▶**Whole Numbers, Fractions, and Decimal Numbers**

Vocabulary
predictable fraction decimal number

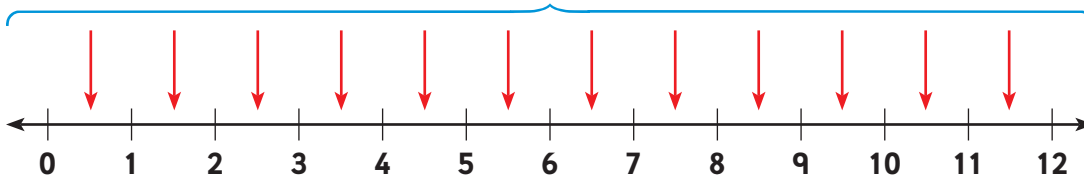## Where are fractions and decimal numbers on the number line?

All the numbers on the number line are whole numbers. When we use whole numbers, we count forward or backward in a **predictable** way. *Predictable* means that if we add numbers in a sequence like 1, 2, 3, we can keep counting by just adding one number. There is an infinite number of whole numbers.

The number line below shows counting from 0 to 12.

There are gaps between the whole numbers. These gaps make up another set of numbers called **fractions** or **decimal numbers** . Fractions and decimal numbers are different names for numbers between whole numbers on a number line.
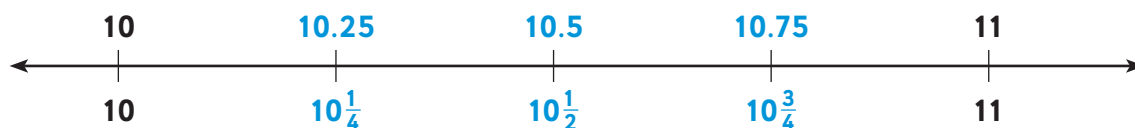
Fractions or Decimal Numbers

For example, the numbers between 7 and 8 are fractions. There is an infinite number of them. We describe the place on the number line that is halfway between 7 and 8 by using the fraction $7\frac{1}{2}$ or the decimal number 7.5.
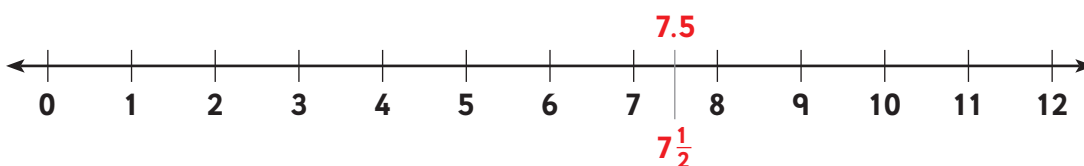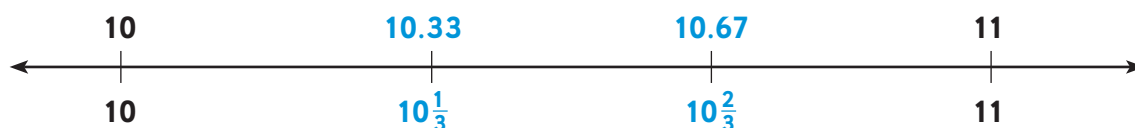
Example 1

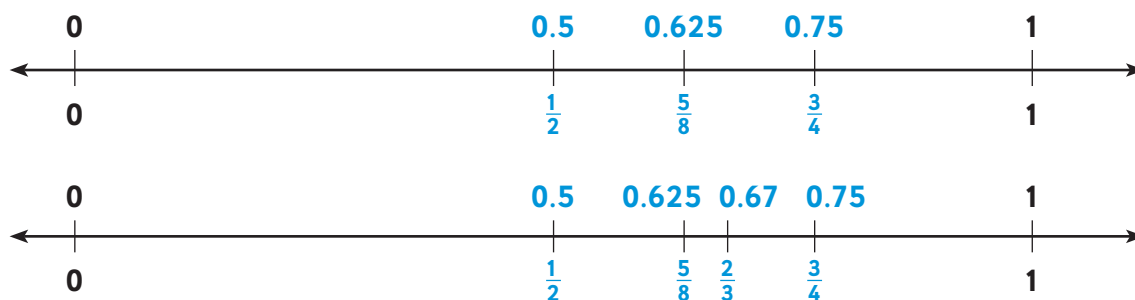**Mark some common fractions and decimal numbers between the whole numbers 10 and 11.**

10	10.25	10.5	10.75	11

10	$10\frac{1}{4}$	$10\frac{1}{2}$	$10\frac{3}{4}$	11

Mark some other fractions and decimal numbers between the whole numbers 10 and 11.

