Essential Question: How can you use a number line to compare positive and negative fractions and decimals?

ACTIVITY: Locating Fractions on a Number Line

On your timeline for “A Day in the Life of an Astronaut” from Activity 3 in Section 6.2, include the following events. Represent each using a fraction or a mixed number.

a. Radio Transmission: 10:30 A.M.

b. Space Walk: 7:30 P.M.

c. Physical Exam: 4:45 A.M.

d. Photograph Taken: 3:15 A.M.

e. Float in the Cabin: 6:20 P.M.

f. Eat Dinner: 8:40 P.M.
2. **ACTIVITY: Fractions and Decimals on a Number Line**

Work with a partner. Find a number that is between the two numbers. The number must be greater than the green number and less than the blue number.

a.  

\[ \frac{2}{3}, \frac{1}{3} \]

\[ -3, -2, -1, 0, 1, 2, 3 \]

b.  

\[ -1.75, -1.5 \]

\[ -3, -2, -1, 0, 1, 2, 3 \]

c.  

\[ -2 \frac{1}{2}, -2 \frac{1}{3} \]

\[ -3, -2, -1, 0, 1, 2, 3 \]

3. **ACTIVITY: Decimals on a Number Line**

Work with a partner.

Snorkeling: -5 meters  
Scuba diving: -50 meters  
Deep-sea diving: -700 meters

a. Write the position of each diver in kilometers.

b. **CHOOSE TOOLS** Would a horizontal or a vertical number line be more appropriate for representing these data? Why?

c. Use a number line to order the positions from deepest to shallowest.

**What Is Your Answer?**

4. **IN YOUR OWN WORDS** How can you use a number line to compare positive and negative fractions and decimals?

5. Draw a number line. Graph and label three values between \(-2\) and \(-1\).

Use what you learned about fractions and decimals on a number line to complete Exercises 4 and 5 on page 264.
In Section 6.1, you learned that integers can be negative. Fractions and decimals can also be negative.

**EXAMPLE 1**  
**Graphing Negative Fractions and Decimals**

Graph each number and its opposite.

a. $\frac{3}{4}$

![Graph of $\frac{3}{4}$]

$-\frac{3}{4}$ is the same distance from 0 as $\frac{3}{4}$.

b. $-1.6$

![Graph of $-1.6$]

$1.6$ is the same distance from 0 as $-1.6$.

**On Your Own**

Graph the number and its opposite.

1. $\frac{2}{2}$  
2. $-\frac{4}{5}$  
3. $-3.5$  
4. $5.25$

**EXAMPLE 2**  
**Comparing Fractions and Mixed Numbers**

a. Compare $-\frac{1}{2}$ and $-\frac{3}{4}$.

![Graph of $-\frac{1}{2}$ and $-\frac{3}{4}$]

$-\frac{1}{2}$ is to the right of $-\frac{3}{4}$.

So, $\frac{1}{2} > -\frac{3}{4}$.

b. Compare $-4 \frac{5}{6}$ and $-4 \frac{1}{6}$.

![Graph of $-4 \frac{5}{6}$ and $-4 \frac{1}{6}$]

$-4 \frac{5}{6}$ is to the left of $-4 \frac{1}{6}$.

So, $-4 \frac{5}{6} < -4 \frac{1}{6}$. 

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EXAMPLE 3 Comparing Decimals

Compare $-3.08$ and $-3.8$.

Graph $-3.8$ and $-3.08$.

$-3.08$ is to the right of $-3.8$.

So, $-3.08 > -3.8$.

EXAMPLE 4 Real-Life Application

A Chinook wind is a warm mountain wind that can cause rapid temperature changes. The table shows three of the greatest temperature drops ever recorded after a Chinook wind occurred. On which date did the temperature drop the fastest? Explain.

<table>
<thead>
<tr>
<th>Date</th>
<th>Temperature Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 10, 1911</td>
<td>$-3\frac{1}{10}$°F per minute</td>
</tr>
<tr>
<td>November 10, 1911</td>
<td>$-\frac{5}{8}$°F per minute</td>
</tr>
<tr>
<td>January 22, 1943</td>
<td>$-2\frac{1}{5}$°F per minute</td>
</tr>
</tbody>
</table>

Graph the numbers on a number line.

$-3\frac{1}{2}$ is farthest to the left.

So, the temperature dropped the fastest on January 10, 1911.

On Your Own

Copy and complete the statement using $<$ or $>$. 

