Unit 4, Lesson 9

Part of a Percent

Let's explore percentages smaller than 1%.

9.1 Math Talk: Dividing by 100

Find the value of each expression mentally.

- $14 \div 100$
- $7 \div 100$
- $3.5 \div 100$
- $103.5 \div 100$

9.2 Fractions of a Percent

1. Find each percentage of 60. What do you notice about your answers?

   30% of 60 3% of 60 0.3% of 60 0.03% of 60

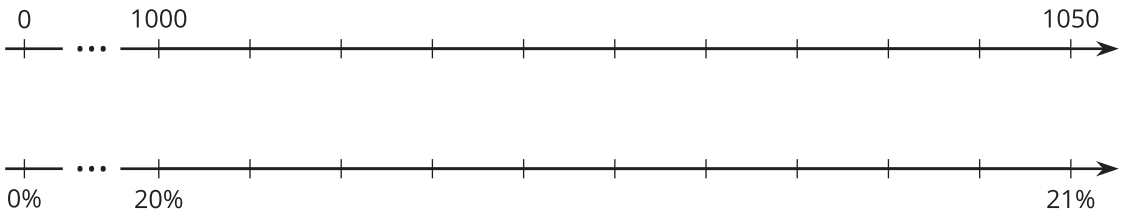
2. 20% of 5,000 is 1,000, and 21% of 5,000 is 1,050. Find each percentage of 5,000, and be prepared to explain your reasoning. If you get stuck, consider using the double number line diagram.

   a. 1% of 5,000

   b. 0.1% of 5,000

   c. 20.1% of 5,000

   d. 20.4% of 5,000



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3. 15% of 80 is 12, and 16% of 80 is 12.8. Find each percentage of 80, and explain your reasoning.

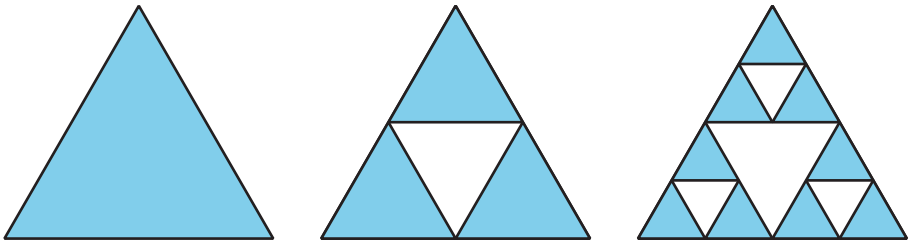
   a. 15.1% of 80

   b. 15.7% of 80

Are you ready for more?

To make Sierpinski's triangle,

- Start with an equilateral triangle. This is step 1.
- Connect the midpoints of every side, and remove the middle triangle, leaving three smaller triangles. This is step 2.
- Do the same to each of the remaining triangles. This is step 3.
- Keep repeating this process.



step 1 step 2 step 3

1. What percentage of the area of the original triangle is left after step 2? Step 3? Step 10?

2. At which step does the percentage first fall below 1%?

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9.3 Population Growth

1. The population of City A was approximately 243,000 people. It increased by 8% in one year. What was the new population?

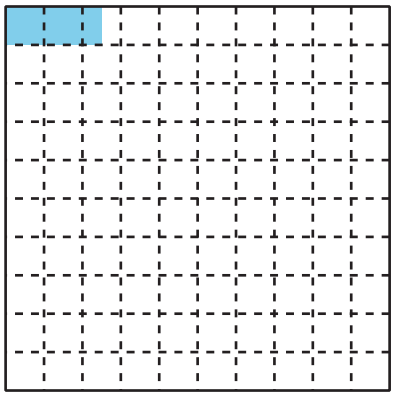
2. The population of City B was approximately 7,150,000. It increased by 0.8% in one year. What was the new population?

3. Lin says that City A grew by more. Andre says that City B grew by more. Do you agree with either of them? Explain your reasoning.

Lesson 9 Summary

A percentage, such as 30%, is a rate per 100. To find 30% of a quantity, we multiply it by $30 \div 100$, or 0.3.

The same method works for percentages that are not whole numbers, like 7.8% or 2.5%. In the square, 2.5% of the area is shaded.



To find 2.5% of a quantity, we multiply it by $2.5 \div 100$, or 0.025. For example, to calculate 2.5% interest on a bank balance of \$80, we multiply $(0.025) \cdot 80 = 2$, so the interest is \$2.

We can sometimes find percentages like 2.5% mentally by using convenient whole-number percentages. For example, 25% of 80 is one fourth of 80, which is 20. Since 2.5 is one tenth of 25, we know that 2.5% of 80 is one tenth of 20, which is 2.