) $x > 4$ C) $x \leq 4$ D) $x \geq 4$

Graph the numbers on the real number line.

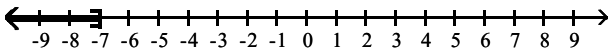
16) $x > -7$



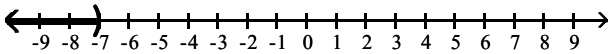
A)



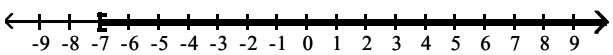
B)



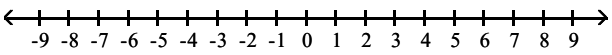
C)



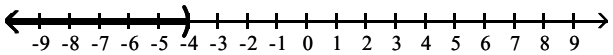
D)



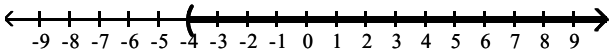
17) $x < -4$



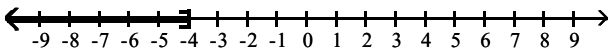
A)



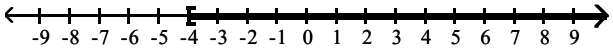
B)



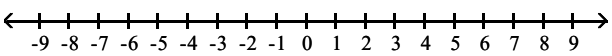
C)



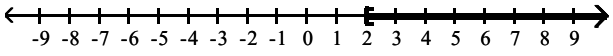
D)



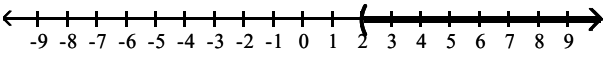
18) $x \geq 2$



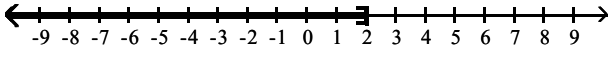
A)



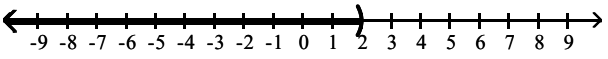
B)



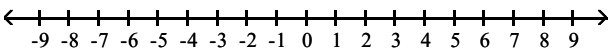
C)



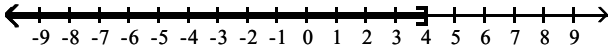
D)



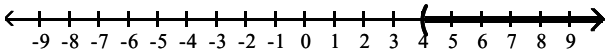
19) $x \leq 4$



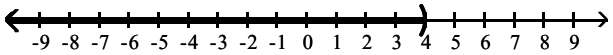
A)



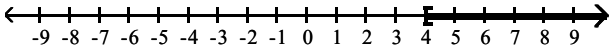
B)



C)



D)

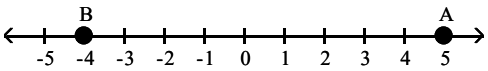


2 Find Distance on the Real Number Line

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use the given real number line to compute the distance.

1) Find d(A, B)



A) 9 B) −9 C) 10 D) 8

3 Evaluate Algebraic Expressions

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Evaluate the expression using the given values.

1) $x + 8y$ $x = -4, y = 2$

A) 12 B) −2 C) −30 D) 4

2) $-8xy + 8y - 10$ $x = 3, y = 2$

A) −42 B) −32 C) −22 D) 54

3) $-4x + y$ $x = 3, y = -2$

A) −14 B) 10 C) 1 D) −6

4) $\frac{13x - 9y}{2}$ $x = 10, y = 3$

A) $\frac{103}{2}$ B) $\frac{121}{2}$ C) $\frac{157}{2}$ D) $\frac{51}{2}$

5) $\frac{3x - 5y}{x + 9}$ $x = 8, y = 3$

A) $\frac{9}{17}$ B) $\frac{31}{17}$ C) $\frac{31}{12}$ D) $\frac{3}{4}$

6) $\frac{2xy + 35}{x}$ $x = 5, y = 7$

A) 21 B) 9 C) 49 D) 7

7) $|x - y|$ $x = -5, y = 7$

A) 12 B) 2 C) −12 D) −2

8) $|x| - |y|$ $x = -8, y = 4$

A) 4 B) 12 C) −4 D) −12

9) $|6x - 7y|$ $x = 5, y = 5$

A) 5 B) 65 C) −5 D) −65

10) $\frac{|x|}{x} + \frac{|y|}{y}$ $x = 4$ and $y = -1$

A) 0 B) 2 C) 1 D) −1

11) $|4x + 7y|$ $x = -3, y = -2$

A) 26 B) 2 C) 29 D) 13

12) $4|x| + 5|y|$ $x = 6, y = -9$

A) 69 B) −21 C) −69 D) 21

Use the formula $C = \frac{5}{9}(F - 32)$ for converting degrees Fahrenheit into degrees Celsius to find the Celsius measure of the Fahrenheit temperature.

13) $F = 212°$

A) 100° C B) 105° C C) 95° C D) 110° C

Express the statement as an equation involving the indicated variables.

14) The area A of a rectangle is the product of its length l and its width w.

A) $A = lw$ B) $A = l + w$ C) $A = 2(l + w)$ D) $A = \frac{l}{w}$

15) The perimeter P of a rectangle is twice the sum of its length l and its width w.

A) $P = 2(l + w)$ B) $P = l + w$ C) $P = lw$ D) $P = 2lw$

16) The circumference C of a circle is the product of π and its diameter d.

A) $C = \pi d$ B) $C = \frac{\pi}{d}$ C) $C = \pi + d$ D) $C = 2\pi d$

17) The area A of a triangle is one−half the product of its base b and its height h.

A) $A = \frac{1}{2}bh$ B) $A = 2bh$ C) $A = \frac{1}{2}(b + h)$ D) $A = bh$

18) The volume V of a sphere is $\frac{4}{3}$ times π times the cube of the radius r.

A) $V = \frac{4}{3}\pi r^3$ B) $V = \frac{4}{3}\pi r^2$ C) $V = \frac{4}{3}\pi \sqrt[3]{r}$ D) $V = \frac{4}{3}\pi r$

19) The surface area S of a sphere is 4 times π times the square of the radius r.

A) $S = 4\pi r^2$ B) $S = 4\pi r$ C) $S = 4\pi\sqrt{r}$ D) $S = \pi r^2$

20) The volume V of a cube is the cube of the length x of a side.

A) $V = x^3$ B) $V = \sqrt[3]{x}$ C) $V = 3x$ D) $V = x^2$

21) The surface area S of a cube is 6 times the square of the length x of a side.

A) $S = 6x^2$ B) $S = 6x$ C) $S = 6 + x^2$ D) $S = x^2$

Solve the problem.

22) The weekly production cost C of manufacturing x calendars is given by $C(x) = 21 + 6x$, where the variable C is in dollars. What is the cost of producing 225 calendars?

A) $1,371.00 B) $4,731.00 C) $1,350.00 D) $246.00

23) At the beginning of the month, Christopher had a balance of $181 in his checking account. During the next month, he wrote a check for $25, deposited $79, and wrote another check for $97. What was his balance at the end of the month?

A) $138 B) −$138 C) −$20 D) $20

4 Determine the Domain of a Variable

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine which value(s), if any, must be excluded from the domain of the variable in the expression.

1) $\dfrac{x^2 - 4}{x}$

A) $x = 0$ B) $x = 2, x = -2$ C) $x = 2, x = 0$ D) $x = -2$

2) $\dfrac{8x - 9}{x^2 - 25}$

A) $x = 5, x = -5$ B) $x = 25$ C) $x = 5$ D) $x = \dfrac{9}{8}$

3) $\dfrac{x^3 + 7x^4}{x^2 + 4}$

A) $x = 0, x = -\dfrac{1}{7}$ B) $x = -4$ C) $x = -2$ D) none

4) $\dfrac{x^2 + 6x + 16}{x^3 - 9x}$

A) $x = 3, x = -3, x = 0$ B) $x = 3, x = -3$ C) $x = 0$ D) $x = 3, x = 0$

5) $\dfrac{x}{x - 3}$

A) $x = 3$ B) $x = -3$ C) $x = 0$ D) none

6) $\dfrac{3}{x + 6}$

A) $x = -6$ B) $x = 6$ C) $x = 0$ D) none

7) $\frac{x-8}{x-6}$

A) $x = 6$ B) $x = -6$ C) $x = 0$ D) none

5 Use the Laws of Exponents

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Simplify the expression.

1) 3^2

A) 9 B) 6 C) −9 D) −6

2) -6^2

A) −36 B) 12 C) 36 D) −12

3) 3^{-2}

A) $\frac{1}{9}$ B) −9 C) 9 D) $\frac{1}{6}$

4) $(-2)^{-4}$

A) $\frac{1}{16}$ B) −16 C) 16 D) $-\frac{1}{16}$

5) -3^{-4}

A) $-\frac{1}{81}$ B) −81 C) 81 D) $\frac{1}{12}$

6) $(-5)^3$

A) −125 B) 125 C) −15 D) 15

7) $4^{-9} \cdot 4^7$

A) $\frac{1}{16}$ B) 16 C) 4 D) $\frac{1}{64}$

8) $(5^{-3})^{-1}$

A) 125 B) $\frac{1}{125}$ C) $\frac{1}{25}$ D) 25

Simplify the expression. Express the answer so that all exponents are positive. Whenever an exponent is 0 or negative, we assume that the base is not 0.

9) $(2xy)^3$

A) $8x^3y^3$ B) $8xy$ C) $2x^3y^3$ D) $\frac{1}{8x^3y^3}$

10) $(10x^3)^{-2}$

A) $\frac{1}{100x^6}$ B) $100x^6$ C) $\frac{x^6}{100}$ D) $\frac{100}{x^6}$

11) $(-6x^4)^{-1}$

A) $-\frac{1}{6x^4}$ B) $-\frac{1}{1{,}296x^4}$ C) $\frac{1}{6x^4}$ D) $\frac{1}{1{,}296x^4}$

12) $(x^2y^{-1})^6$

A) $\frac{x^{12}}{y^6}$ B) $\frac{y^6}{x^{12}}$ C) $\frac{1}{x^{12}y^6}$ D) $x^{12}y^6$

13) $(x^{-8}y)^7$

A) $\frac{y^7}{x^{56}}$ B) $\frac{y^7}{x^8}$ C) $\frac{1}{x^{56}y^7}$ D) $x^{56}y^7$

14) $\frac{x^{-2}y^3}{xy^8}$

A) $\frac{1}{x^3y^5}$ B) $\frac{1}{xy^5}$ C) $\frac{y^5}{x^3}$ D) $\frac{x}{y^5}$

15) $\frac{x^{-3}y^3}{x^3y^9}$

A) $\frac{1}{x^6y^6}$ B) x^6y^6 C) $\frac{y^6}{x^6}$ D) $\frac{x^6}{y^6}$

16) $\left(\frac{9x^{-1}}{7y^{-1}}\right)^{-2}$

A) $\frac{49x^2}{81y^2}$ B) $\frac{81x^2}{49y^2}$ C) $\frac{49y^2}{81x^2}$ D) $\frac{81y^2}{49x^2}$

17) $\left(\frac{5x^{-4}}{6y^{-4}}\right)^{-3}$

A) $\frac{216x^{12}}{125y^{12}}$ B) $\frac{125x^{43}}{216y^{43}}$ C) $\frac{216y^{12}}{125x^{12}}$ D) $\frac{125x^{12}}{216y^{12}}$

18) $(x^{-5}y^5)^{-2}z^3$

A) $\frac{x^{10}z^3}{y^{10}}$ B) $\frac{y^{10}z^3}{x^{10}}$ C) $\frac{x^{10}}{y^{10}z^3}$ D) $\frac{y^{10}}{x^{10}z^3}$

19) $\left(\frac{-8x^6y^{-7}}{7z^7}\right)^{-2}$

A) $\frac{49y^{14}z^{14}}{64x^{12}}$ B) $\frac{64x^{12}}{49y^{14}z^{14}}$ C) $\frac{49z^{14}}{64x^{12}y^{14}}$ D) $\frac{49y^{14}}{64x^{12}z^{14}}$

Evaluate the expression using the given value of the variables.

20) $(x + 2y)^2$ for $x = 4$, $y = 3$

A) 100 B) 10 C) 20 D) 36

21) $-3x^{-1}y^2$ for $x = -2$, $y = -2$

A) 6 B) $\frac{2}{3}$ C) $\frac{3}{8}$ D) 24

22) $-2x^2 + 5y^2$ for $x = 2$, $y = 3$

A) 37 B) 7 C) −53 D) 41

23) $4x^3 + 2x^2 - 4x + 6$ for $x = 1$

A) 8 B) 16 C) 4 D) −4

Solve.

24) What is the value of $\frac{(6{,}666)^4}{(3{,}333)^4}$?

A) 16 B) $(2{,}222)^4$ C) 48 D) $(3{,}333)^4$

6 Evaluate Square Roots

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Simplify the expression.

1) $\sqrt{81}$

A) 9 B) 6,561 C) $\frac{1}{81}$ D) not a real number

2) $\sqrt{(-3)^2}$

A) 3 B) 81 C) $\frac{1}{9}$ D) not a real number

Find the value of the expression using the given values.

3) $\sqrt{x^2}$ $x = 6$

A) 6 B) $2\sqrt{3}$ C) −6 D) $-2\sqrt{3}$

4) $(\sqrt{x})^2$ $x = 6$

A) 6 B) 36 C) $\frac{1}{36}$ D) $\frac{1}{6}$

5) $\sqrt{x^2 + y^2}$ $x = 9$, $y = 12$

A) 15 B) 8 C) 11 D) 14

6) $\sqrt{x^2 + y^2}$ $x = -4$, $y = 3$

A) 5 B) 7 C) −1 D) 12

7) $\sqrt{x^2} + \sqrt{y^2}$ $x = 4$, $y = 6$

A) 10 B) −2 C) 52 D) 2

8) y^x $x = -3, y = 3$

A) $\frac{1}{27}$ B) 27 C) −27 D) $-\frac{1}{27}$

7 Use a Calculator to Evaluate Exponents

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use a calculator to evaluate the expression. Round the answer to three decimal places.

1) $(-7.01)^{-3}$

A) −0.003 B) 0.003 C) −344.472 D) 344.472

2) $-(-5.24)^2$

A) −27.458 B) 27.458 C) −0.036 D) 0.036

3) $(-0.55)^{-2}$

A) 3.306 B) −3.306 C) −0.302 D) 0.303

8 Use Scientific Notation

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Write the number in scientific notation.

1) 3,127

A) 3.127×10^3 B) 3.127×10^4 C) 3.127×10^{-3} D) 3.127×10^1

2) 518.5

A) 5.185×10^2 B) 5.185×10^{-2} C) 5.185×10^3 D) 5.185×10^{-3}

3) 671.667

A) 6.71667×10^2 B) 6.71667×10^{-2} C) 6.71667×10^3 D) 6.71667×10^{-3}

4) 86,000

A) 8.6×10^4 B) 8.6×10^{-4} C) 8.6×10^5 D) 8.6×10^{-5}

5) 2,100,000

A) 2.1×10^6 B) 2.1×10^{-6} C) 2.1×10^7 D) 2.1×10^{-7}

6) 0.000313

A) $3.13 \circ 10^{-4}$ B) 3.13×10^4 C) 3.13×10^{-5} D) 3.13×10^{-3}

7) 0.00006273

A) 6.273×10^{-5} B) 6.273×10^5 C) 6.273 ± 10^{-4} D) 6.273×10^4

8) 0.0000027218

A) 2.7218×10^{-6} B) 2.7218×10^6 C) 2.7218×10^{-5} D) 2.7218×10^{-7}

9) 0.00000098705

A) 9.8705×10^{-7} B) 9.8705×10^7 C) 9.8705×10^{-6} D) 9.8705×10^6

10) 0.000000047009

A) 4.7009×10^{-8} B) 4.7009×10^{8} C) 4.7009×10^{-7} D) 4.7009×10^{-9}

11) In a certain city, the subway system carried a total of 1,350,000,000 passengers.

