Practice 1-1

Rational Numbers

Write the decimal expansion of each fraction.

1. \( \frac{12}{36} \)  
2. \( \frac{20}{25} \)  
3. \( \frac{28}{60} \)

4. \( \frac{14}{80} \)  
5. \( \frac{77}{99} \)  
6. \( \frac{21}{56} \)

7. \( \frac{15}{33} \)  
8. \( \frac{5}{40} \)  
9. \( \frac{15}{60} \)

10. \( \frac{7}{21} \)  
11. \( \frac{24}{50} \)  
12. \( -\frac{2}{3} \)

13. \( \frac{22}{80} \)  
14. \( -\frac{30}{48} \)  
15. \( \frac{11}{12} \)

16. \( \frac{14}{22} \)  
17. \( \frac{35}{40} \)  
18. \( -\frac{28}{72} \)

19. \( -\frac{42}{54} \)  
20. \( \frac{14}{30} \)  
21. \( \frac{9}{40} \)

Write each decimal as a mixed number or fraction in simplest form.

22. 0.006  
23. -4.8  
24. 0.97

25. 0.4  
26. 9.05  
27. -0.28

28. 3.082  
29. -1.41  
30. 4.23

31. 8.05  
32. -3.02  
33. 7.13

Solve.

34. The eighth grade held a magazine sale to raise money for their spring trip. They wanted each student to sell subscriptions. After the first day of the sale, 25 out of 125 students turned in subscription orders. Write a rational number in simplest form to express the student response on the first day.

35. Pete wanted to win the prize for selling the most subscriptions. Of 240 subscriptions sold, Pete sold 30. Write a rational number in simplest form to express Pete’s part of the total sales.
Practice 1-2

Irrational Numbers and Square Roots

Find the two square roots of each number.
1. \(81\)  
2. \(\frac{9}{49}\)  
3. \(\frac{1}{121}\)  
4. \(289\)

Estimate the value of each expression to the nearest integer and to the nearest tenth.
5. \(\sqrt{5}\)  
6. \(-\sqrt{10}\)  
7. \(\sqrt{3}\)  
8. \(-\sqrt{245}\)  
9. \(-\sqrt{21}\)  
10. \(-\sqrt{52}\)

Which number is greater?
11. \(\sqrt{60}, 7.5\)  
12. \(\sqrt{5}, 6.1\)  
13. \(\sqrt{44}, 4.5\)  
14. \(\sqrt{64}, 9.3\)

Find each square root. Round to the nearest tenth if necessary.
15. \(\sqrt{130}\)  
16. \(\sqrt{8}\)  
17. \(\sqrt{144}\)  
18. \(\sqrt{160}\)  
19. \(\sqrt{182}\)  
20. \(\sqrt{256}\)  
21. \(\sqrt{301}\)  
22. \(\sqrt{350}\)

Identify each number as rational or irrational.
23. \(\sqrt{16}\)  
24. \(\sqrt{11}\)  
25. \(\sqrt{196}\)  
26. \(\frac{4}{5}\)  
27. \(0.\overline{712}\)  
28. \(-8\)  
29. \(\sqrt{3}\)  
30. \(5.2\)  
31. \(0.1010010001\ldots\)  
32. \(-\sqrt{25}\)  
33. \(\sqrt{306}\)  
34. \(2.7064\)

Use \(s = 20 \sqrt{273 + T}\) to estimate the speed of sound \(s\) in meters per second for each Celsius temperature \(T\). Round to the nearest integer.
35. \(37^\circ C\)  
36. \(-1^\circ C\)  
37. \(15^\circ C\)  
38. \(-18^\circ C\)
Practice 1-3

Find the cube root of each number.

1. 64
2. 729
3. −343
4. \( \frac{1}{8} \)
5. −1,000
6. \( \frac{27}{64} \)

Solve each equation by finding the value of \( x \).

7. \( x^3 = -1 \)
8. \( x^3 = 216 \)
9. \( x^3 = 1,728 \)
10. \( x^3 = \frac{8}{27} \)
11. \( x^3 = \frac{64}{125} \)
12. \( x^3 = \frac{125}{512} \)

Find the side length of each cube.

13. 216 yd\(^3\)
14. 1,331 cm\(^3\)

15. A bottle of cologne comes in a cube-shaped box that has a volume of 64 cubic inches. What is the length of one side of the box?

16. A cube-shaped shipping crate has a volume of 27 cubic feet. What are the dimensions of the crate?

17. What is a reasonable estimate for the volume of a number cube: 8 cm\(^3\), 27 in\(^3\), or 1 ft\(^3\)?

18. A cube-shaped terrarium has a volume of \( \frac{27}{64} \) cubic feet. What is the length of its sides?
Practice 1-4

The Pythagorean Theorem

Find the length of the hypotenuse of each triangle. If necessary, round to the nearest tenth.

1. 

2. 

3. 

4. 

Let \( a \) and \( b \) represent the lengths of the legs of a right triangle. Find the length of the hypotenuse. If necessary, round to the nearest tenth.

5. \( a = 14, b = 18 \) 

6. \( a = 7, b = 23 \) 

7. \( a = 15, b = 8 \)

Solve.

