Example

7. On a clear day, the number of miles a person can see to the horizon is about 1.23 times the square root of his or her distance from the ground in feet. Suppose Frida is at the Empire State Building observation deck at 1,250 feet and Kia is at the Freedom Tower observation deck at 1,362 feet. How much farther can Kia see than Frida?

Use a calculator to approximate the distance each person can see.

Frida: $1.23 \cdot \sqrt{1{,}250} \approx 43.49$

Kia: $1.23 \cdot \sqrt{1{,}362} \approx 45.39$

Kia can see 45.39 − 43.49 or 1.90 miles farther than Frida.

Guided Practice

Name all sets of numbers to which each real number belongs. (Examples 1–3)

1. 0.050505… rational
2. $-\sqrt{64}$ integer, rational
3. $\sqrt{17}$ irrational

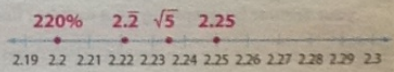
Show your work.

Fill in each ○ with <, >, or = to make a true statement. (Examples 4 and 5)

4. $\sqrt{15}$ (>) 3.5
5. $\sqrt{2.25}$ (=) 150%
6. $\sqrt{6.2}$ (>) $2.\overline{4}$

7. Order the set $\{\sqrt{5}, 220\%, 2.25, 2.\overline{2}\}$ from least to greatest. Verify your answer by graphing on a number line. (Example 6)

220%, $2.\overline{2}$, $\sqrt{5}$, 2.25



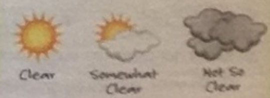
8. The formula $A = \sqrt{s(s-a)(s-b)(s-c)}$ can be used to find the area A of a triangle. The variables a, b, and c are the side measures and s is one half the perimeter. Use the formula to find the area of a triangle with side lengths of 7 centimeters, 9 centimeters, and 10 centimeters. (Example 7) about 30.6 cm^2

9. **Building on the Essential Question** How are real numbers different from irrational numbers?

Sample answer: Real numbers contain the sets of rational and irrational numbers. So all irrational numbers are real numbers but not all real numbers are irrational numbers.

Rate Yourself!

How well do you understand real numbers? Circle the image that applies.



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Independent Practice

Go online for Step-by-Step Solutions eHelp

Name all sets of numbers to which each real number belongs. (Examples 1–3)

1. $\frac{2}{3}$ rational

2. $-\sqrt{20}$ irrational

3. $7.\overline{2}$ rational

4. $\frac{12}{4}$ natural, whole, integer, rational

Fill in each ◯ with <, >, or = to make a true statement. (Examples 4 and 5)

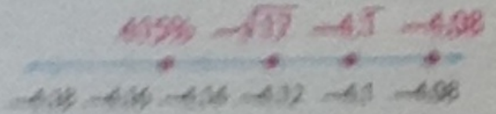
5. $\sqrt{10}$ (<) 3.2

6. $5\frac{1}{6}$ (=) $5.1\overline{6}$

7. $2.\overline{21}$ (<) $\sqrt{5.2}$

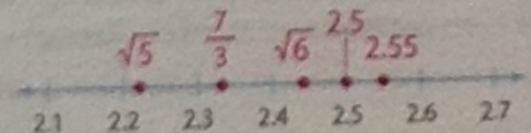
Order each set of numbers from least to greatest. Verify your answer by graphing on a number line. (Example 6)

8. $\{-415\%, -\sqrt{17}, -4.\overline{1}, -4.08\}$



$-415\%, -\sqrt{17}, -4.\overline{1}, -4.08$

9. $\{\sqrt{5}, \sqrt{6}, 2.5, 2.55, \frac{7}{3}\}$



$\sqrt{5}, \frac{7}{3}, \sqrt{6}, 2.5, 2.55$

12. Be Precise Write a brief description and give an example of each type of number in the graphic organizer shown. Sample answer:

natural	whole	integer	rational	irrational
the counting numbers; 1, 2, 3	the counting numbers and 0; 0	the whole numbers and their opposites; −2	integers, all +/− fractions and repeating decimals; −1.2	decimals that do not repeat; $\sqrt{35}$

Use estimation to fill in each ◯ with <, >, or = to make a true statement.

13. 3π (>) $\sqrt{78}$

14. π^2 (<) $3 \cdot \sqrt{15}$

15. $\sqrt{980}$ (<) $4\pi^2$

H.O.T. Problems Higher Order Thinking

16. **Use a Counterexample** Give a counterexample for the statement *All square roots are irrational numbers.* Explain your reasoning.
Sample answer: $\sqrt{4}$; $\sqrt{4} = 2$ and 2 is a rational number

Persevere with Problems Tell whether the following statements are *always*, *sometimes*, or *never* true. If a statement is not always true, explain.

17. Integers are rational numbers. always

18. Rational numbers are integers. sometimes; 3 or $\frac{3}{1}$ is a rational number and an integer, but $\frac{2}{3}$ is a rational number and not an integer.

19. The product of a non-zero rational number and an irrational number is irrational. always

20. **Model with Mathematics** Identify two numbers, one rational number and one irrational number, that are between 1.4 and 1.6. Include the decimal approximation of the irrational number to the nearest hundredth.
Sample answer: 1.5; $\sqrt{2} \approx 1.41$