A) 1.35×10^{9} B) 13.5×10^{9} C) 1.35×10^{8} D) 1.35×10^{10}

12) A business projects next year's profits to be $250,000,000.

A) 2.50×10^{8} B) 2.50×10^{7} C) 2.50×10^{9} D) 2.50×10^{-9}

13) A computer compiles a program in 0.000827 seconds.

A) 8.27×10^{-4} B) 8.27×10^{-5} C) 8.27×10^{-6} D) 8.27×10^{3}

Write the number as a decimal.

14) 6.91×10^{4}

A) 69,100 B) 691,000 C) 6,910 D) 276.4

15) 5.587×10^{6}

A) 5,587,000 B) 55,870,000 C) 558,700 D) 335.22

16) 3.6066×10^{6}

A) 3,606,600 B) 36,066,000 C) 360,660 D) 216.396

17) 1.16×10^{-4}

A) 0.000116 B) 0.00116 C) 0.0000116 D) −116,000

18) 9.818×10^{-5}

A) 0.00009818 B) 0.0009818 C) 0.000009818 D) −981,800

19) 5.705×10^{-6}

A) 0.000005705 B) 0.00005705 C) 0.0000005705 D) −5,705,000

20) 6.0818×10^{-7}

A) 0.00000060818 B) 0.0000060818 C) 0.000000060818 D) −608,180,000

21) There are 2.599×10^{4} miles of highways, roads, and streets in a certain state.

A) 25,990 B) 259,900 C) 2,599 D) 2,599,000

0.3 Geometry Essentials

1 Use the Pythagorean Theorem and Its Converse

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

The lengths of the legs of a right triangle are given. Find the hypotenuse.

1) $a = 24, \quad b = 7$

A) 25 B) 20 C) 5 D) 625

2) $a = 9, \quad b = 12$

A) 15 B) 8 C) 11 D) 14

The lengths of the sides of a triangle are given. Determine if the triangle is a right triangle. If it is, identify the hypotenuse.

3) 5, 12, 13

A) right triangle; 13 B) right triangle; 12 C) right triangle; 5 D) not right triangle

4) 1, 2, 3

A) right triangle; 3 B) right triangle; 2 C) right triangle; 1 D) not right triangle

5) 9, 12, 15

A) right triangle; 15 B) right triangle; 12
C) right triangle; 9 D) not a right triangle

6) 20, 48, 52

A) right triangle; 52 B) right triangle; 48
C) right triangle; 20 D) not a right triangle

7) 28, 96, 100

A) right triangle; 100 B) right triangle; 96
C) right triangle; 28 D) not a right triangle

8) 10, 20, 25

A) right triangle; 25 B) right triangle; 20
C) right triangle; 10 D) not a right triangle

9) 12, 16, 24

A) right triangle; 24 B) right triangle; 16
C) right triangle; 12 D) not a right triangle

Solve. Use the fact that the radius of the Earth is 3960 miles and 1 mile = 5280 feet.

10) A guard tower at a state prison stands 110 feet tall. How far can a guard see from the top of the tower? Round to the nearest tenth of a mile.

A) 12.8 mi B) 5,600.3 mi C) 18.2 mi D) 939.8 mi

11) A person who is 6 feet tall is standing on the beach and looks out onto the ocean. Suddenly, a ship appears on the horizon. How far is the ship from the shore? Round to the nearest tenth of a mile.

A) 3 mi B) 5,600.3 mi C) 4.2 mi D) 218.1 mi

2 Know Geometry Formulas

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

1) Find the area A of a rectangle with length 11 ft and width 13 ft.

A) $A = 143\ ft^2$ B) $A = 286\ ft^2$ C) $A = 24\ ft^2$ D) $A = 44\ ft^2$

2) Find the area A of a rectangle with length 2.1 cm and width 6.8 cm.

A) $A = 14.28\ cm^2$ B) $A = 28.56\ cm^2$ C) $A = 8.9\ cm^2$ D) $A = 8.4\ cm^2$

3) Find the area A of a triangle with height 5 in and base 4 in.

A) $A = 10\ in^2$ B) $A = 10$ in C) $A = 20\ in^2$ D) $A = 20$ in

4) Find the area A and circumference C of a circle of radius 7 mi. Express the answer in terms of π.

A) $A = 49\pi$ mi^2; $C = 14\pi$ mi

B) $A = 14\pi$ mi^2; $C = 14\pi$ mi

C) $A = 196\pi$ mi^2; $C = 7\pi$ mi

D) $A = 28\pi$ mi^2; $C = 7\pi$ mi

5) Find the area A and circumference C of a circle of diameter 7 mi. Use 3.14 for π. Round the result to the nearest tenth.

A) $A = 38.5$ mi^2; $C = 22.0$ mi

B) $A = 22$ mi^2; $C = 22.0$ mi

C) $A = 153.9$ mi^2; $C = 11.0$ mi

D) $A = 44$ mi^2; $C = 11.0$ mi

6) Find the volume V of a rectangular box with length 2 yd, width 8 yd, and height 7 yd.

A) $V = 112$ yd^3 B) $V = 128$ yd^3 C) $V = 392$ yd^3 D) $V = 28$ yd^3

7) Find the surface area S of a rectangular box with length 4 ft, width 5 ft, and height 4 ft.

A) 112 ft^2 B) 120 ft^2 C) 56 ft^2 D) 92 ft^2

8) Find the volume V and surface area S of a sphere of radius 10 centimeters. Express the answer in terms of π.

A) $V = \frac{4000}{3}\pi$ cm^3; $S = 400\pi$ cm^2

B) $V = \frac{1000}{3}\pi$ cm^3; $S = \frac{4000}{3}\pi$ cm^2

C) $V = 4{,}000\pi$ cm^3; $S = 25\pi$ cm^2

D) $V = 1{,}000\pi$ cm^3; $S = 100\pi$ cm^2

9) Find the volume V of a sphere of radius 5 yd. Use 3.14 for π. If necessary, round the result to the nearest tenth.

A) $V = 523.3$ yd^3 B) $V = 104.7$ yd^3 C) $V = 294.4$ yd^3 D) $V = 4{,}186.7$ yd^3

10) Find the volume V of a right circular cylinder with radius 13 ft and height 14 ft. Express the answer in terms of π.

A) $V = 2{,}366\pi$ ft^3 B) $V = \frac{1183}{2}\pi$ ft^3 C) $V = 182\pi$ ft^3 D) $V = 91\pi$ ft^3

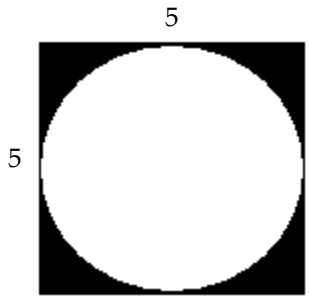
11) Find the surface area S of a right circular cylinder with radius 4 cm, and height 6 cm. Use 3.14 for π. Round your answer to one decimal place.

A) 251.2 cm^2 B) 125.6 cm^2 C) 301.4 cm^2 D) 175.8 cm^2

12) Find the volume V of a sphere of diameter 10 ft. Use 3.14 for π. If necessary, round the result to the nearest tenth.

A) $V = 523.3$ ft^3 B) $V = 104.7$ ft^3 C) $V = 294.4$ ft^3 D) $V = 4{,}186.7$ ft^3

13) Find the area of the shaded region. Express the answer in terms of π.



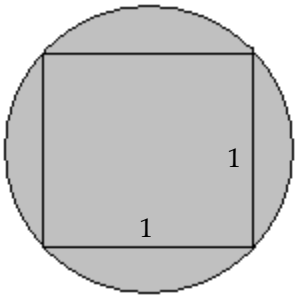
A) $25 - \frac{25}{4}\pi$ square units

B) $100 - 25\pi$ square units

C) $25 - \frac{25}{2}\pi$ square units

D) $\frac{25}{4}\pi + 25$ square units

14) Find the area of the shaded region. Express the answer in terms of π.



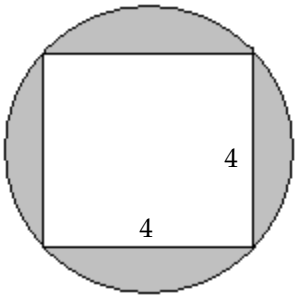
A) $\frac{1}{2}\pi$ square units

B) $\frac{1}{4}\pi$ square units

C) $\frac{1}{2}$ square units

D) 1π square units

15) Find the area of the shaded region. Express the answer in terms of π.



A) $8\pi - 16$ square units

B) $4\pi - 16$ square units

C) 16 square units

D) $4\pi - 4$ square units

16) A bicycle wheel makes 5 revolutions. Determine how far the bicycle travels in inches if the diameter of the wheel is 13 in. Use $\pi \approx 3.14$. Round to the nearest tenth.

A) 204.1 in.

B) 40.8 in.

C) 65 in.

D) 408.2 in.

17) A rectangular patio has dimensions 10 feet by 15 feet. The patio is surrounded by a border with a uniform width of 4 feet. Find the area of the border.

A) 264 ft^2

B) 116 ft^2

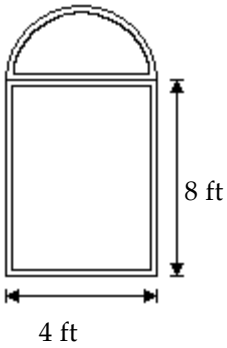
C) 166 ft^2

D) 136 ft^2

18) A circular swimming pool, 20 feet in diameter, is enclosed by a circular deck that is 5 feet wide. What is the area of the deck? Use $\pi = 3.1416$.

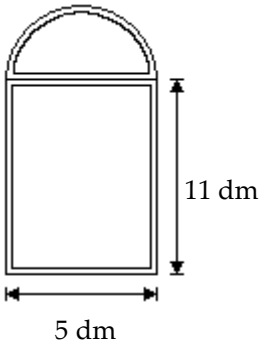
A) 392.7 ft^2 B) 675.4 ft^2 C) 942.5 ft^2 D) 314.2 ft^2

19) Find the perimeter. Approximate the result to the nearest tenth using 3.14 for π.



A) 26.3 ft B) 32.6 ft C) 30.3 ft D) 36.6 ft

20) Find the area of the window. Approximate the result to the nearest tenth using 3.14 for π.



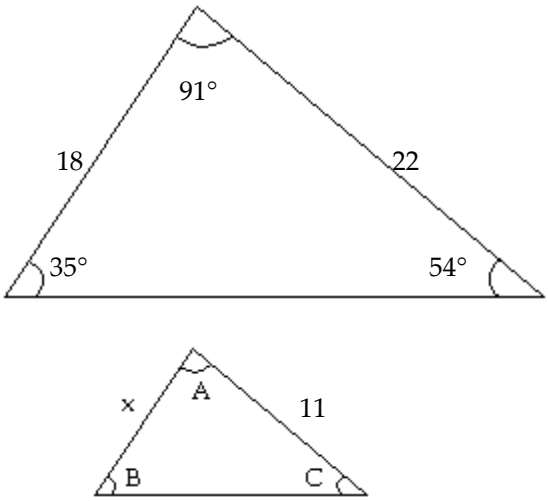
A) 64.8 dm^2 B) 133.5 dm^2 C) 94.3 dm^2 D) 58.9 dm^2

3 Understand Congruent Triangles and Similar Triangles

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

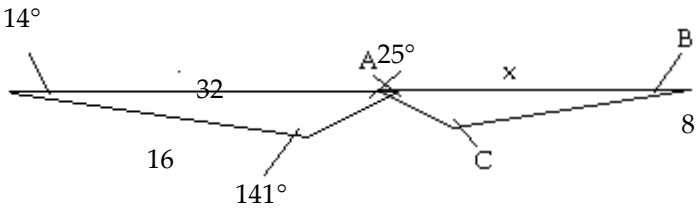
The triangles are similar. Find the missing length x and the missing angles A, B, C.

1)



A) x = 9 units; A = 91°; B = 35°; C = 54°
B) x = 18 units; A = 35°; B = 91°; C = 54°
C) x = 9 units; A = 54°; B = 35°; C = 91°
D) x = 18 units; A = 91°; B = 35°; C = 54°

2)



A) x = 16; A = 25; B = 14; C = 141
B) x = 32; A = 14; B = 25; C = 141
C) x = 16; A = 141; B = 14; C = 25
D) x = 32; A = 25; B = 14; C = 141

Solve. If necessary, round to the nearest tenth.

3) A flagpole casts a shadow of 34 feet. Nearby, a 7−foot tree casts a shadow of 5 feet. What is the height of the flagpole?
A) 47.6 ft
B) 24.3 ft
C) 1 ft
D) 1,190 ft

4) If a flagpole 24 feet tall casts a shadow that is 32 feet long, find the length of the shadow cast by an antenna which is 18 feet tall.
A) 24 ft
B) 13.5 ft
C) 42.7 ft
D) 26 ft

5) The zoo has hired a landscape architect to design the triangular lobby of the children's petting zoo. In his scale drawing, the longest side of the lobby is 6 cm. The shortest side of the lobby is 2 cm. The longest side of the actual lobby will be 32 m. How long will the shortest side of the actual lobby be?
A) 10.7 m
B) 0.1 m
C) 96 m
D) 1 m

6) If a tree 27.5 feet tall casts a shadow that is 11 feet long, find the height of a tree casting a shadow that is 13 feet long.

A) 32.5 ft B) 5.2 ft C) 23.3 ft D) 29.5 ft

0.4 Polynomials

1 Recognize Monomials

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Tell whether the expression is a monomial. If it is, name the variable(s) and coefficient, and give the degree of the monomial.

1) $8x$

A) Monomial; variable x; coefficient 8; degree 1
B) Monomial, variable x; coefficient 1; degree 8
C) Monomial,; variable x; coefficient 8; degree 0
D) Not a monomial

2) $-8x^6$

A) Monomial; variable x; coefficient −8; degree 6
B) Monomial; variable x; coefficient 6; degree −8
C) Monomial; variable x; coefficient 6; degree 0
D) Not a monomial

3) $\frac{11}{x}$

A) Monomial; variable x; coefficient 11; degree 1
B) Monomial; variable x; coefficient 11; degree −1
C) Monomial; variable x; coefficient 11; degree 0
D) Not a monomial

4) $12x^{-6}$

A) Monomial; variable x; coefficient 12; degree −6
B) Monomial; variable x; coefficient 6; degree 12
C) Monomial; variable x; coefficient 12; degree 6
D) Not a monomial

5) $-2xy^7$

A) Monomial; variables x, y; coefficient −2; degree 8
B) Monomial; variables x, y; coefficient −2; degree 7
C) Monomial; variables x, y; coefficient −2; degree 1
D) Not a monomial

6) $-2x^2y^7$

A) Monomial; variables x, y; coefficient −2; degree 9
B) Monomial; variables x, y; coefficient −2; degree 2
C) Monomial; variables x, y; coefficient −2; degree 7
D) Not a monomial

7) $\frac{6x}{y}$

A) Monomial; variables x, y; coefficient 6; degree 1
B) Monomial; variables x, y; coefficient 6; degree −2
C) Monomial; variables x, y; coefficient 6; degree 2
D) Not a monomial

8) $-\frac{5x^9}{y^3}$

A) Monomial; variables x, y; coefficient 5; degree 9
B) Monomial; variables x, y; coefficient 5; degree 3
C) Monomial; variables x, y; coefficient 5; degree 6
D) Not a monomial

9) $3x^5 - 4$

A) Monomial; variable x; coefficient 3; degree 5
B) Monomial; variable x; coefficient 4 ; degree 5
C) Monomial; variable x; coefficient 3; degree 1
D) Not a monomial

2 Recognize Polynomials

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Tell whether the expression is a polynomial. If it is, give its degree.

