NAME _____ DATE _____

2-8

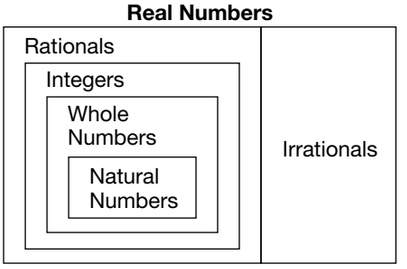
Square Roots and Real Numbers

(Pages 119–125)

If $x^2 = y$, then x is a **square root** of y. A rational number, like 81, whose square root, 9, is a rational number, is called a **perfect square**. The number 81 has two square roots, 9 and -9. The **radical sign** $\sqrt{\ }$ is used to indicate a nonnegative or **principal square root**. For example, $\sqrt{81} = 9$.

A square root of a positive rational number that is not a perfect square is an **irrational number**. An irrational number is a number that cannot be expressed in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$.

The set of rational numbers and the set of irrational numbers together form the set of **real numbers**. The graph of the set of all real numbers is the entire number line.



EXAMPLES

A Find $\sqrt{0.09}$.

$\sqrt{0.09} = 0.3$ since $(0.3) \cdot (0.3) = 0.09$

B Find $-\sqrt{0.4}$ to the nearest hundredth using a calculator.

$\sqrt{0.4} \approx 0.63$, so $-\sqrt{0.4} \approx -0.63$.

PRACTICE

Find each square root. Use a calculator if necessary. Round to the nearest hundredth if necessary.

1. $\sqrt{\frac{9}{16}}$ **2.** $\sqrt{441}$ **3.** $-\sqrt{\frac{121}{196}}$ **4.** $-\sqrt{961}$ **5.** $\sqrt{6.4}$

Evaluate each expression. Use a calculator if necessary. Round to the nearest hundredth if necessary.

6. $\sqrt{a}$, if $a = 729$ **7.** $-\sqrt{cd}$, if $c = 36$ and $d = 81$ **8.** $\sqrt{q + r}$, if $q = 42$ and $r = 30$

Name the set or sets of numbers to which each real number belongs. Use N for natural numbers, W for whole numbers, Z for integers, Q for rational numbers, and I for irrational numbers.

9. $\sqrt{64}$ **10.** $\frac{-20}{2}$ **11.** $\sqrt{50}$ **12.** $-\sqrt{100}$

13. **Standardized Test Practice** A rectangular field has a length of ℓ feet and a width of w feet. The distance from any corner of the field to the diagonally-opposite corner is $\sqrt{\ell^2 + w^2}$. What is the diagonal distance across a field that is 96 feet long and 28 feet wide?

A 144 ft **B** 100 ft **C** 124 ft **D** 114 ft

Answers: **1.** $\frac{3}{4}$ **2.** 21 **3.** $-\frac{11}{14}$ **4.** −31 **5.** 2.53 **6.** 27 **7.** −54 **8.** 8.49 **9.** N, W, Z, Q **10.** Z, Q **11.** I **12.** Z, Q **13.** B