10	10.33	10.67	11

10	$10\frac{1}{3}$	$10\frac{2}{3}$	11

Fractions and decimal numbers are similar to whole numbers, but they can be hard to imagine. There are an infinite number of fractions and decimal numbers between any two whole numbers. When we find two fractions or decimal numbers, we know there are always others between them.

Example 2

Find fractions and their matching decimal numbers between the whole numbers 0 and 1.

0	0.5	0.625	0.75	1

0	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1

0	0.5	0.625	0.67	0.75	1

0	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{2}{3}$	$\frac{3}{4}$	1

These numbers appear in a certain order. For example, $\frac{1}{2}$ is smaller than $\frac{3}{4}$, so $\frac{1}{2}$ comes before $\frac{3}{4}$ on the number line. On the second number line, we see that $\frac{2}{3}$ comes between $\frac{1}{2}$ and $\frac{3}{4}$ because $\frac{2}{3}$ is larger than $\frac{1}{2}$, but smaller than $\frac{3}{4}$.

How do we count fractions and decimal numbers?

An important difference between whole numbers, fractions, and decimal numbers has to do with counting. When we count whole numbers, we add 1 to find the next number. We know the number that comes after 742 is 743 when we count by ones.

This is not the case for fractions and decimal numbers. We are not sure what comes after $\frac{1}{4}$. It depends. It could be $\frac{3}{8}$, or it could be $\frac{1}{2}$. It could be any number of other fractions. The same is true for decimal numbers. What comes after 0.25? It could be 0.251, 0.2511, 0.25111, 0.26, or any number of other decimal numbers.

A way to make counting predictable is to count by the same amount. If we choose $\frac{1}{4}$, we count by $\frac{1}{4}$. The same is true for decimal numbers. If we choose 0.25, we count by 0.25. In this way, we can count forever by whatever fraction or decimal number we choose.

Example 1

Count by fourths on the number line.

| 0	0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5	2.75	3	3.25
0	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{4}$

Apply Skills
Turn to *Interactive Text*, page 8.

mBook Reinforce Understanding
Use the *mBook Study Guide* to review lesson concepts.

How do we use a vertical bar graph to graph data?

Bar graphs make data easier to see. The table shows the popularity of different foods. It shows kinds of foods in one column. In the other column, it shows how many people like each kind of food. In the vertical bar graph, it is easier to see which food type was the favorite.

Favorite Food	Number of People
Pizza	12
Tacos	9
Hamburgers	4
French Fries	2
Burritos	1
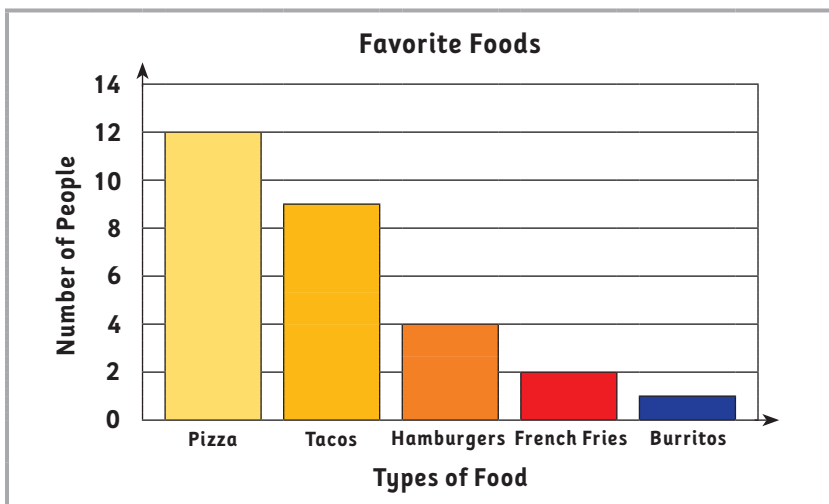
We can use a bar graph to display data that we collect in many different ways.