1) $6x^3 - 4$

A) Polynomial; degree 3
B) Polynomial; degree 4
C) Polynomial; degree 6
D) Not a polynomial

2) $1 - 4x$

A) Polynomial; degree 1
B) Polynomial; degree 4
C) Polynomial; degree −4
D) Not a polynomial

3) −19

A) Polynomial, degree 0
B) Polynomial, degree 1
C) Polynomial, degree −19
D) Not a polynomial

4) 4π

A) polynomial, degree 0
B) polynomial, degree 1
C) polynomial, degree 4
D) not a polynomial

5) $7x^3 - \frac{2}{x}$

A) Polynomial; degree 3
B) Polynomial; degree −1
C) Polynomial; degree 1
D) Not a polynomial

6) $\frac{25}{x} + 1$

A) Polynomial, degree 0
B) Polynomial, degree −1
C) Polynomial, degree 25
D) Not a Polynomial

7) $-7y^4 - \sqrt{3}$

A) Polynomial; degree 4
B) Polynomial; degree −7
C) Polynomial; degree 3
D) Not a polynomial

8) $-9z^2 + z$

A) Polynomial; degree 2
B) Polynomial; degree 3
C) Polynomial; degree 1
D) Not a polynomial

9) $\dfrac{-12x^{11} - 40x^7}{-4x^3}$

A) Polynomial; degree 7
B) Polynomial; degree 11
C) Polynomial; degree 0
D) Not a polynomial

3 Add and Subtract Polynomials

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Add or subtract as indicated. Express the answer as a single polynomial in standard form.

1) $(14x^2 + 4x - 13) + (8x + 13)$
A) $14x^2 + 12x$ B) $14x^2 + 12x - 26$ C) $14x^2 + 4x + 26$ D) $26x^3$

2) $(4x^2 + 8x + 6) + (2x^2 + 6x - 3)$
A) $6x^2 + 14x + 3$ B) $8x^2 + 10x + 5$ C) $6x^2 - 14x + 3$ D) $6x^2 + 14x - 3$

3) $(5x^2 + 11x + 8) - (9x^2 + 6x + 14)$
A) $-4x^2 + 5x - 6$ B) $-4x^2 + 20x + 22$ C) $-4x^2 + 5x + 22$ D) $-4x^2 + 5x + 6$

4) $(3x^4 - 4x^3) + (8x^4 - 3x^3)$
A) $11x^4 - 7x^3$ B) $11x^8 - 7x^6$ C) $4x^7$ D) $4x^{14}$

5) $(8x^4 - 14x^3) - (-17x^4 + 20x^3)$
A) $25x^4 - 34x^3$ B) $25x^4 + 6x^3$ C) $-9x^7$ D) $-9x^4 + 6x^3$

6) $(8x^5 + 9x^3) + (3x^5 - 5x^3 + 5)$
A) $11x^5 + 4x^3 + 5$ B) $-5x^5 + 3x^3 + 5x$ C) $5x + 4x^5 - 3x^3$ D) $12x^9$

7) $(3x^2 + 2) - (-x^3 + 7x^2 - 5)$
A) $x^3 - 4x^2 + 7$ B) $4x^3 + 9x^2 + 5$ C) $x^3 + 10x^2 - 3$ D) $4x^3 + 7x^2 + 7$

8) $(3x^5 + 4x^3 - 17) - (5x^5 + 18x^3 - 13)$
A) $-2x^5 - 14x^3 - 4$ B) $-2x^5 + 9x^3 - 30$ C) $-2x^5 - 14x^3 - 30$ D) $-20x^8$

9) $(7x^6 - 5x^3 - 6) - (13x^3 + 9x^6 + 8)$
A) $-2x^6 - 18x^3 - 14$ B) $-2x^6 + 4x^3 + 2$ C) $-2x^6 - 18x^3 + 2$ D) $-34x^9$

10) $(3x^5 + 3x^3 + 4x) + (5x^5 + 2x^3 + 3x)$
A) $8x^5 + 5x^3 + 7x$ B) $9x^5 + 5x^3 + 6x$ C) $8x + 5x^5 + 7x^3$ D) $20x^9$

11) $-4(x^2 + 3x + 1) + (-3x^2 - x - 9)$
A) $-7x^2 - 13x - 13$ B) $-1x^2 - 13x - 13$ C) $-7x^2 - 12x - 13$ D) $-7x^2 - 13x - 8$

12) $4(4x^3 + x^2 - 1) - 6(2x^3 - 4x + 2)$
A) $4x^3 + 4x^2 + 24x - 16$
B) $4x^3 + 4x^2 - 24x - 16$
C) $4x^3 + x^2 + 24x - 16$
D) $4x^3 + 4x^2 + 24x + 16$

13) $(x^2 + 1) - (5x^2 + 7) + (x^2 + x - 7)$

A) $-3x^2 + x - 13$ B) $-5x^2 + x - 13$ C) $-4x^2 + x - 13$ D) $-3x^2 + 8x - 6$

14) $-6(1 - y^3) - 9(1 + y + y^2 + y^3)$

A) $-3y^3 - 9y^2 - 9y - 15$ B) $-3y^3 + 9y^2 - 9y + 15$

C) $-3y^3 - 9 - ay^2 - 9y - 15$ D) $3y^3 - 9y^2 - 9y - 15$

4 Multiply Polynomials

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Perform the indicated operations. Express the answer as a single polynomial in standard form.

1) $3x(3x - 5)$

A) $9x^2 - 15x$ B) $-6x^2$ C) $9x^2 - 5x$ D) $3x^2 - 15x$

2) $9x^7(-12x + 2)$

A) $-108x^8 + 18x^7$ B) $-108x + 18$ C) $-108x^8 + 2$ D) $-90x^7$

3) $8x^7(-2x^5 + 7)$

A) $-16x^{12} + 56x^7$ B) $-16x^5 + 56$ C) $-16x^{12} + 7$ D) $40x^7$

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

A) $-24x^{12} + 12x^7 - 24x^5$ B) $-24x^{12} + 12x^7$

C) $-24x^{12} + 2x^2 - 4$ D) $-24x^7 + 12x^2 - 24$

5) $(x - 12)(x^2 + 6x - 7)$

A) $x^3 - 6x^2 - 79x + 84$ B) $x^3 + 18x^2 + 65x - 84$

C) $x^3 - 6x^2 - 65x - 84$ D) $x^3 + 18x^2 + 79x + 84$

6) $(8y + 11)(4y^2 - 2y - 2)$

A) $32y^3 + 28y^2 - 38y - 22$ B) $32y^3 - 16y^2 - 16y + 11$

C) $76y^2 - 38y - 38$ D) $32y^3 + 60y^2 + 38y + 22$

Multiply the polynomials using the FOIL method. Express the answer as a single polynomial in standard form.

7) $(x + 6)(x + 10)$

A) $x^2 + 16x + 60$ B) $x^2 + 60x + 16$ C) $x^2 + 15x + 60$ D) $x^2 + 16x + 16$

8) $(3x + 6)(x + 10)$

A) $3x^2 + 36x + 60$ B) $3x^2 + 60x + 36$ C) $3x^2 + 36x + 36$ D) $3x^2 + 34x + 60$

9) $(5x - 12)(3x - 6)$

A) $15x^2 - 66x + 72$ B) $8x^2 - 66x + 72$ C) $15x^2 - 66x - 66$ D) $8x^2 - 66x - 66$

10) $(x - 2y)(x + 10y)$

A) $x^2 + 8xy - 20y^2$ B) $x + 8xy - 20y$ C) $x^2 + 8xy + 8y^2$ D) $x^2 + 5xy - 20y^2$

11) $(x - 6y)(-3x - 11y)$

A) $-3x^2 + 7xy + 66y^2$ B) $x^2 + 7xy + 66y^2$ C) $-3x^2 + 7xy + 7y^2$ D) $x^2 + 7xy + 7y^2$

12) $(5x + 10y)(3x - 8y)$

A) $15x^2 - 10xy - 80y^2$ B) $15x^2 + 30xy - 80y^2$

C) $15x^2 - 40xy - 80y^2$ D) $15x^2 - 10xy - 10y^2$

5 Know Formulas for Special Products

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Multiply the polynomials. Express the answer as a single polynomial in standard form.

1) $(x + 7)(x - 7)$

A) $x^2 - 49$ B) $x^2 - 14$ C) $x^2 - 14x - 49$ D) $x^2 + 14x - 49$

2) $(2x + 11)(2x - 11)$

A) $4x^2 - 121$ B) $x^2 - 121$ C) $4x^2 - 44x - 121$ D) $4x^2 + 44x - 121$

3) $(x + 2)^2$

A) $x^2 + 4x + 4$ B) $x^2 + 4$ C) $4x^2 + 4x + 4$ D) $x + 4$

4) $(x - 13)^2$

A) $x^2 - 26x + 169$ B) $x^2 + 169$ C) $169x^2 - 26x + 169$ D) $x + 169$

5) $(5x + 8)^2$

A) $25x^2 + 80x + 64$ B) $25x^2 + 64$ C) $5x^2 + 80x + 64$ D) $5x^2 + 64$

6) $(x + 3y)(x - 3y)$

A) $x^2 - 9y^2$ B) $x^2 - 6y^2$ C) $x^2 - 6xy - 9y^2$ D) $x^2 + 6xy - 9y^2$

7) $(10y + x)(10y - x)$

A) $100y^2 - x^2$ B) $20y^2 - x^2$ C) $100y^2 - 20xy - x^2$ D) $100y^2 + 20xy - x^2$

8) $(7x - 9)^2$

A) $49x^2 - 126x + 81$ B) $49x^2 + 81$ C) $7x^2 - 126x + 81$ D) $7x^2 + 81$

9) $(w - r)^2$

A) $w^2 - 2wr + r^2$ B) $w^2 - wr + r^2$ C) $w^2 - 2wr - r^2$ D) $w^2 + 2wr + r^2$

10) $(2x + 7y)^2$

A) $4x^2 + 28xy + 49y^2$ B) $4x^2 + 49y^2$ C) $2x^2 + 28xy + 49y^2$ D) $2x^2 + 49y^2$

11) $(9x - 4y)^2$

A) $81x^2 - 72xy + 16y^2$ B) $81x^2 + 16y^2$

C) $9x^2 - 72xy + 16y^2$ D) $9x^2 + 16y^2$

12) $(x - 4)^3$

A) $x^3 - 12x^2 + 48x - 64$ B) $x^3 - 4x^2 + 24x - 64$

C) $x^3 - 12x^2 + 24x - 64$ D) $x^3 - 12x^2 + 12x - 64$

13) $(4x + 2)^3$

A) $64x^3 + 96x^2 + 48x + 8$ B) $64x^3 + 96x^2 + 96x + 8$

C) $16x^6 + 8x^3 + 64$ D) $16x^2 + 16x + 4$

6 Divide Polynomials Using Long Division

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the quotient and the remainder.

1) $12x^8 - 20x^5$ divided by $4x$

A) $3x^7 - 5x^4$; remainder 0
B) $12x^7 - 20x^4$; remainder 0
C) $3x^9 - 5x^6$; remainder 0
D) $3x^8 - 5x^5$; remainder 0

2) $12x^2 + 18x - 11$ divided by $2x$

A) $6x + 9$; remainder -11
B) $6x^2 + 9x - \frac{11}{2}$; remainder 0
C) $12x + 18$; remainder -11
D) $6x - 2$; remainder 0

3) $x^2 + 11x + 28$ divided by $x + 7$

A) $x + 4$; remainder 0
B) $x - 21$; remainder 0
C) $x^2 + 4$; remainder 0
D) $x^3 - 21$; remainder 0

4) $8x^2 + 63x - 81$ divided by $x + 9$

A) $8x - 9$; remainder 0
B) $8x + 9$; remainder 0
C) $x - 9$; remainder 0
D) $8x - 9$; remainder 6

5) $x^2 + 5x - 28$ divided by $x + 9$

A) $x - 4$; remainder 8
B) $x - 4$; remainder 0
C) $x + 4$; remainder 8
D) $x - 8$; remainder 4

6) $x^2 + 12x + 24$ divided by $x + 3$

A) $x + 9$; remainder -3
B) $x + 9$; remainder 3
C) $x + 9$; remainder 0
D) $x + 10$; remainder 0

7) $3x^3 + 4x^2 + 2x + 12$ divided by $x + 2$

A) $3x^2 - 2x + 6$; remainder 0
B) $3x^2 + 2x + 6$; remainder 0
C) $x^2 + 3x + 4$; remainder 0
D) $x^2 + 2x + 3$; remainder 0

8) $-10x^3 + 24x^2 - 3x + 17$ divided by $5x - 2$

A) $-2x^2 + 4x + 1$; remainder 19
B) $-2x^2 + 4x + 1$; remainder 0
C) $-2x^2 + 4x + 1$; remainder 22
D) $x^2 + 1$; remainder 4

9) $5x^3 - 7x^2 + 7x - 8$ divided by $5x - 2$

A) $x^2 - x + 1$; remainder -6
B) $x^2 - x + 1$; remainder 6
C) $x^2 - x + 1$; remainder 10
D) $x^2 + x - 1$; remainder -6

10) $x^4 + 625$ divided by $x - 5$

A) $x^3 + 5x^2 + 25x + 125$; remainder 1,250
B) $x^3 + 5x^2 + 25x + 125$; remainder 625
C) $x^3 + 5x^2 + 25x + 125$; remainder 0
D) $x^3 - 5x^2 + 25x - 125$; remainder 1,250

11) $-12x^3 + 11x^2 + 35x + 22$ divided by $-4x - 3$

A) $3x^2 - 5x - 5$; remainder 7
B) $3x^2 - 5x - 5$; remainder 0
C) $3x^2 - 5x - 5$; remainder 10
D) $x^2 - 5$; remainder -5

12) $8x^3 + 30x^2 + 9x - 13$ divided by $4x + 5$

A) $2x^2 + 5x - 4$; remainder 7
B) $2x^2 + 5x - 4$; remainder 0
C) $2x^2 + 5x - 4$; remainder 10
D) $x^2 - 4$; remainder 5

13) $x^4 + 3x^2 + 10$ divided by $x^2 + 1$

A) $x^2 + 2$; remainder 8
B) $x^2 + 2x + \frac{7}{2}$; remainder 0
C) $x^2 + 2$; remainder 0
D) $x^2 + 2x + 4$; remainder 8

14) $x^4 + 1{,}296$ divided by $x - 6$

A) $x^3 + 6x^2 + 36x + 216$; remainder 2,592
B) $x^3 + 6x^2 + 36x + 216$; remainder 1,296
C) $x^3 + 6x^2 + 36x + 216$; remainder 0
D) $x^3 - 6x^2 + 36x - 216$; remainder 2,592

15) $x^2 - 121a^2$ divided by $x - 11a$

A) $x + 11a$
B) $x - 11a$
C) $x^2 - 22xa$
D) $x^2 + 22xa$

7 Work with Polynomials in Two Variables

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Multiply the polynomials using the FOIL method. Express the answer as a single polynomial in standard form.

