**7.1 Finding Square Roots**

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| --- | --- |
| **Standards**8.EE.2 | **Learning Objectives (I can…)*** Find square roots of perfect squares
* Evaluate expressions involving square roots
* Use square roots to solve equations
 |

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a number is a number that, when multiplied by itself, equals the given number. Every positive number has a positive *and* a negative square root. A \_\_\_\_\_\_\_\_\_\_\_\_\_ is a number with integers as its square roots.

**Example 1:** Finding Square Roots of a Perfect Square

**Find the two square roots of 49.**

The symbol \_\_\_\_ is called a **radical sign.** It is used to represent a square root. The number under the radical sign is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |  |
| --- | --- | --- |
| **Positive Square Root,** | **Negative Square Root,** | **Both Square Roots,** |
|  |  |  |

**Example 2:** Finding Square Roots

**Find the square root(s).**

1.

**On Your Own:**

**Find the two square roots of the number.**

1. 36 **2.** 100 **3.** 121

 **Find the square root(s).**

 **4**. **5.**  **6.**

Squaring a positive number and finding a square root are \_\_\_\_\_\_\_\_\_\_\_\_ operations. You can use this relationship to evaluate expressions and solve equations involving squares.

**Example 3:** Evaluating Expressions Involving Square Roots

 **Evaluate each expression.**

**Example 4:** Real-Life Application

**The area of a crop circle is 45,216 square feet. What is the radius of the crop circle? Use 3.14 for** 𝛑**.**

**On Your Own:**

 **Evaluate the expression.**

 **7.**  **8.**  **9.**

**10.** The area of a circle is 2826 square feet. Write and solve an equation to find the radius of the circle. Use 3.14 for π.

**7.2 Finding Cube Roots**

|  |  |
| --- | --- |
| **Standards**8.EE.2 | **Learning Objectives (I can…)*** Find cube roots of perfect cubes
* Evaluate expressions involving cube roots
* Use cube roots to solve equations
 |

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of a number is a number that, when multiplied by itself, and then multiplied by itself again, equals the given number. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a number that can be written as the cube of an integer. The symbol \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is used to represent a cube root.

**Example 1:** Finding Cube Roots

 **Find each cube root.**

1.
2.
3.

Cubing a number and finding a cube root are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ operations. You can use this relationship to evaluate expressions and solve equations involving cubes.

**Example 2:** Evaluating Expressions Involving Cube Roots

 **Evaluate each expression.**

**On Your Own:**

 **Find the cube root.**

1. **2. 3.**

**Evaluate the expression.**

1. **5. 6.**

**Example 3:** Evaluating an Algebraic Expression

 **Evaluate**  **when .**

**On Your Own:**

 **Evaluate the expression for the given value of the variable.**

 **7.**  **8.**

**Example 4:** Real-Life Application

 **Find the surface area of the baseball display case.**

The baseball display case is in the shape of a cube. Use the formula for the volume of a cube to find the edge length *s*.



**On Your Own:**

**9. The volume of a music box that is shaped like a cube is 512 cubic centimeters. Find the surface area of the music box.**

**7.3 Pythagorean Theorem**

|  |  |
| --- | --- |
| **Standards**8.EE.28.G.68.G.78.G.9 | **Learning Objectives (I can…)*** Provide a geometric proof of the Pythagorean Theorem
* Use the Pythagorean Theorem to find missing side lengths of right triangles
* Solve real-life problems
 |

**Key Idea**

**Sides of a Right Triangle**

The sides of a right triangle have special names.



**The Pythagorean Theorem**

**Words:** In any right triangle, the sum of the squares of the lengths of the legs is equal to the square of the length of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Algebra:**

**Example 1:** Finding the Length of a Hypotenuse

 **Find the length of the hypotenuse of the triangle.**



**On Your Own:**

 **Find the length of the hypotenuse of the triangle.**

1. **2.**

**Example 2:** Find the Length of the Leg

 **Find the missing length of the triangle.**



**On Your Own:**

 **Find the missing length of the triangle.**

 **3. 4.**

**Example 3:** Real-Life Application

**You are playing capture the flag. You are 50 yards north and 20 yards east of your team’s base. The other team’s base is 80 yards north and 60 yards east of your base. How far are you from the other team’s base?**



**7.4 Approximating Square Roots**

|  |  |
| --- | --- |
| **Standards**8.NS.18.NS.28.EE.2 | **Learning Objectives (I can…)*** Define irrational numbers
* Approximating square roots
* Approximating values of expressions involving irrational numbers
 |

A rational number is a number that can be written as the ratio of two integers. An \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cannot be written as the ratio of two integers.

