4.3 Comparing and Ordering Fractions, Decimals, and Percents

Essential Question How can you order numbers that are written as fractions, decimals, and percents?

1 ACTIVITY: Ordering Numbers

Work with a partner to order the following numbers.

$$\frac{1}{8} \qquad 11\% \qquad \frac{3}{20} \qquad 0.172 \qquad 0.32 \qquad 43\% \qquad 7\% \qquad 0.7 \qquad \frac{5}{6}$$

a. Decide on a strategy for ordering the numbers. Will you write them all as fractions, decimals, or percents?

b. Use your strategy and a number line to order the numbers from least to greatest. (Note: Label the number line appropriately.)

2 ACTIVITY: Using Fractions, Decimals, and Percents

Work with a partner. Decide which number form (fraction, decimal, or percent) is more common. Then find which is greater.
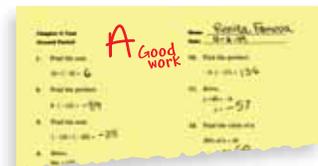
a. 7% sales tax   or $\frac{1}{20}$ sales tax

b. 0.37 cup of flour   or $\frac{1}{3}$ cup of flour

c. $3\frac{5}{8}$-inch wrench   or   3.69-inch wrench

d. $12\frac{2}{3}$ dollars   or   12.56 dollars

e. 93% test score   or $\frac{7}{8}$ test score

f. $5\frac{5}{6}$ fluid ounces   or   5.6 fluid ounces

ACTIVITY: The Game of Math Card War

Preparation:

- Cut index cards to make 40 playing cards.
- Write each number in the table on a card.

To Play:

- Play with a partner.
- Deal 20 cards to each player face-down.
- Each player turns one card face-up. The player with the greater number wins. The winner collects both cards and places them at the bottom of his or her cards.
- Suppose there is a tie. Each player lays three cards face-down, then a new card face-up. The player with the greater of these new cards wins. The winner collects all ten cards and places them at the bottom of his or her cards.
- Continue playing until one player has all the cards. This player wins the game.

75%	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{3}{10}$	0.3	25%	0.4	0.25	100%	0.27
0.75	$66\frac{2}{3}\%$	12.5%	40%	$\frac{1}{4}$	4%	0.5%	0.04	$\frac{1}{100}$	$\frac{2}{3}$
0	30%	5%	$\frac{27}{100}$	0.05	$33\frac{1}{3}\%$	$\frac{2}{5}$	0.333...	27%	1%
1	0.01	$\frac{1}{20}$	$\frac{1}{8}$	0.125	$\frac{1}{25}$	$\frac{1}{200}$	0.005	0.666...	0%

What Is Your Answer?

4. **IN YOUR OWN WORDS** How can you order numbers that are written as fractions, decimals, and percents? Give an example with your answer.

5. All but one U.S. coin has a name that is related to its value. Which one is it? How are the names of the others related to their values?

Practice

Use what you learned about ordering numbers to complete Exercises 4–7, 16, and 17 on page 164.

When comparing and ordering fractions, decimals, and percents write the numbers as all fractions, all decimals, or all percents.

EXAMPLE 1 — **Comparing Fractions, Decimals, and Percents**

a. **Which is greater, $\dfrac{3}{20}$ or 16%?**

$\times 5$

Write $\dfrac{3}{20}$ as a percent: $\dfrac{3}{20} = \dfrac{15}{100} = 15\%$

$\times 5$

Study Tip

It is usually easier to order decimals or percents.

∴ 15% is less than 16%. So, 16% is the greater number.

b. **Which is greater, 79% or 0.08?**

Write 79% as a decimal: $79\% = 79.\% = 0.79$

∴ 0.79 is greater than 0.08. So, 79% is the greater number.

On Your Own

Now You're Ready
Exercises 4–15

1. Which is greater, 25% or $\dfrac{7}{25}$?   2. Which is greater, 0.49 or 94%?
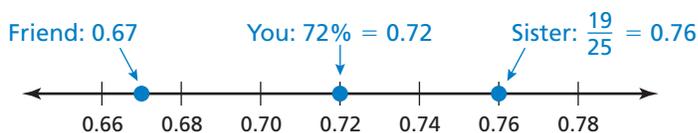
EXAMPLE 2 — **Real-Life Application**

You, your sister, and a friend each take the same number of shots at a soccer goal. You make 72% of your shots, your sister makes $\dfrac{19}{25}$ of her shots, and your friend makes 0.67 of his shots. Who made the fewest shots?

Remember

To order numbers from least to greatest, write them as they appear on a number line from left to right.

Write 72% and $\dfrac{19}{25}$ as decimals.

$\times 4$

You: $72\% = 72.\% = 0.72$ **Sister:** $\dfrac{19}{25} = \dfrac{76}{100} = 0.76$

$\times 4$

Graph the decimals on a number line.

Friend: 0.67   You: 72% = 0.72   Sister: $\dfrac{19}{25} = 0.76$

0.66 0.68 0.70 0.72 0.74 0.76 0.78

∴ 0.67 is the least number. So, your friend made the fewest shots.

3. WHAT IF? You make 75% of your shots, your sister makes $\dfrac{13}{20}$ of her shots, and your friend makes 0.7 of his shots. Who made the most shots?