1) $(x - 7y)(x + 2y)$

A) $x^2 - 5xy - 14y^2$
B) $x - 5xy - 14y$
C) $x^2 - 5xy - 5y^2$
D) $x^2 - 8xy - 14y^2$

2) $(2x - 11y)(-3x + 8y)$

A) $-6x^2 + 49xy - 88y^2$
B) $-6x^2 + 33xy - 88y^2$
C) $-6x^2 + 16xy - 88y^2$
D) $-6x^2 + 49xy + 49y^2$

Multiply the polynomials using the special product formulas. Express the answer as a single polynomial in standard form.

3) $(x + 8y)(x - 8y)$

A) $x^2 - 64y^2$
B) $x^2 - 16y^2$
C) $x^2 - 16xy - 64y^2$
D) $x^2 + 16xy - 64y^2$

4) $(12x + y)(12x - y)$

A) $144x^2 - y^2$
B) $24x^2 - y^2$
C) $144x^2 - 24xy - y^2$
D) $144x^2 + 24xy - y^2$

5) $(5x + 7y)(5x - 7y)$

A) $25x^2 - 49y^2$
B) $25x^2 - 70xy - 49y^2$
C) $10x^2 - 14y^2$
D) $25x^2 + 70xy - 49y^2$

6) $(x - y)^2$

A) $x^2 - 2xy + y^2$
B) $x^2 - xy + y^2$
C) $x^2 - y^2$
D) $x^2 - 2x^2y^2 + y^2$

7) $(x - 11y)^2$

A) $x^2 - 22xy + 121y^2$
B) $x^2 - 11xy + 121y^2$
C) $x^2 - y^2$
D) $x^2 + 22xy + 121y^2$

8) $(12x - y)^2$

A) $144x^2 - 24xy + y^2$ B) $144x^2 - 12xy + y^2$

C) $144x^2 + y^2$ D) $144x^2 - 24xy - 2y^2$

9) $(5x + 3y)^2$

A) $25x^2 + 30xy + 9y^2$ B) $25x^2 + 9y^2$ C) $5x^2 + 30xy + 9y^2$ D) $5x^2 + 9y^2$

10) $(9x - 10y)^2$

A) $81x^2 - 180xy + 100y^2$ B) $81x^2 + 100y^2$

C) $9x^2 - 180xy + 100y^2$ D) $9x^2 + 100y^2$

0.5 Factoring Polynomials

1 Factor the Difference of Two Squares and the Sum and Difference of Two Cubes

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Factor the polynomial by removing the common monomial factor.

1) $9x - 9$

A) $9(x - 1)$ B) $9(x + 1)$ C) $x(x - 9)$ D) $x(x + 9)$

2) $7x^2 - 14x$

A) $7x(x - 2)$ B) $7x(x + 2)$ C) $7(x^2 - 2x)$ D) $7x^2(x - 2)$

Factor the difference of two squares.

3) $x^2 - 9$

A) $(x + 3)(x - 3)$ B) $(x + 9)(x - 9)$ C) $(x - 3)(x - 3)$ D) $(x^2 + 3)(x^2 - 3)$

4) $81x^2 - 1$

A) $(9x - 1)(9x + 1)$ B) $(9x + 1)^2$ C) $(9x - 1)^2$ D) prime

5) $16 - x^2$

A) $(4 - x)(4 + x)$ B) $(4 + x)^2$ C) $(4 - x)^2$ D) prime

6) $25x^2 - 81$

A) $(5x + 9)(5x - 9)$ B) $(5x - 9)^2$ C) $(5x + 9)^2$ D) $(25x + 1)(x - 81)$

Factor the sum or difference of two cubes.

7) $x^3 - 27$

A) $(x - 3)(x^2 + 3x + 9)$ B) $(x + 3)(x^2 - 3x + 9)$

C) $(x - 3)(x^2 + 9)$ D) $(x + 27)(x^2 - 1)$

8) $x^3 + 64$

A) $(x + 4)(x^2 - 4x + 16)$ B) $(x - 4)(x^2 + 4x + 16)$

C) $(x + 4)(x^2 + 16)$ D) $(x - 64)(x^2 - 1)$

9) $512y^3 - 1$

A) $(8y - 1)(64y^2 + 8y + 1)$ B) $(8y - 1)(64y^2 + 1)$

C) $(512y - 1)(y^2 + 8y + 1)$ D) $(8y + 1)(64y^2 - 8y + 1)$

10) $1{,}000x^3 + 1$

A) $(10x + 1)(100x^2 - 10x + 1)$ B) $(10x + 1)(100x^2 + 1)$

C) $(10x + 1)(100x^2 + 10x + 1)$ D) $(10x + 1)(100x^2 - 10x - 1)$

11) $125 - x^3$

A) $(5 - x)(25 + 5x + x^2)$ B) $(5 + x)(25 - 5x + x^2)$

C) $(5 - x)(25 + x^2)$ D) $(5 + x)(25 - x^2)$

12) $343x^3 - 729$

A) $(7x - 9)(49x^2 + 63x + 81)$ B) $(7x - 9)(49x^2 + 81)$

C) $(343x - 9)(x^2 + 63x + 81)$ D) $(7x + 9)(49x^2 - 63x + 81)$

13) $729x^3 + 512$

A) $(9x + 8)(81x^2 - 72x + 64)$ B) $(9x + 8)(81x^2 + 72x + 64)$

C) $(729x - 8)(x^2 + 72x + 64)$ D) $(9x - 8)(81x^2 + 72x + 64)$

14) $27 - 8x^3$

A) $(3 - 2x)(9 + 6x + 4x^2)$ B) $(3 - 2x)(9 + 4x^2)$

C) $(27 - 2x)(1 + 6x + 4x^2)$ D) $(3 + 2x^2)(9 - 6x + 4x^2)$

Factor completely. If the polynomial cannot be factored, say it is prime.

15) $2x^2 - 32$

A) $2(x + 4)(x - 4)$ B) $2(x - 4)^2$ C) $2(x + 4)^2$ D) prime

16) $x^4 - 121$

A) $(x^2 + 11)(x^2 - 11)$ B) $(x^2 + 11)^2$ C) $(x^2 - 11)^2$ D) prime

17) $x^4 - 256$

A) $(x^2 + 16)(x + 4)(x - 4)$ B) $(x^2 + 16)^2$

C) $(x^2 - 16)^2$ D) prime

18) $(x + 8)^2 - 25$

A) $(x + 13)(x + 3)$ B) $(x + 33)(x - 17)$ C) $(x - 3)(x - 13)$ D) $x^2 + 16x + 39$

19) $(x - 9)^2 - 9$

A) $(x - 6)(x - 12)$ B) $(x + 0)(x - 18)$ C) $(x + 6)(x + 12)$ D) $(x - 12)^2$

20) $x^9 + 1$

A) $(x + 1)(x^2 - x + 1)(x^6 - x^3 + 1)$ B) $(x^3 + 1)(x^6 - x^3 + 1)$

C) $(x - 1)(x^2 + x + 1)(x^6 + x^3 + 1)$ D) $(x - 1)(x + 1)(x^6 - x^3 + 1)$

21) $729x^4 - x$

A) $x(9x - 1)(81x^2 + 9x + 1)$ B) $x(9x - 1)(81x^2 + 1)$

C) $x(729x - 1)(x^2 + 9x + 1)$ D) $x(9x + 1)(81x^2 - 9x + 1)$

22) $(3x - 4)^3 + 27$

A) $(3x - 1)(9x^2 - 33x + 37)$ B) $(3x - 7)(9x^2 - 15x + 13)$

C) $(3x - 1)(9x^2 - 15x + 13)$ D) $(3x - 1)(9x^2 - 15x + 37)$

23) $(3 - x)^3 - x^3$

A) $(3 - 2x)(x^2 - 3x + 9)$ B) $(3 - x)(x^2 - 3x + 9)$

C) $(3 - 2x)(3x^2 - 3x + 9)$ D) $(3 + 2x)(x^2 - 3x + 9)$

2 Factor Perfect Squares

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Factor the perfect square.

1) $x^2 + 50x + 625$

A) $(x + 25)^2$ B) $(x - 25)^2$ C) $(x + 25)(x - 25)$ D) $x^2 + 50x + 625$

2) $x^2 - 12x + 36$

A) $(x - 6)^2$ B) $(x - 6)(x + 6)$ C) $(x + 6)^2$ D) $(x - 12)(x + 12)$

3) $9x^2 - 48x + 64$

A) $(3x - 8)^2$ B) $(3x + 8)^2$ C) $(3x + 8)(3x - 8)$ D) $(3x - 9)^2$

4) $49x^2 + 56x + 16$

A) $(7x + 4)^2$ B) $(7x - 4)^2$ C) $(7x + 4)(7x - 4)$ D) $(7x - 5)^2$

5) $x^4 + 10x^2 + 25$

A) $(x^2 + 5)^2$ B) $(x^2 - 5)^2$ C) $(x + 5)(x - 5)$ D) $(x + 5)^2$

Factor completely. If the polynomial cannot be factored, say it is prime.

6) $243x^2 - 108x + 12$

A) $3(9x - 2)^2$ B) $3(9x + 2)^2$ C) $3(9x - 2)(9x + 2)$ D) prime

7) $x^3 + 30x^2 + 225x$

A) $x(x + 15)^2$ B) $x(x - 15)^2$ C) $x(x + 15)(x - 15)$ D) prime

3 Factor a Second–Degree Polynomial: x^2 + Bx + C

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Factor the polynomial.

1) $x^2 - x - 42$

A) $(x + 6)(x - 7)$ B) $(x + 7)(x - 6)$ C) $(x + 1)(x - 42)$ D) prime

2) $x^2 - 3x - 18$

A) $(x - 6)(x + 3)$ B) $(x + 6)(x + 3)$ C) $(x + 6)(x + 1)$ D) prime

3) $x^2 + 4x - 60$

A) $(x + 10)(x - 6)$ B) $(x - 10)(x + 6)$ C) $(x - 10)(x + 1)$ D) prime

4) $x^2 + 16$

A) $(x + 4)(x - 4)$ B) $(x + 4)^2$ C) $(x - 4)^2$ D) prime

Factor completely. If the polynomial cannot be factored, say it is prime.

5) $8x^2 - 8x - 48$

A) $8(x + 2)(x - 3)$ B) $(8x + 16)(x - 3)$ C) $8(x - 2)(x + 3)$ D) prime

6) $4x^2 - 28x + 40$

A) $4(x - 5)(x - 2)$ B) $4(x - 10)(x + 1)$ C) $(x - 5)(4x - 8)$ D) prime

7) $5x^3 + 5x^2 - 30x$

A) $5x(x - 2)(x + 3)$ B) $5x(x + 2)(x - 3)$ C) $(5x^2 + 10x)(x - 3)$ D) $(x - 2)(5x^2 + 15)$

8) $(x + 9)^2 - 13(x + 9) + 42$

A) $(x + 3)(x + 2)$ B) $(x + 15)(x + 16)$

C) $(x^2 + 9x - 6)(x^2 + 9x - 7)$ D) $(x^2 - 9x + 6)(x^2 - 9x + 7)$

9) $x^4 + 14x^2 + 48$

A) $(x^2 + 6)(x^2 + 8)$ B) $(x^2 - 6)(x^2 + 8)$ C) $(x^2 - 6)(x^2 + 1)$ D) Prime

4 Factor by Grouping

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Factor the polynomial by grouping.

1) $x^2 + 5x + 2x + 10$

A) $(x + 5)(x + 2)$ B) $(x - 5)(x - 2)$ C) $(x - 5)(x + 2)$ D) prime

2) $2x^2 + 9x + 18x + 81$

A) $(x + 9)(2x + 9)$ B) $(2x + 9)(2x + 9)$ C) $(2x + 9)(9x + 2)$ D) prime

3) $10x^2 - 4x - 25x + 10$

A) $(2x - 5)(5x - 2)$ B) $(2x + 5)(5x + 2)$ C) $(10x - 5)(x - 2)$ D) $(10x + 5)(x + 2)$

4) $15x^2 + 10x + 18x + 12$

A) $(5x + 6)(3x + 2)$ B) $(5x - 6)(3x - 2)$ C) $(15x + 6)(x + 2)$ D) $(15x - 6)(x - 2)$

Factor completely. If the polynomial cannot be factored, say it is prime.

5) $x^3 - 9x + 5x^2 - 45$

A) $(x + 3)(x - 3)(x + 5)$ B) $(x^2 - 9)(x + 5)$

C) $(x - 3)^2(x + 5)$ D) prime

6) $4x^2 - 20x - 8x + 40$

A) $4(x - 5)(x - 2)$ B) $(x - 5)(x - 2)$ C) $(x - 5)(4x - 8)$ D) $4(x + 5)(x + 2)$

7) $2y^3 + 10y^2 - 6y^2 - 30y$

A) $2y(y + 5)(y - 3)$ B) $(y + 5)(y - 3)$ C) $(y + 5)(2y^2 - 6y)$ D) $2y(y - 5)(y + 3)$

8) $20x^6 + 12x^3 - 15x^3 - 9$

A) $(4x^3 - 3)(5x^3 + 3)$ B) $(4x^3 + 3)(5x^3 - 3)$ C) $(4x^6 - 3)(5x + 3)$ D) $(20x^3 + 3)(x^3 - 3)$

9) $20x^2 + 15xy - 16xy - 12y^2$

A) $(5x - 4y)(4x + 3y)$ B) $(5x - 4)(4x + 3)$ C) $(5x + 4y)(4x + 3y)$ D) $(20x - 4y)(x + 3y)$

10) $6x^3 - 15x^2y + 10xy^2 - 25y^3$

A) $(3x^2 + 5y^2)(2x - 5y)$ B) $(3x^2 + 5y)(2x - 5y)$

C) $(3x^2 - 5y^2)(2x + 5y)$ D) $(6x^2 + 5y^2)(x - 5y)$

An expression that occurs in calculus is given. Factor completely.

11) $2(x + 6)(x - 5)^3 + (x + 6)^2 \cdot 6(x - 5)^2$

A) $2(x + 6)(x - 5)^2(4x + 13)$ B) $(x + 6)(x - 5)^2(4x + 13)$

C) $(x + 6)(x - 5)^2(8x + 26)$ D) $2(x + 5)(x - 6)^2(4x + 13)$

12) $(2x + 1)^2 + 3(2x + 1) - 4$

A) $2x(2x + 5)$ B) $2x - 6$ C) $2x(2x + 1)$ D) $2x - 1$

13) $3(x + 5)^2(2x - 1)^2 + 4(x + 5)^3(2x - 1)$

A) $(x + 5)^2(2x - 1)(10x + 17)$ B) $(x + 5)^2(2x - 1)(x + 17)$

C) $(x + 5)^2(10x + 17)$ D) $(x + 5)(2x - 1)(10x + 17)$

5 Factor a Second–Degree Polynomial: Ax^2 + Bx + C, A ≠ 1

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Factor the polynomial.

