1-1 The Rational Numbers

Name _____ Date _____

A *rational number* is a number that can be expressed in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$.

A rational number can be written as a terminating or repeating decimal.

Write $\frac{5}{6}$ as a decimal.

- Divide 5 by 6.
- Use an ellipsis or an overbar to show that the 3s repeat.

$$6\overline{)5.0^{2}0^{2}0^{2}0} \quad 0.8\ 3\ 3\ 3$$

$$\frac{5}{6} = 0.8333\ldots = 0.8\overline{3}$$

So in decimal form, $\frac{5}{6} = 0.8333\ldots = 0.8\overline{3}$.

Write a rational number for each expression.

1. 5.03 km underwater

−5.03

2. a deposit of $141.15

+141.15 or 141.15

3. 20.4° below zero

−20.4

4. loss of 15 yards

−15

5. a gain of $16.25

+16.25 or 16.25

6. down $4\frac{2}{3}$ points

$-4\frac{2}{3}$

7. withdrawal of $50

−50

8. 5 more minutes

+5 or 5

9. down 21 floors

−21

Show that each number is rational by writing it in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$. **Possible answers shown.**

10. 32

$\frac{32}{1}$

11. −7

$-\frac{7}{1}$

12. $-8\frac{1}{2}$

$-\frac{17}{2}$

13. $4\frac{3}{5}$

$\frac{23}{5}$

14. $56\frac{1}{3}$

$\frac{169}{3}$

15. −6

$-\frac{6}{1}$

16. $7\frac{9}{10}$

$\frac{79}{10}$

17. $-36\frac{2}{7}$

$-\frac{254}{7}$

18. −175

$-\frac{175}{1}$

19. $30\frac{2}{9}$

$\frac{272}{9}$

20. $-5\frac{1}{4}$

$-\frac{21}{4}$

21. 312

$\frac{312}{1}$

Write each fraction or mixed number in decimal form.

22. $\frac{1}{4}$

0.25

23. $-\frac{3}{5}$

−0.6

24. $-\frac{11}{20}$

−0.55

25. $4\frac{7}{10}$

4.7

26. $\frac{8}{25}$

0.32

27. $-\frac{15}{16}$

−0.9375

28. $19\frac{43}{50}$

19.86

29. $-\frac{9}{16}$

−0.5625

30. $\frac{7}{8}$

0.875

31. $-\frac{2}{9}$

$-0.\overline{2}$

32. $\frac{5}{8}$

0.625

33. $-1\frac{17}{18}$

$-1.9\overline{4}$

34. $5\frac{3}{11}$

$5.\overline{27}$

35. $-41\frac{1}{9}$

$-41.\overline{1}$

36. $-5\frac{3}{8}$

−5.375

37. $-12\frac{5}{12}$

$-12.41\overline{6}$

38. $-9\frac{9}{11}$

$-9.\overline{81}$

39. $-811\frac{13}{18}$

$-811.7\overline{2}$

Tell which of the following terms describes each number: *natural number, whole number, integer, rational number.* (List all that apply.)

40. -13
integer, rational number

41. 8
natural number, whole number, integer, rational number

42. $7.\overline{52}$
rational number

43. 0
whole number, integer, rational number

44. $-\frac{21}{7}$
integer, rational number

45. $\frac{3}{4}$
rational number

Tell whether each statement is *TRUE* or *FALSE*.

46. -5.86 is a rational number but not an integer.
TRUE

47. 2 is an integer but not a rational number.
FALSE

48. -14 is an integer and a rational number.
TRUE

49. $2\frac{1}{2}$ is an integer and a rational number.
FALSE

50. $-\frac{35}{7}$ is a whole number and a rational number.
FALSE

51. $\frac{28}{4}$ is natural number but not an integer.
FALSE

52. A repeating decimal cannot be a rational number.
FALSE

53. Any integer is a rational number.
TRUE

54. Any rational number is an integer.
FALSE

Problem Solving

55. The Tinyton Tigers play 16 games this season. So far, they have won 8 out of 13 games. If they win their last 3 games, what fraction of the games will they have won? Express this fraction as a decimal.

$8 + 3 = 11; \frac{11}{16} = 0.6875$

They will have won $\frac{11}{16}$ or 0.6875 of the games.

56. On her first three 5-point math quizzes, Ami's scores were 4, 3, and 5. She will take three more quizzes this semester. What three scores would give her an average that is a whole number? A repeating decimal?

Possible answers: The three scores 2, 5, and 5 would give her an average that is a whole number. The three scores 5, 5, and 3 would give her an average that is a repeating decimal.

CRITICAL THINKING

Complete. Write *All, Some,* or *No.*

57. All integers are rational numbers.

58. Some integers are whole numbers.

59. Some positive numbers are integers.

60. All fractions are rational numbers.

61. Some rational numbers are whole numbers.

62. No integers are not rational numbers.

63. All terminating decimals are rational numbers.

64. All natural numbers are rational numbers.