EXAMPLE 3 **Real-Life Application**

Washington: $\dfrac{1}{50}$ Michigan: 0.03

New York: 6%

California: 0.12

Ohio: $\dfrac{1}{25}$
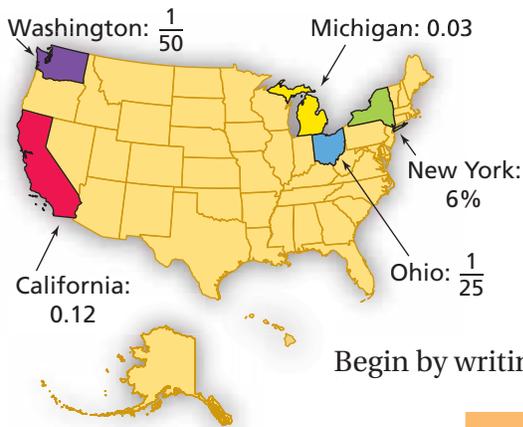
The map shows the portions of the U.S. population that live in five states.

List the five states in order by population from least to greatest.

Begin by writing each portion as a fraction, decimal, and percent.

State	Fraction	Decimal	Percent
Michigan	$\dfrac{3}{100}$	0.03	3%
New York	$\dfrac{6}{100}$	0.06	6%
Washington	$\dfrac{1}{50}$	0.02	2%
California	$\dfrac{12}{100}$	0.12	12%
Ohio	$\dfrac{1}{25}$	0.04	4%

Graph the percent for each state on a number line.

Michigan: 3%   New York: 6%
Washington: 2%   Ohio: 4%   California: 12%

0% 2% 4% 6% 8% 10% 12% 14%

∴ The states in order from least to greatest are Washington, Michigan, Ohio, New York, and California.

● **On Your Own**

4. The portion of the U.S. population that lives in Texas is $\dfrac{2}{25}$. The portion that lives in Illinois is 0.043. Reorder the states in Example 3 including Texas and Illinois.

Check It Out
Help with Homework
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Vocabulary and Concept Check

1. **NUMBER SENSE** Copy and complete the table.

2. **NUMBER SENSE** How would you decide whether $\frac{3}{5}$ or 59% is greater? Explain.

3. **WHICH ONE DOESN'T BELONG?** Which one does *not* belong with the other three? Explain your reasoning.

| 40% | $\frac{2}{5}$ | 0.4 | 0.04 |

Fraction	Decimal	Percent
$\frac{18}{25}$	0.72	
$\frac{17}{20}$		85%
$\frac{13}{50}$		
	0.62	
		45%

Practice and Problem Solving

Tell which number is greater.

① 4. 0.9, 95%   5. 20%, 0.02   6. $\frac{37}{50}$, 37%   7. 50%, $\frac{13}{25}$

8. 0.086, 86%   9. 76%, 0.67   10. 60%, $\frac{5}{8}$ 11. 0.12, 1.2%

12. 17%, $\frac{4}{25}$ 13. 140%, 0.14   14. $\frac{1}{3}$, 30%   15. 80%, $\frac{7}{9}$

Use a number line to order the numbers from least to greatest.

② 16. 38%, $\frac{8}{25}$, 0.41   17. 68%, 0.63, $\frac{13}{20}$

18. $\frac{43}{50}$, 0.91, $\frac{7}{8}$, 84%   19. 0.15%, $\frac{3}{20}$, 0.015

20. 2.62, $2\frac{2}{5}$, 26.8%, 2.26, 271%   21. $\frac{87}{200}$, 0.44, 43.7%, $\frac{21}{50}$

22. **TEST** You answer 21 out of 25 questions correctly on a test. Did you reach your goal of getting 80% or better?

23. **POPULATION** The table shows the portions of the world population that live in four countries. Order the countries by population from least to greatest.

Country	Brazil	China	Japan	United States
Portion of World Population	3%	$\frac{1}{5}$	$\frac{1}{50}$	0.046

Order the numbers from least to greatest.

24. 66.1%, 0.66, $\frac{2}{3}$, 0.667

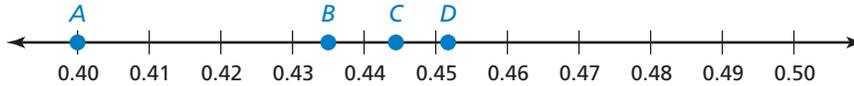**25.** $\frac{2}{9}$, 21%, $0.2\overline{1}$, $\frac{11}{50}$

Tell which letter shows the graph of the number.

26. $\frac{2}{5}$

27. 45.2%

28. 0.435

29. $\frac{4}{9}$

30. **TOUR DE FRANCE** The Tour de France is a bicycle road race. The whole race is made up of 21 small races called stages. The table shows how several stages compare to the whole Tour de France. Order the stages from shortest to longest.

Stage	1	7	8	17	21
Portion of Total Distance	$\frac{11}{200}$	0.044	$\frac{6}{125}$	0.06	4%

31. **SLEEP** The table shows the portions of the day that several animals sleep.

   a. Order the animals by sleep time from least to greatest.

   b. Estimate the portion of the day that you sleep.

   c. Where do you fit on the ordered list?

Animal	Portion of Day Sleeping
Dolphin	0.433
Lion	56.3%
Rabbit	$\frac{19}{40}$
Squirrel	$\frac{31}{50}$
Tiger	65.8%

32. **Number Sense** Tell what whole number you can substitute for a in each list so the numbers are ordered from least to greatest. If there is none, explain why.

   a. $\frac{2}{a}$, $\frac{a}{22}$, 33%

   b. $\frac{1}{a}$, $\frac{a}{8}$, 33%

Fair Game Review What you learned in previous grades & lessons

Multiply.

33. 0.6×8

34. 3.3×5

35. 0.74×9

36. 2.19×12

37. **MULTIPLE CHOICE** A flute is 27 inches long. A piccolo is $12\frac{1}{2}$ inches long. How many times greater is the length of the flute than the length of the piccolo?

   (A) $\frac{25}{54}$

   (B) $1\frac{1}{5}$

   (C) $2\frac{4}{25}$

   (D) 6