1) $15x^2 + 29x + 12$

A) $(3x + 4)(5x + 3)$ B) $(3x - 4)(5x - 3)$ C) $(15x + 4)(x + 3)$ D) prime

2) $16y^2 + 24y + 9$

A) $(4y + 3)(4y + 3)$ B) $(4y - 3)(4y - 3)$ C) $(16y + 3)(y + 3)$ D) prime

3) $10z^2 + 11z - 6$

A) $(2z + 3)(5z - 2)$ B) $(2z - 3)(5z + 2)$ C) $(10z + 3)(z - 2)$ D) prime

4) $9z^2 - 6z - 8$

A) $(3z - 4)(3z + 2)$ B) $(3z + 4)(3z - 2)$ C) $(9z - 4)(z + 2)$ D) prime

5) $9x^2 - 6xt - 8t^2$

A) $(3x + 2t)(3x - 4t)$ B) $(3x - 2t)(3x + 4t)$ C) $(9x + 2t)(x - 4t)$ D) prime

6) $15z^2 - 8z - 16$

A) $(3z - 4)(5z + 4)$ B) $(3z + 4)(5z - 4)$ C) $(15z - 4)(z + 4)$ D) prime

7) $x^2 - x - 45$

A) $(x - 45)(x + 1)$ B) $(x + 5)(x - 9)$ C) $(x - 5)(x + 9)$ D) prime

Factor completely. If the polynomial cannot be factored, say it is prime.

8) $9x^2 - 39x - 30$

A) $3(3x + 2)(x - 5)$ B) $3(3x - 2)(x + 5)$ C) $(9x + 6)(x - 5)$ D) prime

9) $16x^2 - 56x - 32$

A) $8(2x + 1)(x - 4)$ B) $8(2x - 1)(x + 4)$ C) $(16x - 8)(x + 4)$ D) prime

10) $16y^2 + 72y - 40$

A) $8(2y - 1)(y + 5)$ B) $8(2y + 1)(y - 5)$ C) $(16y - 8)(y + 5)$ D) prime

11) $35x^2 - 195x + 100$

A) $5(7x - 4)(x - 5)$ B) $5(7x + 4)(x + 5)$ C) $(7x - 4)(5x - 5)$ D) prime

12) $15x^3 - 14x^2 - 8x$

A) $x(3x - 4)(5x + 2)$ B) $x(5x - 4)(3x + 2)$ C) $(3x^2 - 4)(5x + 2)$ D) $x^2(3x - 4)(5x + 2)$

13) $36x^2 + 72x + 32$

A) $4(3x + 2)(3x + 4)$ B) $4(3x + 1)(3x + 8)$ C) $4(8x + 2)(x + 4)$ D) $(3x + 1)(3x + 8)$

14) $6(x - 7)^2 - 13(x - 7) - 28$

A) $(2x - 21)(3x - 17)$ B) $(2x + 14)(3x + 11)$ C) $(2x + 7)(3x + 4)$ D) $(2x + 18)(3x + 28)$

15) $12x^4 + 17x^2 + 6$

A) $(3x^2 + 2)(4x^2 + 3)$ B) $(4x^2 - 3)(3x^2 - 2)$ C) $(3x^2 + 1)(4x^2 + 6)$ D) $(12x^2 + 2)(x^2 + 3)$

16) $6x^4 - 11x^2 - 10$

A) $(2x^2 - 5)(3x^2 + 2)$ B) $(3x - 2)(2x + 5)$ C) $(2x^2 + 1)(3x^2 - 10)$ D) $(6x^2 - 5)(x^2 + 2)$

17) $6x^6 - 5x^3 - 6$

A) $(3x^3 + 2)(2x^3 - 3)$ B) $(2x^3 + 3)(3x^3 - 2)$ C) $6(x^3 - 3)(x^3 + 2)$ D) $(3x^3 + 1)(2x^3 - 6)$

18) $5y^6 - 19y^3 + 12$

A) $(5y^3 - 4)(y^3 - 3)$ B) $y^2(5y^2 - 4)(y^2 - 3)$

C) $y^4(5y - 4)(y - 3)$ D) $(5y^3 - 3y^2 + y - 4)(y^3 - 4y^2 + y - 3)$

6 Complete the Square

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

What number should be added to complete the square of the expression?

1) $x^2 + 16x$

A) 64 B) 8 C) 128 D) 32

2) $x^2 - 8x$

A) 16 B) –4 C) 32 D) 8

3) $x^2 + \frac{2}{5}x$

A) $\frac{1}{25}$ B) $\frac{2}{25}$ C) $\frac{4}{25}$ D) $\frac{1}{5}$

4) $x^2 - \frac{2}{3}x$

A) $\frac{1}{9}$ B) $-\frac{2}{9}$ C) $\frac{4}{9}$ D) $-\frac{1}{6}$

5) $x^2 - x$

A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) 1 D) 4

0.6 Synthetic Division

1 Divide Polynomials Using Synthetic Division

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use synthetic division to find the quotient and the remainder.

1) $x^2 + 17x + 67$ is divided by $x + 8$

A) $x + 9$; remainder -5 B) $x + 9$; remainder 5
C) $x + 9$; remainder 0 D) $x + 10$; remainder 0

2) $x^3 - x^2 + 6$ is divided by $x + 2$

A) $x^2 - 3x + 6$; remainder -6 B) $x^2 - 3x + 6$; remainder 2
C) $x^2 + x + 2$; remainder -6 D) $3x^2 - 4x + 2$; remainder 0

3) $x^5 + x^3 - 5$ is divided by $x + 3$

A) $x^4 - 3x^3 + 10x^2 - 30x + 90$; remainder -275 B) $x^4 - 3x^3 + 9x^2 - 26x + 78$; remainder -239
C) $x^4 - 2x^2$; remainder 1 D) $x^4 - 2$; remainder 1

4) $-2x^3 - 4x^2 + 27x - 15$ is divided by $x + 5$

A) $-2x^2 + 6x - 3$; remainder 0 B) $2x^2 - 5x - 3$; remainder 0

C) $-\frac{2}{5}x^2 - \frac{4}{5}x + \frac{27}{5}$; remainder 0 D) $-2x^2\, x - \frac{4}{5} - 3$; remainder0

5) $x^5 + 7x^4 + 7x^3 - 13x^2 + 13x + 16$ is divided by $x + 5$

A) $x^4 + 2x^3 - 3x^2 + 2x + 3$; remainder 1 B) $x^3 + 2x^2 - 3x + 2$; remainder 1
C) $x^4 + 2x^3 - 3x^2 + 2x - 3$; remainder 3 D) $x^4 + 2x^3 - 3x^2 + 2x + 1$; remainder 0

6) $x^4 - 5$ is divided by $x - 2$

A) $x^3 + 2x^2 + 4x + 8$; remainder 11 B) $x^3 + 2x^2 + 4x + 8$; remainder 623
C) $x^3 + 6x^2 + 4x + 2$; remainder 11 D) $x^3 + 5x^2 + 25x + 125$; remainder 623

7) $x^4 + 256$ is divided by $x - 4$

A) $x^3 + 4x^2 + 16x + 64$; remainder 512

B) $x^3 + 4x^2 + 16x + 64$; remainder 256

C) $x^3 + 4x^2 + 16x + 64$; remainder 0

D) $x^3 - 4x^2 + 16x - 64$; remainder 512

8) $6x^5 - 5x^4 + x - 4$ is divided by $x + \frac{1}{2}$

A) $6x^4 - 8x^3 + 4x^2 - 2x + 2$; remainder -5

B) $6x^4 - 2x^3 - x^2 + \frac{1}{2}x + \frac{5}{4}$; remainder $-\frac{27}{8}$

C) $6x^4 - 8x^3 + 5$; remainder $-\frac{13}{2}$

D) $6x^4 - 2x^3 + x^2 - \frac{1}{2}x + \frac{5}{4}$; remainder $-\frac{37}{8}$

Use synthetic division to determine whether x – c is a factor of the given polynomial.

9) $x^3 - 9x^2 + 26x - 24$; $x - 3$

A) Yes

B) No

10) $x^3 + 12x^2 + 23x - 36$; $x - 4$

A) Yes

B) No

11) $x^3 - 4x^2 - 31x + 70$; $x + 5$

A) Yes

B) No

12) $x^3 - 12x^2 + 24x + 108$; $x + 1$

A) Yes

B) No

13) $3x^3 - 16x^2 + 27x - 14$; $x - 6$

A) Yes

B) No

14) $2x^3 - 13x^2 - 38x + 112$; $x + 6$

A) Yes

B) No

15) $3x^3 - 25x^2 + 13x + 105$; $x - 7$

A) Yes

B) No

16) $4x^3 - 33x^2 + 14x + 147$; $x - 7$

A) Yes

B) No

17) $6x^5 - 5x^4 + x - 4$; $x + \frac{1}{2}$

A) Yes

B) No

0.7 Rational Expressions

1 Reduce a Rational Expression to Lowest Terms

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Reduce the rational expression to lowest terms.

1) $\frac{x^2 - 49}{x - 7}$

A) $x + 7$ B) $x - 7$ C) $\frac{1}{x - 7}$ D) $\frac{1}{x + 7}$

2) $\frac{2x + 2}{10x^2 + 16x + 6}$

A) $\frac{1}{5x + 3}$ B) $\frac{2x + 2}{10x^2 + 16x + 6}$ C) $\frac{2x + 5}{5x + 16}$ D) $\frac{2x}{5x + 3}$

3) $\frac{y^2 + 11y + 24}{y^2 + 15y + 56}$

A) $\frac{y + 3}{y + 7}$ B) $\frac{11y + 24}{15y + 56}$ C) $\frac{11y + 3}{15y + 7}$ D) $-\frac{y^2 + 11y + 24}{y^2 + 15y + 56}$

4) $\frac{5x^2 - 41x + 42}{x - 7}$

A) $5x - 6$ B) $\frac{5x^2 - 41x + 42}{x - 7}$ C) $5x^2 - 47$ D) $\frac{1}{x - 7}$

5) $\frac{x^2 + 13x + 42}{x^2 + 15x + 56}$

A) $\frac{x + 6}{x + 8}$ B) $\frac{13x + 42}{15x + 56}$ C) $\frac{13x + 3}{15x + 4}$ D) $-\frac{x^2 + 13x + 42}{x^2 + 15x + 56}$

6) $\frac{2x^2 + 13x + 6}{2x^2 + 15x + 18}$

A) $\frac{2x+ 1}{2x + 3}$ B) $\frac{x- 1}{x - 3}$ C) $\frac{2x + 6}{2x - 6}$ D) $\frac{x + 2}{x + 4}$

7) $\frac{7x^2 + 21x^3}{8x + 24x^2}$

A) $\frac{7x}{8}$ B) $\frac{7x^2 + 21x^3}{8x + 24x^2}$ C) $\frac{7 + 21x^3}{8x + 24}$ D) $\frac{7}{8}$

8) $\frac{y^3 - 125}{y - 5}$

A) $y^2 + 5y + 25$ B) $\frac{y^3 - 125}{y - 5}$ C) $y^2 - 25$ D) $\frac{1}{y - 5}$

An expression that occurs in calculus is given. Reduce the expression to lowest terms.

9) $\dfrac{(x^2+6)\cdot 8-(8x+9)\cdot 7x}{(x^2+6)^3}$

A) $\dfrac{-48x^2-63x+48}{(x^2+6)^3}$ B) $\dfrac{-56x^2-63x+8}{(x^2+6)^2}$ C) $\dfrac{48x^2+63x-48}{(x^2+6)^3}$ D) $\dfrac{-64x^2-63x+48}{(x^2+6)^3}$

10) $\dfrac{(2x+5)4x-2x^2(2)}{(2x+5)^2}$

A) $\dfrac{4x(x+5)}{(2x+5)^2}$ B) $\dfrac{2x}{(x+5)^2}$ C) $\dfrac{4x}{(2x+5)^2}$ D) $\dfrac{4(x+5)}{(2x+5)^2}$

2 Multiply and Divide Rational Expressions

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Perform the indicated operations and simplify the result. Leave the answer in factored form.

1) $\dfrac{5x}{10x+5}\cdot\dfrac{6x+3}{5}$

A) $\dfrac{3x}{5}$ B) $\dfrac{3}{5}$ C) $\dfrac{3x}{25}$ D) $\dfrac{x}{5}$

2) $\dfrac{6x-6}{x}\cdot\dfrac{7x^2}{9x-9}$

A) $\dfrac{14x}{3}$ B) $\dfrac{3}{14x}$ C) $\dfrac{42x^3-42x^2}{9x^2-9x}$ D) $\dfrac{54x^2+108x+54}{7x^3}$

3) $\dfrac{x^3+1}{x^3-x^2+x}\cdot\dfrac{10x}{-40x-40}$

A) $-\dfrac{1}{4}$ B) $\dfrac{x+1}{4(-x-1)}$ C) $-\dfrac{x^3+1}{4(x+1)}$ D) $-\dfrac{x^2+1}{4}$

4) $\dfrac{x^2+12x+27}{x^2+15x+54}\cdot\dfrac{x^2+13x+42}{x^2+10x+21}$

A) 1 B) $\dfrac{1}{x+7}$ C) $\dfrac{x+6}{x+7}$ D) $\dfrac{x+3}{x+6}$

5) $\dfrac{x^2-9x+8}{x^2-7x+12}\cdot\dfrac{x^2-8x+15}{x^2-10x+16}$

A) $\dfrac{(x-1)(x-5)}{(x-4)(x-2)}$ B) $\dfrac{(x+1)(x+5)}{(x+4)(x+2)}$

C) $\dfrac{(x^2-9x+8)(x^2-8x+15)}{(x^2-7x+12)(x^2-10x+16)}$ D) $\dfrac{(x-1)}{(x-2)}$

6) $\frac{x^2 + 12x + 27}{x^2 + 18x + 81} \cdot \frac{x^2 + 9x}{x^2 - 4x - 21}$

A) $\frac{x}{x - 7}$ B) $\frac{1}{x - 7}$ C) $\frac{x(x + 9)}{x - 7}$ D) $\frac{x}{x^2 + 18x + 81}$

7) $\frac{9x^4 - 72x}{3x^2 - 12} \cdot \frac{x^2 + x - 2}{4x^3 + 8x^2 + 16x}$

A) $\frac{3(x - 1)}{4}$ B) $\frac{3x(x - 1)}{4}$ C) $\frac{3x(x - 1)(x - 2)^2}{4(x + 2)^2}$ D) $\frac{3x(x + 1)}{4}$

8) $\frac{x^2 + 15x + 56}{x^2 + 16x + 64} \cdot \frac{x^2 + 8x}{x^2 + 12x + 35}$

A) $\frac{x}{x + 5}$ B) $\frac{1}{x + 5}$ C) $\frac{x^2 + 8x}{x + 5}$ D) $\frac{x}{x^2 + 16x + 64}$

9) $\frac{10x^2 - 3x - 4}{5x^2 - x - 4} \cdot \frac{15x^2 + 12x}{1 - 4x^2}$

A) $\frac{3x(5x - 4)}{(1 - 2x)(x - 1)}$ B) $\frac{3x}{(1 - 2x)(x - 1)}$ C) $\frac{(5x + 4)(5x - 4)}{(1 - 2x)(x - 1)}$ D) $\frac{3x(5x + 4)}{(1 - 2x)(x - 1)}$