8. A circus performer walks on a tightrope 25 feet above the ground. The tightrope is supported by two beams and two support cables. If the distance between each beam and the base of its support cable is 15 feet, what is the length of the support cable? Round to the nearest foot.

You are given three circles, as shown. Points \( A, B, C, D, E, F, \) and \( G \) lie on the same line. Find each length to the nearest tenth.

9. \( HD \) 

10. \( IE \) 

11. \( JD \)
**Practice 1-5**

Using The Pythagorean Theorem

Find the missing leg length. If necessary, round the answer to the nearest tenth.

1. \[ \text{12 in.} \]
   \[ \text{17 in.} \]

2. \[ \text{15 m} \]
   \[ \text{12 m} \]

3. \[ \text{15 m} \]
   \[ \text{25 m} \]

4. \[ \text{60 mi} \]
   \[ \text{38 mi} \]

For Exercises 5–14, \(a\) and \(b\) represent leg lengths and \(c\) represents the length of the hypotenuse. Find the missing leg length. If necessary, round to the nearest tenth.

5. \(a = 8\, \text{cm}, c = 12\, \text{cm}\)

6. \(b = 9\, \text{in.}, c = 15\, \text{in.}\)

7. \(b = 5\, \text{m}, c = 25\, \text{m}\)

8. \(a = 36\, \text{in.}, c = 39\, \text{in.}\)

9. \(a = 10\, \text{m}, c = 20\, \text{m}\)

10. \(b = 24\, \text{mm}, c = 25\, \text{mm}\)

11. \(a = 9\, \text{yd}, c = 41\, \text{yd}\)

12. \(b = 10\, \text{cm}, c = 26\, \text{cm}\)

13. \(b = 27\, \text{yd}, c = 130\, \text{yd}\)

14. \(a = 11\, \text{mi}, c = 61\, \text{mi}\)

15. One leg of a right triangle is 4 ft long and the hypotenuse is 5 ft long. Ritchie uses \(\sqrt{4^2 + 5^2}\) to find the length of the other leg. Is Ritchie correct in his approach? Why or why not?
Practice 1-6

Is it possible to construct a triangle with the given side lengths? Explain.

1. 2 yd, 3 yd, 7 yd
2. 4 cm, 4 cm, 8 cm
3. 12 ft, 14 ft, 15 ft
4. 5.4 m, 8.6 m, 13 m
5. \(\frac{4}{5}\) in., \(\frac{3}{5}\) in., 4 in.
6. 18 mm, 25 mm, 52 mm

Determine whether the given lengths can be side lengths of a right triangle. Explain.

7. 6 ft, 10 ft, 12 ft
8. 10 in., 24 in., 26 in.
9. 20 m, 21 m, 29 m
10. 15 cm, 17 cm, 21 cm
11. 14 ft, 22.5 ft, 26.5 ft
12. 12 yd, 35 yd, 38 yd

Determine whether the triangles are right triangles. Explain.

13.

\[
\begin{align*}
9 \text{ in.} & \quad 12 \text{ in.} \\
15 \text{ in.} 
\end{align*}
\]

14.

\[
\begin{align*}
15 \text{ cm} & \quad 17 \text{ cm} \\
8 \text{ cm} 
\end{align*}
\]

15. A company is designing a new logo in the shape of a triangle. Two of the sides each measure 2 cm. Which of the following is a possible measure for the third side: 3 cm, 4 cm, 5 cm?

16. Three nature trails intersect to form a triangle around a park. The lengths of the trails are 2.8 mi, 3.2 mi, and 4.1 mi. Do the trails form a right triangle? Explain.

17. The sides of a triangular game board are 1 ft, 1 ft, and \(\sqrt{2}\) ft in length. Is the game board in the shape of a right triangle? Explain.

18. How do you know that the lengths 6 in., 8 in., and 25 in. cannot form a right triangle without using the Converse of the Pythagorean Theorem?
Practice 1-7

Distance in the Coordinate Plane

Find the distance between each pair of points. If necessary, round to the nearest tenth.

1. $A(7, 4)$ and $H(2, 7)$

2. $C(-4, 3)$ and $G(6, 0)$

3. $B(4, -6)$ and $D(-3, -4)$

4. $E(5, -3)$ and $C(-4, 3)$

5. $F(4, 3)$ and $G(6, 0)$

6. $A(7, 4)$ and $D(-3, -4)$

7. $B(4, -6)$ and $I(-5, -9)$

8. $E(5, -3)$ and $F(4, 3)$

9. Arnie plotted points on the graph on the right. He placed his pencil point at $A$. He can move either right or down any whole number of units until he reaches point $B$. In how many ways can he do this?

10. Marika had to draw $\triangle ABC$ that fit several requirements.
   a. It must fit in the box shown.
   b. The endpoints of $AB$ have coordinates $A(-2, 0)$ and $B(2, 0)$.
   c. Point $C$ must be on the $y$-axis and its $y$-coordinate is an integer.

Name all the points that could be point $C$. 

Name ___________________________ Class ___________________ Date ______________