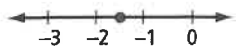


Check Your Understanding

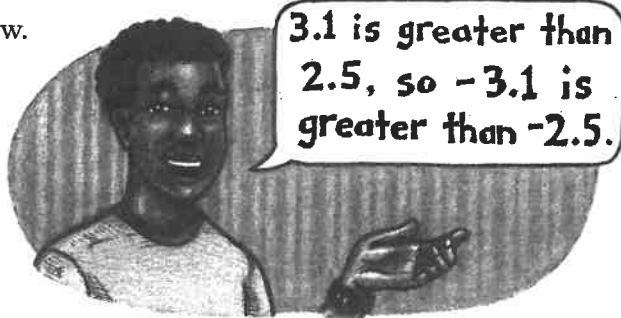
Communicate the Ideas

1. Laura placed $-2\frac{1}{2}$ incorrectly on a number line, as shown.



How could you use the idea of opposites to show Laura how to plot $-2\frac{1}{2}$ correctly?

2. Is Dominic correct? Show how you know.

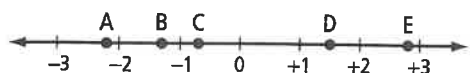


3. Tomas and Roxanne were comparing -0.9 and $-\frac{7}{8}$. Tomas wrote -0.9 as a fraction, and then he compared the two fractions. Roxanne wrote $-\frac{7}{8}$ as a decimal, and then she compared the two decimals.
- Which method do you prefer? Explain.
 - Which is greater, -0.9 or $-\frac{7}{8}$? Explain how you know.

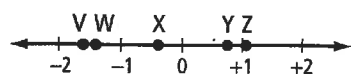
Practise

For help with #4 to #9, refer to Example 1 on page 48.

4. Match each rational number to a point on the number line.



- $\frac{3}{2}$
 - -0.7
 - $-2\frac{1}{5}$
 - $\frac{14}{5}$
 - $-1\frac{1}{3}$
5. Which point on the number line matches each rational number?



- $-1\frac{2}{5}$
- $\frac{3}{4}$
- $1\frac{1}{20}$
- $-1\frac{3}{5}$
- $-0.\bar{4}$

6. Place each number and its opposite on a number line.

a) $\frac{8}{9}$ b) -1.2 c) $2\frac{1}{10}$ d) $-\frac{11}{3}$

7. What is the opposite of each rational number?

a) $-4.\bar{1}$ b) $\frac{4}{5}$ c) $-5\frac{3}{4}$ d) $\frac{9}{8}$

8. Compare $1\frac{5}{6}$, $-1\frac{2}{3}$, -0.1 , 1.9 , and $-\frac{1}{5}$. Write the numbers in ascending order.

9. Compare $-\frac{3}{8}$, $1.\bar{8}$, $\frac{9}{5}$, $-\frac{1}{2}$, and -1 . Write the numbers in descending order.

For help with #10 to #13, refer to Example 2 on page 49.

10. Express each fraction as an equivalent fraction.

a) $-\frac{2}{5}$ b) $\frac{10}{6}$
c) $-\frac{9}{12}$ d) $-\frac{4}{3}$

11. Write each rational number as an equivalent fraction.

a) $\frac{-1}{3}$ b) $\frac{-4}{-5}$
c) $-\left(\frac{-5}{-4}\right)$ d) $\frac{7}{-2}$

12. Which value in each pair is greater?

a) $\frac{1}{3}, -\frac{2}{3}$ b) $-\frac{9}{10}, \frac{7}{10}$
c) $-\frac{1}{2}, -\frac{3}{5}$ d) $-2\frac{1}{8}, -2\frac{1}{4}$

13. Which value in each pair is smaller?

a) $\frac{4}{7}, \frac{2}{3}$ b) $-\frac{4}{3}, -\frac{5}{3}$
c) $-\frac{7}{10}, -\frac{3}{5}$ d) $-1\frac{3}{4}, -1\frac{4}{5}$

For help with #14 to #17, refer to Example 3 on page 50.

14. Identify a decimal number between each of the following pairs of rational numbers.

a) $\frac{3}{5}, \frac{4}{5}$ b) $-\frac{1}{2}, -\frac{5}{8}$
c) $-\frac{5}{6}, 1$ d) $\frac{17}{20}, -\frac{4}{5}$

15. What is a decimal number between each of the following pairs of rational numbers?

a) $1\frac{1}{2}, 1\frac{7}{10}$ b) $-2\frac{2}{3}, -2\frac{1}{3}$
c) $1\frac{3}{5}, -1\frac{7}{10}$ d) $-3\frac{1}{100}, -3\frac{1}{50}$

16. Identify a fraction between each of the following pairs of rational numbers.

a) 0.2, 0.3 b) 0, -0.1
c) -0.74, -0.76 d) -0.52, -0.53

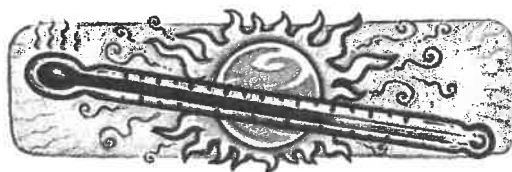
17. Identify a mixed number between each of the following pairs of rational numbers.