10) $\frac{\frac{33x - 33}{5}}{\frac{11x - 11}{10}}$

A) 6 B) $\frac{363(x - 1)^2}{50}$ C) $\frac{1}{6}$ D) $\frac{2(33x - 33)}{11x - 11}$

11) $\frac{\frac{8x - 8}{x}}{\frac{10x - 10}{4x^2}}$

A) $\frac{16x}{5}$ B) $\frac{5}{16x}$ C) $\frac{32x^2(x - 1)}{10x(x - 1)}$ D) $\frac{80(x + 1)^2}{4x^3}$

12) $\frac{\frac{x^2 + 9x + 14}{x^2 + 13x + 42}}{\frac{x^2 + 2x}{x^2 + 12x + 36}}$

A) $\frac{x + 6}{x}$ B) $x + 6$ C) $\frac{x + 6}{x(x + 6)}$ D) $\frac{x}{(x + 6)(x + 7)}$

13)
$$\frac{\frac{x^2 - 18x + 81}{10x - 90}}{\frac{12x - 108}{120}}$$

A) 1 B) $\frac{(x - 9)^2}{100}$ C) $\frac{x^2 - 18x + 81}{(x - 9)^2}$ D) 120

14)
$$\frac{\frac{1}{x + 2}}{\frac{5}{x^2 - 4}}$$

A) $\frac{x - 2}{5}$ B) $\frac{x + 2}{5}$ C) $x - 2$ D) $\frac{5}{x - 2}$

15)
$$\frac{\frac{x^2 - 25}{x}}{\frac{x - 5}{x + 6}}$$

A) $\frac{(x + 5)(x + 6)}{x}$ B) $(x + 5)(x + 6)$ C) $\frac{(x - 5)(x^2 - 5)}{x(x + 6)}$ D) $\frac{x}{(x + 5)(x + 6)}$

16)
$$\frac{\frac{25x^2 - 49}{x^2 - 25}}{\frac{5x - 7}{x - 5}}$$

A) $\frac{5x + 7}{x + 5}$ B) $\frac{5x - 7}{x - 5}$

C) $\frac{(5x - 7)(25x^2 - 49)}{(x^2 - 5)(x - 5)}$ D) $\frac{x + 5}{5x + 7}$

3 Add and Subtract Rational Expressions

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Perform the indicated operations and simplify the result. Leave the answer in factored form.

1) $\frac{x}{3} - \frac{12}{11}$

A) $\frac{11x - 36}{33}$ B) $\frac{x - 12}{14}$ C) $\frac{x - 12}{33}$ D) $\frac{11x + 36}{36}$

2) $\frac{4x + 5}{2} - \frac{4x - 5}{2}$

A) 5 B) 4x C) 0 D) 25

3) $\frac{3x^2}{x-1} - \frac{3x}{x-1}$

A) $3x$ B) $\frac{3x(x+1)}{x-1}$ C) 0 D) $\frac{3x}{x-1}$

4) $\frac{2}{11x} - \frac{6}{11x}$

A) $\frac{-4}{11x}$ B) $\frac{11}{-4x}$ C) 1 D) $\frac{-2}{11x}$

5) $\frac{3}{5x} + \frac{1}{5x}$

A) $\frac{4}{5x}$ B) $\frac{5}{4x}$ C) 1 D) $\frac{8}{20x}$

6) $\frac{-7x-3}{x} + \frac{-8x+6}{4x}$

A) $\frac{-36x-6}{4x}$ B) $\frac{-36x+18}{4x}$ C) $\frac{-20x-6}{4x}$ D) $\frac{-36x-6}{4x^2}$

7) $\frac{4}{x^2} - \frac{6}{x}$

A) $\frac{2(2-3x)}{x^2}$ B) $\frac{2(2+3x)}{x^2}$ C) $\frac{2(3x-2)}{x}$ D) $\frac{2(2x+3)}{x^2}$

8) $\frac{2}{x} + \frac{4}{x-7}$

A) $\frac{6x-14}{x(x-7)}$ B) $\frac{14x-6}{x(x-7)}$ C) $\frac{6x-14}{x(7-x)}$ D) $\frac{14x-6}{x(7-x)}$

9) $\frac{5}{x+6} - \frac{3}{x-6}$

A) $\frac{2x-48}{(x+6)(x-6)}$ B) $\frac{2x-12}{(x+6)(x-6)}$ C) $\frac{2}{(x+6)(x-6)}$ D) $\frac{2x+48}{(x+6)(x-6)}$

10) $\frac{19}{x-9} + \frac{2}{x-9}$

A) $\frac{21}{x-9}$ B) $\frac{17}{x-9}$ C) $\frac{17}{x}$ D) $\frac{19(x-9)}{2(x-9)}$

11) $\frac{3x^2}{x-1} - \frac{3x}{x-1}$

A) $3x$ B) $\frac{3x(x+1)}{x-1}$ C) 0 D) $\frac{3x}{x-1}$

12) $\frac{6 - x}{x - 7} - \frac{2x - 4}{7 - x}$

A) $\frac{x + 2}{x - 7}$ B) $\frac{x + 10}{x - 7}$ C) $-\frac{x + 2}{x - 7}$ D) $-\frac{x + 10}{x - 7}$

13) $\frac{x - 1}{x + 1} - \frac{x - 1}{x - 8}$

A) $\frac{-9(x - 1)}{(x + 1)(x - 8)}$ B) $\frac{-7(x - 1)}{(x + 1)(x - 8)}$ C) 0 D) $\frac{9(x - 1)}{(x + 1)(x - 8)}$

14) $\frac{7x}{x - 2} + \frac{2}{2 - x}$

A) $\frac{7x - 2}{x - 2}$ B) $\frac{7x + 2}{x - 2}$ C) $\frac{7x - 2}{2 - x}$ D) $\frac{5x}{x - 2}$

15) $\frac{x^2 - 11x}{x - 6} + \frac{30}{x - 6}$

A) x − 5 B) x + 6 C) x + 5 D) x − 6

4 Use the Least Common Multiple Method

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the LCM of the given polynomials.

1) x, x + 4

A) x(x + 4) B) x + 4 C) x D) $x^2(x + 4)$

2) 8x + 32, $x^2 + 4x$

A) 8x(x + 4) B) 8x + 4 C) $8x^2 + 4$ D) $8x^2 + 32$

3) $x^2 + 12x + 36$, $x^2 + 6x$

A) $x(x + 6)^2$ B) x(x + 1)(x + 6) C) $(x + 6)^2$ D) x(x + 6)

4) $x^2 - 9x + 20$, 5x − 20

A) 5(x − 5)(x − 4) B) 5(x + 5)(x + 4) C) 5(x − 5)(x + 4) D) 5(x + 5)(x − 4)

5) $x^2 + 6x + 5$, $x^2 - 3x - 4$

A) (x + 5)(x + 1)(x − 4) B) (x + 5)(x + 1)
C) (x + 1)(x − 4) D) (x − 5)(x − 1)(x − 4)

6) x − 7, 7 − x

A) (x − 7) or (7 − x) B) (x − 7)(7 − x) C) −1 D) x + 7

7) 16x − 3, 16x + 3

A) (16x − 3)(16x + 3) B) (16x − 3) or (16x + 3)
C) (16x − 3) D) (16x + 3)

8) $x^2 - 5x$, $(x - 5)^2$

A) $x(x - 5)^2$ B) x(x − 5) C) $(x + 5)(x - 5)^2$ D) $x(x + 5)^2$

9) $x^2 - 2x - 35,\ x^2 - 25,\ x^2 - 12x + 35$

A) $(x - 7)(x + 5)(x - 5)$ B) $(x + 7)(x + 5)(x - 5)$

C) $(x - 7)(x + 5)$ D) $(x + 7)(x - 5)^2$

Perform the indicated operations and simplify the result. Leave the answer in factored form.

10) $\frac{3}{x} + \frac{5}{x - 2}$

A) $\frac{8x - 6}{x(x - 2)}$ B) $\frac{6x - 8}{x(x - 2)}$ C) $\frac{8x - 6}{x(2 - x)}$ D) $\frac{6x - 8}{x(2 - x)}$

11) $-\frac{1}{8} - \frac{6}{7x}$

A) $\frac{-7x - 48}{56x}$ B) $\frac{-13}{56 - 7x}$ C) $\frac{7x - 48}{56x}$ D) $\frac{-7x + 48}{56x}$

12) $\frac{1}{(x - 4)(x - 1)} - \frac{3}{(x - 1)(x - 2)}$

A) $\frac{-2(x - 5)}{(x - 4)(x - 1)(x - 2)}$ B) $\frac{2(2x - 7)}{(x - 4)(x - 1)(x - 2)}$

C) $\frac{-2(x - 3)}{(x - 4)(x - 1)(x - 2)}$ D) $\frac{2(x - 5)}{(x - 4)(x - 1)(x - 2)}$

13) $\frac{x - 4}{x^2 + 14x + 48} + \frac{5x + 2}{x^2 + 3x - 40}$

A) $\frac{6x^2 + 23x + 32}{(x + 8)(x + 6)(x - 5)}$ B) $\frac{6x^2 + 23x + 32}{(x - 8)(x - 6)(x + 5)}$

C) $\frac{6x - 2}{2x^2 + 17x + 8}$ D) $6x - 2$

14) $\frac{2}{x^2 - 3x + 2} + \frac{7}{x^2 - 1}$

A) $\frac{9x - 12}{(x - 1)(x + 1)(x - 2)}$ B) $\frac{9x - 12}{(x - 1)(x - 2)}$

C) $\frac{12x - 9}{(x - 1)(x + 1)(x - 2)}$ D) $\frac{28x - 12}{(x - 1)(x + 1)(x - 2)}$

15) $\frac{x}{x^2 - 16} - \frac{3}{x^2 + 5x + 4}$

A) $\frac{x^2 - 2x + 12}{(x - 4)(x + 4)(x + 1)}$ B) $\frac{x^2 + 2x + 12}{(x - 4)(x + 4)(x + 1)}$

C) $\frac{x^2 - 2x + 12}{(x - 4)(x + 4)}$ D) $\frac{x^2 - 2}{(x - 4)(x + 4)(x + 1)}$

16) $\frac{6}{x^2 + 3x} + \frac{3}{x} + \frac{2}{x + 3}$

A) $\frac{5}{x}$ B) $\frac{2}{x}$ C) $\frac{3}{x}$ D) $\frac{6}{x}$

17) $\frac{4x}{x + 1} + \frac{5}{x - 1} - \frac{8}{x^2 - 1}$

A) $\frac{4x - 3}{x - 1}$ B) $\frac{4x - 3}{x + 1}$ C) $\frac{x + 1}{x - 1}$ D) $\frac{4x}{x - 1}$

18) $\frac{3x}{x^2 - 5x - 36} - \frac{x - 1}{x^2 - 16} + \frac{1}{x^2 - 13x + 36}$

A) $\frac{2x^2 - x - 5}{(x - 9)(x + 4)(x - 4)}$ B) $\frac{2x^2 - 21x + 13}{(x - 9)(x + 4)(x - 4)}$

C) $\frac{2x - 1}{(x - 9)(x + 4)}$ D) $\frac{2x - 1}{(x - 9)(x - 4)}$

5 Simplify Complex Rational Expressions

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Perform the indicated operations and simplify the result. Leave the answer in factored form.

1) $\frac{\frac{10}{x} + 10}{\frac{10}{x} - 10}$

A) $\frac{1 + x}{1 - x}$ B) $\frac{10(1 + x)}{1 - x}$ C) $10 - x^2$ D) $\frac{x^2}{10 - x^2}$

2) $\frac{1 - \frac{8}{x}}{1 + \frac{8}{x}}$

A) $\frac{x - 8}{x + 8}$ B) $\frac{x + 8}{x - 8}$ C) $x - 8$ D) $x + 8$

3) $\frac{\frac{7}{x} + 1}{\frac{7}{x} - 1}$

A) $\frac{7 + x}{7 - x}$ B) 7 C) $x^2 + 7$ D) $\frac{x^2}{x^2 + 7}$

4)

$$\frac{1 - \frac{1}{x}}{4 + \frac{1}{x}}$$

A) $\frac{x - 1}{4x + 1}$ B) $\frac{x - 1}{4x}$ C) $\frac{x + 1}{4x - 1}$ D) $\frac{4x + 1}{x - 1}$

5)

$$\frac{1 - \frac{9}{x}}{x - \frac{81}{x}}$$

A) $\frac{1}{x + 9}$ B) $\frac{1}{x - 9}$ C) $x + 9$ D) $x - 9$

6)

$$\frac{\frac{x}{36} - \frac{1}{x}}{1 + \frac{6}{x}}$$

A) $\frac{x - 6}{36}$ B) $\frac{x + 6}{36}$ C) $\frac{36}{x - 6}$ D) $\frac{36}{x + 6}$

7)

$$\frac{4 + \frac{2}{x}}{\frac{x}{3} + \frac{1}{6}}$$

A) $\frac{12}{x}$ B) $\frac{x}{12}$ C) 1 D) 12

8)

$$\frac{\frac{5}{x} + \frac{9}{x^2}}{\frac{25}{x^2} - \frac{81}{x}}$$

A) $\frac{5x + 9}{25 - 81x}$ B) $\frac{1}{5x - 9}$ C) $\frac{1}{5 - 9x}$ D) $\frac{5x^2 + 9}{25 - 81x}$

9)

$$\frac{\frac{4}{x} + 7}{\frac{16}{x^2} - 49}$$

A) $\frac{x}{4 - 7x}$ B) $\frac{x}{4x - 7}$ C) $\frac{1}{4 - 7x}$ D) $\frac{1}{4x - 7}$

10)

$$\frac{x - \frac{x}{x-5}}{x-6}$$

A) $\frac{x}{x-5}$ B) $\frac{x}{x-6}$ C) $\frac{x^2}{x-5}$ D) $\frac{x}{x+5}$

11)

$$\frac{\frac{5}{3x-1} - 5}{\frac{5}{3x-1} + 5}$$

A) $\frac{2-3x}{3x}$ B) $\frac{2+3x}{3x}$ C) $\frac{2-x}{x}$ D) $\frac{3x}{2-3x}$

12)

$$\frac{\frac{4}{5-x} + \frac{5}{x-5}}{\frac{3}{x} + \frac{2}{x-5}}$$

A) $\frac{x}{5x-15}$ B) $\frac{9x}{5x-15}$ C) $-\frac{x}{5x-15}$ D) $-\frac{9x}{5x-15}$

13)

$$\frac{\frac{x}{x+6} + 1}{\frac{27}{x^2-36} + 1}$$

A) $\frac{2x-12}{x-3}$ B) $\frac{x-6}{x-3}$ C) $\frac{2x-12}{x+3}$ D) $\frac{2x+12}{x+3}$

14)

$$\frac{\frac{7}{x+5} + \frac{21}{x+3}}{\frac{2x+9}{x^2+8x+15}}$$

A) 14 B) $\frac{1}{14}$ C) $2x + 9$ D) 28

15)

$$\frac{\frac{x+2}{x-2} + \frac{x-2}{x+2}}{\frac{x+2}{x-2} - \frac{x-2}{x+2}}$$

A) $\frac{x^2+4}{4x}$ B) 1 C) $\frac{(x+2)^3}{8x(x+3)}$ D) $\frac{(x+2)^2}{4x}$

16) $\dfrac{\dfrac{1}{x+9}+\dfrac{1}{x-9}}{\dfrac{1}{x^2-81}}$

A) 2x B) x^2 C) 18 D) –18

17) $\dfrac{\dfrac{2}{x^2-3x-10}-\dfrac{1}{x-5}}{\dfrac{1}{x+2}+1}$

A) $-\dfrac{x}{x^2-2x-15}$ B) $\dfrac{x}{x^2-4x-15}$ C) $-\dfrac{x}{x^2-3x-10}$ D) –1

Solve the problem.