* The square root of any whole number that is not a perfect square is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The cube root of any integer that is not a perfect cube is irrational.
* The decimal form of an irrational number neither terminates nor \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Key Idea**

**Real Numbers**

Rational numbers and irrational numbers together form the set of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.



**Example 1:** Classifying Real Numbers

 **Classify each real number.**

|  |  |  |
| --- | --- | --- |
| **Number** | **Subset(s)** | **Reasoning** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**On Your Own:**

 **Classify the real number.**

1. **2.** **3.**

**Example 2:** Approximating a Square Root

 **Estimate to the nearest (a) integer and (b) tenth.**

1. Make a table of numbers whose squares are close to 71.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** |  |  |  |  |
| **Square of Number** |  |  |  |  |

1. Make a table of numbers between 8 and 9 whose squares are close to 71.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** |  |  |  |  |
| **Square of Number** |  |  |  |  |

**On Your Own:**

 **Estimate the square root to the nearest (a) integer and (b) tenth.**

**4. 5. 6.**

**Example 3:** Comparing Real Numbers

 **Which is greater, or ?**

Estimate to the nearest integer. Then graph the numbers on a number line.

**Example 4:** Approximating the Value of an Expression

**The radius of a circle with area *A* is approximately**  **. The area of a** **circular mouse pad is 51 square inches. Estimate its radius to the** **nearest integer.**

**Example 5:** Real-Life Application

**The distance (in nautical miles) you can see with a periscope is , where *h* is the height of the periscope above the water. Can you see twice as far with a periscope that is 6 feet above the water than with a periscope that is 3 feet above the water? Explain.**



**On Your Own:**

 **Which number is greater? Explain.**

**7. 8. 9.**

**Extension 7.4 Repeating Decimals**

|  |  |
| --- | --- |
| **Standards**8.NS.1 | **Learning Objectives (I can…)*** Write a repeating decimal as a fraction
 |

**Key Idea**

**Writing a Repeating Decimal as a Fraction**

Let a variable *x* equal the repeating decimal *d*.

**Step 1:**

**Step 2:**

**Step 3:**

**Step 4:**

**Example 1:** Writing a Repeating Decimal as a Fraction (1 Digit Repeats)

 **Write**  **as a fraction in simplest form.**

**Example 2:** Writing a Repeating Decimal as a Fraction (1 Digit Repeats)

 **Write as a fraction in simplest form.**

**On Your Own:**

 **Write the decimal as a fraction or a mixed number.**

1. **2. 3. 4.**

**Example 3:** Writing a Repeating Decimal as a Fraction (2 Digit Repeats)

 **Write as a mixed number.**

**7.5 Using the Pythagorean Theorem**

|  |  |
| --- | --- |
| **Standards**8.EE.28.G.68.G.78.G.8 | **Learning Objectives (I can…)*** Use the converse of the Pythagorean Theorem to identify right triangles
* Use the Pythagorean Theorem to find distances in a coordinate plane
* Solve real-life problems
 |

**Key Idea**

**Converse of the Pythagorean Theorem**

If the equation \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is true for the side lengths of a triangle, then the triangle is a right triangle.



**Example 1:** Identifying a Right Triangle

 **Tell whether each triangle is a right triangle.**

1.  **2.**

**On Your Own:**

 **Tell whether each triangle is a right triangle with the given side lengths.**

1. 28 in., 21 in., 20 in. **2.** 1.25 mm, 1 mm, 0.75 mm

**Key Idea**

The distance *d* between any two points and is given by the formula



\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Example 2:** Finding the Distance Between Two Points

 **Find the distance between (1, 5) and (**−**4,** −**2).**

**On Your Own:**

**Find the distance between the two points.**

**3.** (0, 0), (4, 5) **4.** (7, − 3), (9, 6) **5.** (− 2, − 3), (− 5, 1)

**Example 3:** Real-Life Application

**You design a football play in which a player runs down the field, makes a 90**°**turn, and runs to the corner of the end zone. Your friend runs the play as shown. Did your friend make a 90**°**turn? Each unit of the grid represents 10 feet.**