5. $\frac{4}{7} < -\frac{1}{7}$
6. $-1\frac{2}{3} < -\frac{5}{6}$
7. $-0.5 < 0.3$

8. WHAT IF? In Example 4, a temperature change of $-3\frac{2}{5}$°F per minute is recorded. How does this temperature change compare with the other temperature changes? Explain.
**Vocabulary and Concept Check**

1. **NUMBER SENSE** Which statement is *not* true?
   a. On a number line, $-2\frac{1}{6}$ is to the left of $-2\frac{2}{3}$.
   b. $-2\frac{2}{3}$ is less than $-2\frac{1}{6}$.
   c. $-2\frac{1}{6}$ is greater than $-2\frac{2}{3}$.
   d. On a number line, $-2\frac{2}{3}$ is to the left of $-2\frac{1}{6}$.

2. **NUMBER SENSE** Is a negative decimal *always*, *sometimes*, or *never* equal to a positive decimal? Explain.

3. **NUMBER SENSE** On a number line, is $-2.06$ or $-2.6$ farther to the left?

**Practice and Problem Solving**

Find a fraction or mixed number that is between the two numbers.

4. $\frac{-3}{4}$, $\frac{1}{3}$

5. $\frac{-2}{5}$, $\frac{-1}{10}$

Graph the number and its opposite.

6. $\frac{2}{3}$

7. $-2\frac{1}{4}$

8. $-3.8$

9. $2.15$

Copy and complete the statement using < or >.

10. $-3\frac{1}{3}$ ___ $-3\frac{2}{3}$

11. $\frac{-1}{2}$ ___ $\frac{-1}{6}$

12. $\frac{-3}{4}$ ___ $\frac{5}{8}$

13. $-2\frac{2}{3}$ ___ $-2\frac{1}{2}$

14. $-1\frac{5}{6}$ ___ $-1\frac{3}{4}$

15. $-4.6$ ___ $-4.8$

16. $-0.12$ ___ $-0.05$

17. $2.41$ ___ $-3.16$

18. $-3.524$ ___ $-3.542$

19. **SAND DOLLARS** In rough water, a small sand dollar burrows $-\frac{1}{2}$ centimeter into the sand. A larger sand dollar burrows $-1\frac{1}{4}$ centimeters into the sand. Which sand dollar burrowed farther?
Order the numbers from least to greatest.

20. \(-\frac{3}{10}, -\frac{2}{5}, -2, -\frac{1}{2}, -3\)

21. \(-\frac{1}{20}, -\frac{5}{8}, 0, -1, -\frac{3}{4}\)

22. \(1.3, -2, -1.8, 0, -1.75\)

23. \(-4, -4.35, -4.9, -5, -4.3\)

24. **STARS** The apparent magnitude of a star measures how bright the star appears as seen from Earth. The brighter the star, the lesser the number. Which star is the brightest?

<table>
<thead>
<tr>
<th>Star</th>
<th>Alpha Centauri</th>
<th>Antares</th>
<th>Canopus</th>
<th>Deneb</th>
<th>Sirius</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apparent Magnitude</td>
<td>-0.27</td>
<td>0.96</td>
<td>-0.72</td>
<td>1.25</td>
<td>-1.46</td>
</tr>
</tbody>
</table>

25. **LOW TIDE** The daily water level is recorded for seven straight days at a tide station on the Big Marco River in Florida. On which days is the water level higher than on the previous day? On which days is it lower?

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Level of the Day (feet)</td>
<td>-3/25</td>
<td>7/20</td>
<td>27/50</td>
<td>13/20</td>
<td>16/25</td>
<td>53/100</td>
<td>1/3</td>
</tr>
</tbody>
</table>

26. **PROBLEM SOLVING** A guitar tuner allows you to tune a guitar string to its correct pitch. The units on a tuner are measured in cents. The units tell you how far the string tone is above or below the correct pitch.

<table>
<thead>
<tr>
<th>Guitar String</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Cents Away from the Correct Pitch</td>
<td>-0.3</td>
<td>1.6</td>
<td>-2.3</td>
<td>2.8</td>
<td>2.4</td>
<td>-3.6</td>
</tr>
</tbody>
</table>

a. What number on the tuner represents a correctly tuned guitar string?
b. Which strings have a pitch below the correct pitch?
c. Which string has a pitch closest to its correct pitch?
d. Which string has a pitch farthest from its correct pitch?
e. The tuner is rated to be accurate to within 0.5 cent of the true pitch. Which string could possibly be correct?

27. **Number Sense** What integer values of \(x\) make the statement \(-\frac{3}{x} < -\frac{x}{3}\) true?

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**Fair Game Review** What you learned in previous grades & lessons

Graph the integer and its opposite. *(Section 6.1)*

28. \(-7\) 29. \(40\) 30. \(100\) 31. \(-15\)

32. **MULTIPLE CHOICE** You pay $48 for 8 pounds of chicken. Which is an equivalent rate? *(Section 5.3)*

- **A** $44 for 4 pounds
- **B** $28 for 4 pounds
- **C** $15 for 3 pounds
- **D** $30 for 5 pounds