



Lesson Check

Do you know HOW?

Name the subset(s) of the real numbers to which each number belongs.

- $\sqrt{11}$
- -7
- Order $\frac{47}{10}$, 4.1 , -5 , and $\sqrt{16}$ from least to greatest.
- A square card has an area of 15 in.^2 . What is the approximate side length of the card?

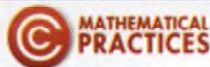
Do you UNDERSTAND?



- Vocabulary** What are the two subsets of the real numbers that form the set of real numbers?
- Vocabulary** Give an example of a rational number that is not an integer.
- Reasoning** Tell whether each square root is *rational* or *irrational*. Explain.
 - $\sqrt{100}$
 - $\sqrt{0.29}$



Practice and Problem-Solving Exercises



A Practice

Simplify each expression.

- | | | | |
|----------------------------|--------------------------|-----------------------------|-------------------|
| 9. $\sqrt{36}$ | 10. $\sqrt{169}$ | 11. $\sqrt{16}$ | 12. $\sqrt{900}$ |
| 14. $\sqrt{\frac{25}{81}}$ | 15. $\sqrt{\frac{1}{9}}$ | 16. $\sqrt{\frac{121}{16}}$ | 17. $\sqrt{1.96}$ |

See Problem 1.

- $\sqrt{\frac{36}{49}}$
- $\sqrt{0.25}$

Estimate the square root. Round to the nearest integer.

- | | | | |
|-----------------|-----------------|------------------|-----------------|
| 19. $\sqrt{17}$ | 20. $\sqrt{35}$ | 21. $\sqrt{242}$ | 22. $\sqrt{61}$ |
|-----------------|-----------------|------------------|-----------------|

See Problem 2.

- $\sqrt{320}$

Find the approximate side length of each square figure to the nearest whole unit.

- a mural with an area of 18 m^2
- a game board with an area of 160 in.^2
- a helicopter launching pad with an area of 3000 ft^2

Name the subset(s) of the real numbers to which each number belongs.

- | | | | |
|-------------------|-----------------------|------------------|-----------------------|
| 27. $\frac{2}{3}$ | 28. 13 | 29. -1 | 30. $-\frac{19}{100}$ |
| 32. -2.38 | 33. $\frac{17}{4573}$ | 34. $\sqrt{144}$ | 35. $\sqrt{113}$ |

See Problem 3.

- π
- $\frac{59}{2}$

Compare the numbers in each exercise using an inequality symbol.

- | | | |
|------------------------------|----------------------------------|-----------------------------|
| 37. $\frac{2}{3}, \sqrt{29}$ | 38. $-3.1, -\frac{16}{5}$ | 39. $\frac{4}{3}, \sqrt{2}$ |
| 41. $-\frac{7}{11}, -0.63$ | 42. $\sqrt{115}, 10.72104 \dots$ | 43. $-\frac{22}{25}, -0.8$ |

See Problem 4.

- $9.6, \sqrt{96}$
- $\sqrt{184}, 15.56987 \dots$

Order the numbers in each exercise from least to greatest.

- | | | |
|--|---|--|
| 45. $\frac{1}{2}, -2, \sqrt{5}, -\frac{7}{4}, 2.4$ | 46. $-3, \sqrt{31}, \sqrt{11}, 5.5, -\frac{60}{11}$ | 47. $-6, \sqrt{20}, 4.3, -\frac{59}{9}$ |
| 48. $\frac{10}{3}, 3, \sqrt{8}, 2.9, \sqrt{7}$ | 49. $-\frac{13}{6}, -2.1, -\frac{26}{13}, -\frac{9}{4}$ | 50. $-\frac{1}{6}, -0.3, \sqrt{1}, -\frac{2}{13}, \frac{7}{8}$ |

See Problem 5.

B Apply

- © 51. **Think About a Plan** A stage designer paid \$4 per square foot for flooring to be used in a square room. If the designer spent \$600 on the flooring, about how long is a side of the room? Round to the nearest foot.
- How is the area of a square related to its side length?
 - How can you estimate the length of a side of a square?

Tell whether each statement is *true* or *false*. Explain.

52. All negative numbers are integers.
53. All integers are rational numbers.
54. All square roots are irrational numbers.
55. No positive number is an integer.

- © 56. **Reasoning** A restaurant owner is going to panel a square portion of the restaurant's ceiling. The portion to be paneled has an area of 185 ft^2 . The owner plans to use square tin ceiling panels with a side length of 2 ft. What is the first step in finding out whether the owner will be able to use a whole number of panels?

Show that each number is rational by writing it in the form $\frac{a}{b}$, where a and b are integers.

57. 417 58. 0.37 59. 2.01 60. 2.1 61. 3.06

- © 62. **Error Analysis** A student says that $\sqrt{7}$ is a rational number because you can write $\sqrt{7}$ as the quotient $\frac{\sqrt{7}}{1}$. Is the student correct? Explain.

- STEM 63. **Construction** A contractor is tiling a square patio that has the area shown at the right. What is the approximate side length of the patio? Round to the nearest foot.



- © 64. **Open-Ended** You are tutoring a younger student. How would you explain rational numbers, irrational numbers, and how they are different?
65. **Geometry** The irrational number π , equal to $3.14159\dots$, is the ratio of a circle's circumference to its diameter. In the sixth century, the mathematician Brahmagupta estimated the value of π to be $\sqrt{10}$. In the thirteenth century, the mathematician Fibonacci estimated the value of π to be $\frac{864}{275}$. Which is the better estimate? Explain.
66. **Home Improvement** If you lean a ladder against a wall, the length of the ladder should be $\sqrt{(x)^2 + (4x)^2}$ ft to be considered safe. The distance x is how far the ladder's base is from the wall. Estimate the desired length of the ladder when the base is positioned 5 ft from the wall. Round your answer to the nearest tenth.
- © 67. **Writing** Is there a greatest integer on the real number line? A least fraction? Explain.
- © 68. **Reasoning** Choose three intervals on the real number line that contain both rational and irrational numbers. Do you think that any given interval on the real number line contains both rational and irrational numbers? Explain.