a) 1.7, 1.9 b) -0.5, 1.5
c) -3.3, -3.4 d) -2.01, -2.03

Apply

18. Use a rational number to represent each quantity. Explain your reasoning.

- a) a temperature increase of 8.2°C



- b) growth of 2.9 cm



- c) 3.5 m below sea level



- d) earnings of \$32.50



- e) 14.2°C below freezing



19. The table includes the melting points and boiling points of six elements known as the noble gases.

Noble Gas	Melting Point (°C)	Boiling Point (°C)
Argon	-189.2	-185.7
Helium	-272.2	-268.6
Neon	-248.67	-245.92
Krypton	-156.6	-152.3
Radon	-71.0	-61.8
Xenon	-111.9	-107.1

- Which noble gases have a melting point that is less than the melting point of argon?
- Which noble gases have a boiling point that is greater than the boiling point of krypton?
- Arrange the melting points in ascending order.
- Arrange the boiling points in descending order.

Science Link

For many years, the noble gases were known as the *inert gases*. Most chemists thought that these gases would not react with other chemicals. In 1962, Neil Bartlett, a chemist at the University of British Columbia, proved them wrong.

WWW Web Link

To learn more about Neil Bartlett and to research Canadian scientific discoveries, go to www.mathlinks9.ca and follow the links.

20. a) Kwasi said that he ignored the fractions when he decided that $-2\frac{1}{5}$ is smaller than $-1\frac{9}{10}$. Explain his thinking.
- b) Naomi said that she ignored the integer -1 when she decided that $-1\frac{1}{4}$ is greater than $-1\frac{2}{7}$. Explain her thinking.

21. The table shows the average early-morning temperature for seven communities in May.

Community	Average Early-Morning Temperature (°C)
Churchill, Manitoba	-5.1
Regina, Saskatchewan	3.9
Edmonton, Alberta	5.4
Penticton, British Columbia	6.1
Yellowknife, Northwest Territories	-0.1
Whitehorse, Yukon Territory	0.6
Resolute, Nunavut	-14.1

- Write the temperatures in descending order.
- Which community has an average temperature between the values for Whitehorse and Churchill?

22. Replace each $\blacksquare$ with $>$, $<$, or $=$ to make each statement true.

- $\frac{-9}{6} \blacksquare \frac{3}{-2}$
- $\frac{3}{5} \blacksquare -0.\bar{6}$
- $-1\frac{3}{10} \blacksquare -\left(\frac{-13}{-10}\right)$
- $-3.25 \blacksquare -3\frac{1}{5}$
- $-\frac{8}{12} \blacksquare -\frac{11}{15}$
- $-2\frac{5}{6} \blacksquare -2\frac{7}{8}$

23. Is zero a rational number? Explain.

24. Give an example of a fraction in lowest terms that satisfies the following conditions.
- greater than 0, with the denominator greater than the numerator
 - between 0 and -1 , with the denominator less than the numerator
 - less than -2 , with the numerator less than the denominator
 - between -1.2 and -1.3 , with the numerator greater than the denominator

25. Which integers are between $\frac{11}{5}$ and $\frac{15}{-4}$?

26. Which number in each pair is greater? Explain each answer.

- a) 0.4 and 0.44
- b) $0.\bar{3}$ and 0.33
- c) -0.7 and -0.77
- d) -0.66 and $-0.\bar{6}$

27. Identify the fractions that are between 0 and -2 and that have 3 as the denominator.

Extend

28. How many rational numbers are between $\frac{2}{3}$ and $0.\bar{6}$? Explain.

29. Replace each $\blacksquare$ with an integer to make each statement true. In each case, is more than one answer possible? Explain.

- a) $\blacksquare.5 < -1.9$
- b) $\frac{\blacksquare}{-4} = -2\frac{1}{4}$
- c) $\frac{-3}{\blacksquare} = -\frac{15}{5}$
- d) $-1.5\blacksquare2 > -1.512$
- e) $-\frac{3}{4} < -0.7\blacksquare$
- f) $-5\frac{1}{2} > \frac{11}{\blacksquare}$
- g) $-2\frac{3}{5} = \frac{\blacksquare}{10}$
- h) $\frac{8}{\blacksquare} < -\frac{2}{3}$

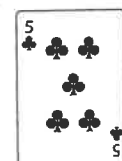
30. Determine the value of x.

- a) $\frac{4}{-5} = \frac{x}{-10}$
- b) $\frac{x}{3} = \frac{6}{-9}$
- c) $\frac{5}{x} = -\frac{20}{12}$
- d) $\frac{-6}{-5} = \frac{30}{x}$

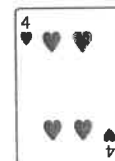
Math Link

Play the following game with a partner or in a small group. You will need one deck of playing cards.

- Remove the jokers, aces, and face cards from the deck.
- Red cards represent positive integers. Black cards represent negative integers.
- In each round, the dealer shuffles the cards and deals two cards to each player.
- Use your two cards to make a fraction that is as close as possible to zero.
- In each round, the player with the fraction closest to zero wins two points. If there is a tie, each tied player wins a point.
- The winner is the first player with ten points. If two or more players reach ten points in the same round, keep playing until one player is in the lead by at least two points.



represents -5



represents 4

With a five of clubs and a four of hearts, you can make $\frac{4}{-5}$ or $\frac{-5}{4}$. Choose $\frac{4}{-5}$ because it is closer to zero.