18) The focal length f of a lens with index of refraction n is $\dfrac{1}{f}=(n-1)\left[\dfrac{1}{R_1}+\dfrac{1}{R_2}\right]$ where R_1 and R_2 are the radii of curvature of the front and back surfaces of the lens. Express f as a rational expression.

A) $f=\dfrac{R_1 R_2}{(n-1)(R_1+R_2)}$ B) $f=\dfrac{(n-1)(R_1+R_2)}{R_1 R_2}$

C) $f=\dfrac{R_1 R_2}{(n+1)(R_1-R_2)}$ D) $f=\dfrac{n(R_1-R_2)}{R_1 R_2}$

19) An electrical circuit contains two resistors connected in parallel. If the resistance of each is R_1 and R_2 ohms, respectively, then their combined resistance R is given the formula

$$R=\frac{1}{\dfrac{1}{R_1}+\dfrac{1}{R_2}}$$

If their combined resistance R is 2 ohms and R_2 is 9 ohms, find R_1.

A) $\dfrac{18}{7}$ ohms B) $\dfrac{7}{18}$ ohm C) $\dfrac{2}{7}$ ohms D) 7 ohms

0.8 nth Roots; Rational Exponents

1 Work with nth Roots

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Simplify the expression. Assume that all variables are positive when they appear.

1) $\sqrt[3]{64}$

A) 4 B) 16 C) ±4 D) 8

2) $\sqrt[3]{-512}$

A) –8 B) ±8 C) 64 D) 23

3) $\sqrt[4]{16}$

A) 2 B) −2 C) 16 D) not a real number

2 Simplify Radicals

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Simplify the expression. Assume that all variables are positive when they appear.

1) $\sqrt{9y^8}$

A) $3y^4$ B) $3y^8$ C) $9y^4$ D) $3y^6$

2) $\sqrt{147x^2}$

A) $7x\sqrt{3}$ B) $7\sqrt{3x}$ C) $147x$ D) $3x^2\sqrt{7}$

3) $\sqrt[3]{-8x^{12}y^{12}}$

A) $-2x^4y^4$ B) $-2x^6y^6$ C) $2x^4y^4$ D) $4x^4y^4$

4) $-\sqrt[3]{-64x^{12}y^{12}}$

A) $4x^4y^4$ B) $4x^4y^6$ C) $-4x^{12}y^4$ D) $16x^4y^4$

5) $\sqrt{320x^7y^8}$

A) $8x^3y^4\sqrt{5x}$ B) $8x^7y^8\sqrt{5x}$ C) $8x^3y^4\sqrt{5}$ D) $8y^4\sqrt{5x^7}$

6) $\sqrt[3]{512x^4y^5}$

A) $8xy\sqrt[3]{xy^2}$ B) $5xy\sqrt[3]{xy^2}$ C) $8xy\sqrt[3]{xy}$ D) $8xy\sqrt{xy^2}$

7) $\sqrt{\frac{32x^2y}{25}}$

A) $\frac{4x\sqrt{2y}}{5}$ B) $\frac{4\sqrt{2x^2y}}{5}$ C) $x\sqrt{\frac{32y}{5}}$ D) $16x\sqrt{2y}$

8) $\sqrt{y^7}$

A) $y^3\sqrt{y}$ B) $\sqrt{y^7}$ C) $y^6\sqrt{y}$ D) $y\sqrt{y^5}$

9) $\sqrt[3]{-125x^{33}}$

A) $-5x^{11}$ B) $5x^{11}$ C) $-5x^{33}$ D) $-5x^{30}$

10) $\sqrt[3]{x^{23}}$

A) $x^7\sqrt[3]{x^2}$ B) $x\sqrt[3]{x^{20}}$ C) x^9 D) $\sqrt[3]{x^{23}}$

11) $\sqrt[3]{\frac{9}{y^{12}}}$

A) $\frac{\sqrt[3]{9}}{y^4}$ B) $\frac{\sqrt[3]{9}}{y^9}$ C) $\frac{9}{y^4}$ D) $\sqrt[3]{\frac{9}{y^{12}}}$

12) $\sqrt[3]{\frac{192}{x^{27}}}$

A) $\frac{4\sqrt[3]{3}}{x^9}$ B) $\frac{\sqrt[3]{192}}{x^9}$ C) $\frac{4\sqrt[3]{3}}{x^{24}}$ D) $\sqrt[3]{\frac{192}{x^{27}}}$

13) $(\sqrt{6}+2)(\sqrt{6}-2)$

A) 2 B) 10 C) $6-2\sqrt{2}$ D) 4

14) $(3\sqrt{6})(9\sqrt{36})$

A) $162\sqrt{6}$ B) $27\sqrt{216}$ C) $972\sqrt{6}$ D) $162\sqrt{36}$

15) $\sqrt[3]{14}\cdot\sqrt[3]{4}$

A) $2\sqrt[3]{7}$ B) $\sqrt[3]{56}$ C) $2\sqrt[3]{14}$ D) $\sqrt[6]{56}$

16) $12\sqrt[3]{6}\cdot 3\sqrt[3]{5}$

A) $36\sqrt[3]{30}$ B) $15\sqrt[3]{30}$ C) $36\sqrt[3]{6}\cdot\sqrt[3]{5}$ D) $36\sqrt[3]{11}$

17) $5\sqrt{2}+6\sqrt{18}$

A) $23\sqrt{2}$ B) $13\sqrt{2}$ C) $11\sqrt{2}$ D) $-23\sqrt{2}$

18) $-4\sqrt{32}-4\sqrt{162}$

A) $-52\sqrt{2}$ B) $52\sqrt{2}$ C) $20\sqrt{2}$ D) $-20\sqrt{2}$

19) $-5\sqrt{162}-5\sqrt{200}-4\sqrt{18}$

A) $-107\sqrt{2}$ B) $-5\sqrt{2}$ C) $-7\sqrt{2}$ D) $7\sqrt{2}$

20) $\sqrt{2x^2}+4\sqrt{50x^2}+2\sqrt{50x^2}$

A) $31x\sqrt{2}$ B) $31x\sqrt{83}$ C) $6x\sqrt{83}$ D) $6x\sqrt{2}$

21) $5\sqrt[3]{2}-3\sqrt[3]{54}$

A) $-4\sqrt[3]{2}$ B) $2\sqrt[3]{2}$ C) $4\sqrt[3]{2}$ D) $5\sqrt[3]{2}-3\sqrt[3]{54}$

22) $\sqrt[3]{8y}-\sqrt[3]{128y}$

A) $2\sqrt[3]{y}-4\sqrt[3]{2y}$ B) $2-4\sqrt[3]{2}$ C) $6\sqrt[3]{y}$ D) $4\sqrt[3]{2y}-2\sqrt[3]{y}$

23) $(5\sqrt{2}-5)^2$

A) $75-50\sqrt{2}$ B) $75+50\sqrt{2}$ C) $25-50\sqrt{2}$ D) $45-50\sqrt{2}$

24) $4\sqrt[3]{125x} + 4\sqrt[3]{8x}$

A) $28\sqrt[3]{x}$ B) $28x$ C) $4\sqrt[3]{133x}$ D) $7\sqrt[3]{x}$

25) $2\sqrt[3]{81x} - 3\sqrt[3]{24x}$

A) 0 B) $12\sqrt[3]{x}$ C) $6\sqrt[3]{x} - 3\sqrt[3]{24x}$ D) cannot simplify

26) $\sqrt[3]{27} + 4 - \sqrt[3]{20}$

A) $7 - \sqrt[3]{20}$ B) $\sqrt[3]{27} + 4 - \sqrt[3]{20}$ C) $7 - 2\sqrt[3]{10}$ D) $7\sqrt[3]{20}$

27) $\sqrt{3x^2} - \sqrt[3]{1{,}080} + \sqrt{48x^2}$

A) $5x\sqrt{3} - 6\sqrt[3]{5}$ B) $4x\sqrt{3} - 6\sqrt[3]{5}$ C) $5x\sqrt{3} - 6\sqrt{30}$ D) $5\sqrt{3x^2} - \sqrt[3]{1{,}080}$

28) $(\sqrt{11} + \sqrt{z})(\sqrt{11} - \sqrt{z})$

A) $11 - z$ B) $11z$ C) $11 - 2\sqrt{z}$ D) $11 - 2\sqrt{11z}$

29) $\dfrac{\sqrt{56x^5y^6}}{\sqrt{2y^4}}$

A) $2x^2y\sqrt{7x}$ B) $4x^2y\sqrt{7x}$ C) $2x^4y^2\sqrt{7xy}$ D) $28xy\sqrt{x}$

Solve.

30) When an object is dropped to the ground from a height of h meters, the time it takes for the object to reach the ground is given by the equation $t = \sqrt{\dfrac{h}{4.9}}$, where t is measured in seconds. If an object falls 44.1 meters before it hits the ground, find the time it took for the object to fall.

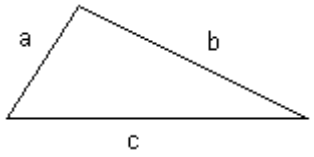
A) 3 seconds B) 4 seconds C) 9 seconds D) 6 seconds

31) If the three lengths of the sides of a triangle are known, Heron's formula can be used to find its area. If a, b, are the three lengths of the sides, Heron's formula for area is:

$A = \sqrt{s(s - a)(s - b)(s - c)}$

where s is half the perimeter of the triangle, or $s = \dfrac{1}{2}(a + b + c)$.

Use this formula to find the area of the triangle if a = 9 cm, b = 11 cm and c = 16 cm.



A) $18\sqrt{7}$ sq. cm B) $18\sqrt{14}$ sq. cm C) $180\sqrt{15}$ sq. cm D) $3\sqrt{14}$ sq. cm

Solve the problem.

32) A formula used to determine the velocity v in feet per second of an object (neglecting air resistance) after it has fallen a certain height is $v = \sqrt{2gh}$, where g is the acceleration due to gravity and h is the height the object has fallen. If the acceleration g due to gravity on Earth is approximately 32 feet per second, find the velocity of a bowling ball after it has fallen 90 feet. (Round to the nearest tenth.)

A) 75.9 ft per sec B) 53.7 ft per sec C) 13.4 ft per sec D) 5,760 ft per sec

33) Police use the formula $s = \sqrt{30fd}$ to estimate the speed s of a car in miles per hour, where d is the distance in feet that the car skidded and f is the coefficient of friction. If the coefficient of friction on a certain gravel road is 0.24 and a car skidded 350 feet, find the speed of the car, to the nearest mile per hour.

A) 50 mph B) 102 mph C) 275 mph D) 2,520 mph

34) The formula $v = \sqrt{2.5r}$ can be used to estimate the maximum safe velocity v, in miles per hour, at which a car can travel along a curved road with a radius of curvature r, in feet. To the nearest whole number, find the maximum safe speed for a curve in a road with a radius of curvature of 350 feet.

A) 30 mph B) 47 mph C) 19 mph D) 12 mph

35) The maximum distance d in kilometers that you can see from a height h in meters is given by the formula $d = 3.5\sqrt{h}$. How far can you see from the top of a 426–meter building? (Round to the nearest tenth of a kilometer.)

A) 72.2 km B) 38.6 km C) 20.6 km D) 797 km

3 Rationalize Denominators

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Simplify the expression. Assume that all variables are positive when they appear.

1) $\frac{1}{\sqrt{23}}$

A) $\frac{\sqrt{23}}{23}$ B) $23\sqrt{23}$ C) 23 D) $\sqrt{23}$

2) $\frac{6}{\sqrt{5}}$

A) $\frac{6\sqrt{5}}{5}$ B) $6\sqrt{5}$ C) $\frac{36\sqrt{5}}{5}$ D) 31

3) $\frac{4}{\sqrt{11}}$

A) $\frac{4\sqrt{11}}{11}$ B) $4\sqrt{11}$ C) $\frac{16\sqrt{11}}{11}$ D) 125

4) $\frac{\sqrt{81}}{\sqrt{7}}$

A) $\frac{9\sqrt{7}}{7}$ B) $9\sqrt{7}$ C) $\frac{81\sqrt{7}}{7}$ D) 58

5) $\frac{-9}{\sqrt{20}}$

A) $-\frac{9\sqrt{5}}{10}$ B) $-9\sqrt{5}$ C) $-\frac{9\sqrt{5}}{5}$ D) −20

6) $\frac{2}{6-\sqrt{3}}$

A) $\frac{12+2\sqrt{3}}{33}$ B) $\frac{12-2\sqrt{3}}{33}$ C) $\frac{12+2\sqrt{3}}{-3}$ D) $\frac{2}{6}-\frac{2}{\sqrt{3}}$

7) $\frac{\sqrt{3}}{\sqrt{7}+2}$

A) $\frac{\sqrt{21}-2\sqrt{3}}{3}$ B) $\frac{\sqrt{21}+2\sqrt{3}}{3}$ C) $\frac{\sqrt{21}-2\sqrt{3}}{9}$ D) $\frac{3\sqrt{21}+7\sqrt{3}}{14}$

8) $\frac{\sqrt{3}}{3\sqrt{2}-\sqrt{3}}$

A) $\frac{\sqrt{6}+1}{5}$ B) $\frac{\sqrt{6}-1}{5}$ C) $\frac{\sqrt{6}+1}{7}$ D) $\frac{\sqrt{2}+1}{5}$

9) $\frac{7-\sqrt{6}}{7+\sqrt{6}}$

A) $\frac{55-14\sqrt{6}}{43}$ B) $\frac{55+14\sqrt{6}}{43}$ C) 1 D) $\frac{43-14\sqrt{6}}{55}$

10) $\frac{6\sqrt{7}+\sqrt{14}}{\sqrt{14}+\sqrt{7}}$

A) $5\sqrt{2}-4$ B) $7\sqrt{2}+8$ C) $6\sqrt{2}-8$ D) $6\sqrt{2}-4$

11) $\frac{7}{\sqrt[3]{3}}$

A) $\frac{7\sqrt[3]{9}}{3}$ B) $\frac{7\sqrt[3]{3}}{3}$ C) $7\sqrt[3]{9}$ D) $7\sqrt[3]{3}$

12) $\frac{-5}{\sqrt[3]{9}}$

A) $\frac{-5\sqrt[3]{3}}{3}$ B) $\frac{-5\sqrt[3]{9}}{3}$ C) $-5\sqrt[3]{9}$ D) $-5\sqrt[3]{3}$

13) $\frac{\sqrt{x}-\sqrt{y}}{\sqrt{5x}+\sqrt{2y}}$

A) $\frac{x\sqrt{5}-\sqrt{2xy}\ -\sqrt{5xy}+y\sqrt{2}}{5x-2y}$ B) $\frac{x\sqrt{5}-\sqrt{2xy}\ -\sqrt{5xy}+y\sqrt{2}}{5x+2y}$

C) $\frac{\sqrt{5x}-\sqrt{7xy}\ +\sqrt{2y}}{5x-2y}$ D) $\frac{\sqrt{5x}-\sqrt{7xy}\ +\sqrt{2y}}{5x+2y}$

14) $\frac{4}{\sqrt{x+h}-\sqrt{x}}$

A) $\frac{4(\sqrt{x+h}+\sqrt{x})}{h}$ B) $\frac{4\sqrt{x+h}+\sqrt{x}}{h}$ C) $\frac{4\sqrt{h}}{h}$ D) $\frac{4(\sqrt{x+h}-\sqrt{x})}{h}$

4 Simplify Expressions with Rational Exponents

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Simplify the expression.