✎ **Problem-Solving Activity**
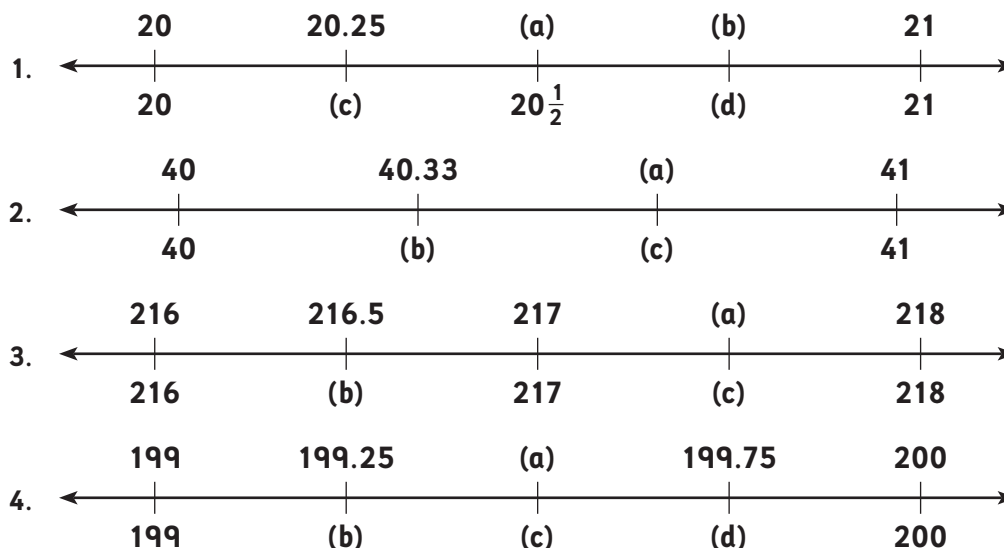Turn to *Interactive Text*,
page 9.

⌨ **Reinforce Understanding**
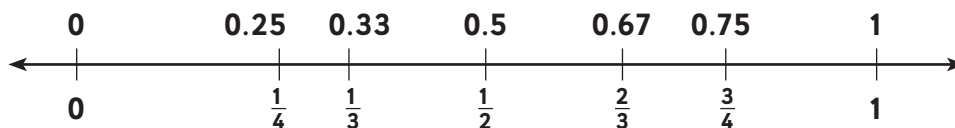Use the *mBook Study Guide*
to review lesson concepts.

Activity 1

Tell the value of the missing numbers on the number line.

1.

20	20.25	(a)	(b)	21
20	(c)	$20\frac{1}{2}$	(d)	21

2.

40	40.33	(a)	41
40	(b)	(c)	41

3.

216	216.5	217	(a)	218
216	(b)	217	(c)	218

4.

199	199.25	(a)	199.75	200
199	(b)	(c)	(d)	200

Activity 2

Use the number line to decide which fraction or decimal number is bigger.

0	0.25	0.33	0.5	0.67	0.75	1
0	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{4}$	1

1. What's bigger, $\frac{1}{2}$ or $\frac{1}{4}$?

2. What's bigger, 0.67 or 0.5?

3. What's bigger, 0.5 or 0.25?

4. What's bigger, $\frac{2}{3}$ or $\frac{3}{4}$?

Activity 3 • Distributed Practice

Solve.

1. $\begin{array}{r} 876 \\ -299 \\ \hline \end{array}$

2. $\begin{array}{r} 794 \\ +876 \\ \hline \end{array}$

3. $\begin{array}{r} 69 \\ \times 48 \\ \hline \end{array}$

4. $\begin{array}{r} 537 \\ \times\ \ \ 8 \\ \hline \end{array}$

5. $7\overline{)679}$