

CHAPTER P

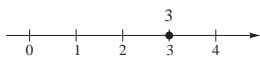
Prerequisites: Fundamentals of Algebra

Section P.1 The Real Number System

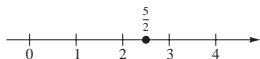
Solutions to Odd-Numbered Exercises

1. $\{-10, -\sqrt{5}, -\frac{2}{3}, -\frac{1}{4}, 0, \frac{5}{8}, 1, \sqrt{3}, 4, 2\pi, 6\}$
- (a) Natural numbers: $\{1, 4, 6\}$
- (b) Integers: $\{-10, 0, 1, 4, 6\}$
- (c) Rational numbers: $\{-10, -\frac{2}{3}, -\frac{1}{4}, 0, \frac{5}{8}, 1, 4, 6\}$
- (d) Irrational numbers: $\{-\sqrt{5}, \sqrt{3}, 2\pi\}$
3. $\{-3.5, -\sqrt{4}, -\frac{1}{2}, -0.\bar{3}, 0, 3, \sqrt{5}, 3\pi, 25.2\}$
- (a) Natural numbers: $\{3\}$
- (b) Integers: $\{-\sqrt{4}, 0, 3\}$
- (c) Rational numbers: $\{-3.5, -\sqrt{4}, -\frac{1}{2}, -0.\bar{3}, 0, 3, 25.2\}$
- (d) Irrational numbers: $\{\sqrt{5}, 3\pi\}$
5. $\{-5, -4, -3, -2, -1, 0, 1, 2, 3\}$
7. $\{1, 3, 5, 7, 9\}$

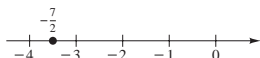
9. (a) The point representing the real number 3 lies between 2 and 4.



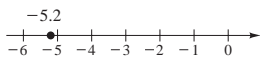
- (b) The point representing the real number $\frac{5}{2}$ lies between 2 and 3.



- (c) The point representing the real number $-\frac{7}{2}$ lies between -4 and -3 .



- (d) The point representing the real number -5.2 lies between -6 and -5 .



11. $a = -1, b = 3$

$$-1 < 3$$

13. $a = -\frac{9}{2}, b = -2$

$$-\frac{9}{2} < -2$$

15. $2 < 5$ because 2 is to the left of 5 on the number line.

17. $10 > 4$ because 10 is to the right of 4 on the number line.

19. $-7 < -2$ because -7 is to the left of -2 on the number line.

21. $-5 < -2$ because -5 is to the left of -2 on the number line.

23. $\frac{1}{3} > \frac{1}{4}$ because $\frac{1}{3}$ is to the right of $\frac{1}{4}$ on the number line.

25. $-\frac{5}{8} < \frac{1}{2}$ because $-\frac{5}{8}$ is to the left of $\frac{1}{2}$ on the number line.

27. $-\frac{2}{3} > -\frac{10}{3}$ because $-\frac{2}{3}$ is to the right of $-\frac{10}{3}$ on the number line.

29. $2.75 < \pi$ because 2.75 is to the left of π on the number line.

31. Distance = $10 - 4 = 6$

33. Distance = $7 - (-12) = 7 + 12 = 19$

35. Distance = $18 - (-32) = 18 + 32 = 50$

37. Distance = $0 - (-8) = 0 + 8 = 8$

39. Distance = $35 - 0 = 35$

41. Distance = $(-6) - (-9) = (-6) + 9 = 3$

43. $|10| = 10$

45. $|-225| = 225$

47. $-|-85| = -85$

49. $-|16| = -16$

51. $-|-\frac{3}{4}| = -\frac{3}{4}$

53. $-|3.5| = -3.5$

55. $|\pi| = \pi$

57. $|-6| > |2|$ since $6 > 2$.

59. $|47| > |-27|$ since $47 > 27$.

61. $-|-16.8| = -|16.8|$ since $-16.8 = -16.8$.

63. $|\frac{3}{4}| > |\frac{4}{5}|$ since $\frac{3}{4} > \frac{4}{5}$.

65. Opposite: -34

67. Opposite: 160

69. Opposite: $\frac{3}{11}$

71. Opposite: $-\frac{5}{4}$

Absolute value: 34

Absolute value: 160

Absolute value: $\frac{3}{11}$

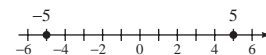
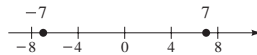
Absolute value: $\frac{5}{4}$

73. Opposite: -4.7

75. $|7| = 7$

77. $|-5| = 5$

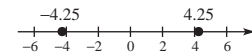
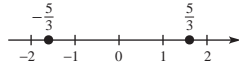
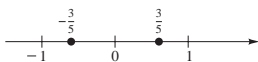
Absolute value: 4.7



79. $|\frac{3}{5}| = \frac{3}{5}$

81. Opposite of $\frac{5}{3}$ is $-\frac{5}{3}$.

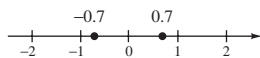
83. Opposite of -4.25 is 4.25.



85. Opposite of 0.7 is -0.7 .

87. $x < 0$

89. $x \geq 0$



91. $2 < z \leq 10$

93. $p < \$225$

95. True

97. False. $\frac{2}{3}$ is not an integer.

99. False. $|3 + (-2)| = 1 \neq 5 = |3| + |-2|$

101. The set of integers includes the natural numbers, zero, and the negative integers.

103. Yes, the nonnegative real numbers include 0.

105. Place them on the real number line. The number on the right is greater.