1) $-32^{1/5}$

A) −2 B) 16 C) 32 D) −8

2) $\left(\frac{1}{625}\right)^{1/4}$

A) $\frac{1}{5}$ B) −5 C) $\frac{-1}{5}$ D) 5

3) $8^{4/3}$

A) 16 B) 64 C) 32 D) 128

4) $16^{5/4}$

A) 32 B) 256 C) 128 D) 512

5) $243^{4/5}$

A) 81 B) 6,561 C) 2,187 D) 19,683

6) $\left(\frac{1}{64}\right)^{2/3}$

A) $\frac{1}{16}$ B) $-\frac{1}{16}$ C) $\frac{1}{24}$ D) $\frac{1}{8}$

7) $(-8)^{4/3}$

A) 16 B) 64 C) −16 D) not a real number

8) $16^{-3/2}$

A) $\frac{1}{64}$ B) $-\frac{1}{64}$ C) 64 D) −64

9) $27^{-4/3}$

A) $\frac{1}{81}$ B) $-\frac{1}{81}$ C) 81 D) not a real number

10) $16^{-5/4}$

A) $\frac{1}{32}$ B) $-\frac{1}{32}$ C) 32 D) not a real number

11) $32^{-4/5}$

A) $\frac{1}{16}$ B) $-\frac{1}{16}$ C) 16 D) not a real number

12) $-27^{-4/3}$

A) $-\frac{1}{81}$ B) $\frac{1}{81}$ C) 81 D) not a real number

13) $-243^{-4/5}$

A) $-\frac{1}{81}$ B) $\frac{1}{81}$ C) 81 D) not a real number

14) $361^{1/2}$

A) 19 B) 38 C) 9.5 D) 76

15) $125^{1/3}$

A) 5 B) 15 C) 625 D) 1,875

16) $16^{1/4}$

A) 2 B) 8 C) 16 D) 32

17) $16^{7/4}$

A) 128 B) 16,384 C) $\sqrt[7]{8}$ D) 131

18) $64^{4/3}$

A) 256 B) 4,096 C) 1,024 D) 16,384

19) $256^{5/4}$

A) 1,024 B) 65,536 C) 16,384 D) 262,144

20) $4^{-1/2}$

A) $\frac{1}{2}$ B) 2 C) −2 D) $-\frac{1}{2}$

21) $8^{-1/3}$

A) $\frac{1}{2}$ B) $\frac{1}{6}$ C) −2 D) 2

22) $125^{-4/3}$

A) $\frac{1}{625}$ B) $-\frac{1}{625}$ C) −625 D) 625

23) $16^{-5/4}$

A) $\frac{1}{32}$ B) −1,024 C) $-\frac{1}{32}$ D) −32

24) $\left(\frac{25}{4}\right)^{3/2}$

A) $\frac{125}{8}$ B) $\frac{8}{125}$ C) $-\frac{8}{125}$ D) $-\frac{125}{8}$

25) $\left(\frac{49}{36}\right)^{-1/2}$

A) $\frac{6}{7}$ B) $\frac{49}{72}$ C) $\frac{7}{6}$ D) not a real number

26) $\left(-\frac{8}{27}\right)^{-2/3}$

A) $\frac{9}{4}$ B) $\frac{4}{9}$ C) $-\frac{4}{9}$ D) not a real number

Simplify the expression. Express the answer so that only positive exponents occur. Assume that all variables are positive.

27) $x^{7/8} \cdot x^{1/8}$

A) x B) $x^{7/8}$ C) $x^{7/64}$ D) $\frac{1}{x}$

28) $x^{-2/5} \cdot x^{3/5}$

A) $x^{1/5}$ B) $x^{-1/5}$ C) $x^{6/5}$ D) $x^{5/6}$

29) $(x^{14}y^7)^{1/7}$

A) x^2y B) $x^2|y|$ C) $x^{14}y$ D) x^2

30) $(25x^6y^4)^{1/2}$

A) $5x^3y^2$ B) $5x^3y$ C) x^3y^2 D) $5x^6y^2$

31) $(2x^{2/3})(7x^{3/4})$

A) $14x^{17/12}$ B) $14x^{5/12}$ C) $14x^{17/7}$ D) $14x^{2/3}$

32) $(x^5y^4)^{7/3}$

A) $x^{35/3}y^{28/3}$ B) $x^{22/3}y^{19/3}$ C) $x^{28/3}y^{35/3}$ D) $x^{15/7}y^{12/7}$

33) $(16x^{10}y^{-4})^{3/2}$

A) $\frac{64x^{15}}{y^6}$ B) $\frac{16x^{15}}{y^6}$ C) $64x^{15}y^6$ D) $\frac{64}{x^{15}y^6}$

34) $(9x^{1/3} \cdot y^{1/3})^2$

A) $81x^{2/3}y^{2/3}$ B) $81x^{1/9}y^{1/9}$ C) $81x^{1/6}y^{1/6}$ D) $81x^2y^2$

35) $\frac{x^{3/4} \cdot x^{2/5}}{x^{-2/7}}$

A) $x^{201/140}$ B) $x^{121/140}$ C) $\frac{1}{x^{201/140}}$ D) $\frac{1}{x^{121/140}}$

36) $\frac{(5x^{5/2})^2}{x^{-4/3}}$

A) $25x^{19/3}$ B) $25x^{11/3}$ C) $5x^{19/3}$ D) $5x^{11/3}$

An expression that occurs in calculus is given. Write the expression as a single quotient in which only positive exponents and/or radicals appear.

37) $\dfrac{(49 - x^2)^{1/2} + 3x^2(49 - x^2)^{-1/2}}{49 - x^2}$

A) $\dfrac{49 + 2x^2}{(49 - x^2)^{3/2}}$ B) $\dfrac{49 - 4x^2}{(49 - x^2)^{3/2}}$ C) $\dfrac{3x^2}{(49 - x^2)^{3/2}}$ D) $\dfrac{3x^2}{\sqrt{49 - x^2}}$

38) $6x^{3/2}(x^3 + x^2) - 8x^{5/2} - 8x^{3/2}$

A) $2x^{3/2}(x + 1)(3x^2 - 4)$ B) $6x^{3/2}(x^3 - 1) + 6x^3 - 2x^{3/2}(x - 1)$

C) $x^{3/2}(x - 1)[6(x^2 - 1) - 2] + 6x^3$ D) $6x^{3/2}(x + 1)(3x^2 - 4)$

39) $(x^2 - 1)^{1/2} \cdot \dfrac{3}{2}(2x + 5)^{1/2} \cdot 2 + (2x + 5)^{3/2} \cdot \dfrac{1}{2}(x^2 - 1)^{-1/2} \cdot 2x$

A) $\dfrac{(2x + 5)^{1/2}(5x^2 + 5x - 3)}{(x^2 - 1)^{1/2}}$ B) $\dfrac{(2x + 5)^{1/2}(5x^2 + 5x - 3)}{(x^2 - 1)^{-1/2}}$

C) $(x^2 - 1)^{1/2}(2x + 5)^{1/2}(5x^2 + 5x - 3)$ D) $(x^2 - 1)^{1/2}(2x + 5)^{-1/2}(5x^2 + 5x - 3)$

40) $\dfrac{(x^2 + 2)^{1/2} \cdot \dfrac{3}{2}(2x + 1)^{1/2} \cdot 2 - (2x + 1)^{3/2} \cdot \dfrac{1}{2}(x^2 + 2)^{-1/2} \cdot 2x}{x^2 + 2}$

A) $\dfrac{(2x + 1)^{1/2}(x^2 - x + 6)}{(x^2 + 2)^{3/2}}$ B) $\dfrac{(2x + 1)^{1/2}(x^2 - x + 6)}{(x^2 + 2)^{-3/2}}$

C) $(x^2 + 2)^{3/2}(2x + 1)^{1/2}(x^2 - x + 6)$ D) $(x^2 + 2)^{3/2}(2x + 1)^{-1/2}(x^2 - x + 6)$

Factor the expression. Express your answer so that only positive exponents occur.

41) $x^{6/8} + 3x^{5/8}$

A) $x^{5/8}(x^{1/8} + 3)$ B) $x^{5/8}(x^{-1/8} + 3)$ C) $x^{1/8}(x^{6/8} + 3)$ D) $x^{1/8}(x^{1/8} + 3)$

42) $9x^{4/7} - 11x^{-6/7}$

A) $x^{-6/7}(9x^{10/7} - 11)$ B) $x^{1/3}(9 - 11x^{10/11})$

C) $x^{-6/7}(9x^{10/7} - 11x)$ D) $x^{4/7}(9x^{10/7} - 11x^{10/11})$

43) $x^{2/3} + x^{1/6}$

A) $x^{1/6}(x^{1/2} + 1)$ B) $x^{1/6}(x^{1/2})$ C) $x^{1/6}(x^{1/2} - 1)$ D) $x^{1/6}(x^{1/2} + x)$

44) $x^{1/2} - x^{-1/4}$

A) $x^{-1/4}(x^{3/4} - 1)$ B) $x^{-1/4}(x^{3/4})$ C) $x^{-1/4}(x^{3/4} + 1)$ D) $x^{-1/4}(x^{3/4} - x)$

45) $(x + 2)^{-3/17} + (x + 2)^{-1/17} + (x + 2)^{1/17}$

A) $(x + 2)^{-3/17}[1 + (x + 2)^{2/17} + (x + 2)^{4/17}]$ B) $(x + 2)^{-3/17}[1 + (x + 2)^{-2/17} + (x + 2)^{-4/17}]$

C) $(x + 2)^{-3/17}[1 + (x + 2)^{4/17} + (x + 2)^{6/17}]$ D) $(x + 2)^{-3/17}[1 + (x + 2)^{1/17} + (x + 2)^{3/17}]$

46) $(3m + 1)^{-2/5} + (3m + 1)^{1/5} + (3m + 1)^{7/5}$

A) $(3m + 1)^{-2/5}[1 + (3m + 1)^{3/5} + (3m + 1)^{9/5}]$

B) $(3m + 1)^{-2/5}[1 + (3m + 1)^{4/5} + (3m + 1)^{7/5}]$

C) $(3m + 1)^{-2/5}[1 + (3m + 1)^{-3/5} + (3m + 1)^{-9/5}]$

D) $(3m + 1)^{-2/5}[1 + (3m + 1)^{3/5} - (3m + 1)^{9/5}]$

Ch. 0 Chapter R: Review
Answer Key

0.1 Real Numbers

1 Work with Sets

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A

2 Classify Numbers

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A

3 Evaluate Numerical Expressions

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A
15) A
16) A
17) A
18) A
19) A
20) A
21) A

4 Work with Properties of Real Numbers

1) A
2) A

3) A
4) A
5) A
6) A
7) A

0.2 Algebra Essentials

1 Graph Inequalities

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A
15) A
16) A
17) A
18) A
19) A

2 Find Distance on the Real Number Line

1) A

3 Evaluate Algebraic Expressions

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A
15) A
16) A
17) A
18) A
19) A
20) A
21) A
22) A
23) A

4 Determine the Domain of a Variable

1) A
2) A
3) D
4) A
5) A
6) A
7) A

5 Use the Laws of Exponents

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A
15) A
16) A
17) A
18) A
19) A
20) A
21) A
22) A
23) A
24) A

6 Evaluate Square Roots

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A

7 Use a Calculator to Evaluate Exponents

1) A
2) A
3) A

8 Use Scientific Notation

1) A
2) A
3) A
4) A
5) A
6) A

7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A
15) A
16) A
17) A
18) A
19) A
20) A
21) A

0.3 Geometry Essentials

1 Use the Pythagorean Theorem and Its Converse

1) A
2) A
3) A
4) D
5) A
6) A
7) A
8) D
9) D
10) A
11) A

2 Know Geometry Formulas

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A
15) A
16) A
17) A
18) A
19) A
20) A

3 Understand Congruent Triangles and Similar Triangles

1) A
2) A

3) A
4) A
5) A
6) A

0.4 Polynomials

1 Recognize Monomials

1) A
2) A
3) D
4) D
5) A
6) A
7) D
8) D
9) D

2 Recognize Polynomials

1) A
2) A
3) A
4) A
5) D
6) D
7) A
8) A
9) D

3 Add and Subtract Polynomials

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A

4 Multiply Polynomials

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A

12) A

5 Know Formulas for Special Products

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A

6 Divide Polynomials Using Long Division

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A
15) A

7 Work with Polynomials in Two Variables

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A

0.5 Factoring Polynomials

1 Factor the Difference of Two Squares and the Sum and Difference of Two Cubes

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A

9) A
10) A
11) A
12) A
13) A
14) A
15) A
16) A
17) A
18) A
19) A
20) A
21) A
22) A
23) A

2 Factor Perfect Squares

1) A
2) A
3) A
4) A
5) A
6) A
7) A

3 Factor a Second–Degree Polynomial: x^2 + Bx + C

1) A
2) A
3) A
4) D
5) A
6) A
7) A
8) A
9) A

4 Factor by Grouping

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A

5 Factor a Second–Degree Polynomial: Ax^2 + Bx + C, A ≠ 1

1) A
2) A
3) A
4) A
5) A

6) A
7) D
8) A
9) A
10) A
11) A
12) A
13) A
14) A
15) A
16) A
17) A
18) A

6 Complete the Square

1) A
2) A
3) A
4) A
5) A

0.6 Synthetic Division

1 Divide Polynomials Using Synthetic Division

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) B
11) A
12) B
13) B
14) B
15) A
16) A
17) B

0.7 Rational Expressions

1 Reduce a Rational Expression to Lowest Terms

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A

2 Multiply and Divide Rational Expressions

1) A

2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A
15) A
16) A

3 Add and Subtract Rational Expressions

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A
15) A

4 Use the Least Common Multiple Method

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A
15) A
16) A
17) A
18) A

5 Simplify Complex Rational Expressions

1) A
2) A

3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A
15) A
16) A
17) A
18) A
19) A

0.8 nth Roots; Rational Exponents

1 Work with nth Roots

1) A
2) A
3) A

2 Simplify Radicals

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A
15) A
16) A
17) A
18) A
19) A
20) A
21) A
22) A
23) A
24) A
25) A
26) A
27) A
28) A
29) A

30) A
31) A
32) A
33) A
34) A
35) A

3 Rationalize Denominators

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A

4 Simplify Expressions with Rational Exponents

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A
15) A
16) A
17) A
18) A
19) A
20) A
21) A
22) A
23) A
24) A
25) A
26) A
27) A
28) A
29) A
30) A
31) A

32) A
33) A
34) A
35) A
36) A
37) A
38) A
39) A
40) A
41) A
42) A
43) A
44) A
45) A
46) A