

## Lesson 9: More and Less than 1%

Let's explore percentages smaller than 1%.

### 9.1: Number Talk: What Percentage?

Determine the percentage mentally.

10 is what percentage of 50?

5 is what percentage of 50?

1 is what percentage of 50?

17 is what percentage of 50?

### 9.2: Waiting Tables

During one waiter's shift, he delivered 13 appetizers, 17 entrées, and 10 desserts.

1. What percentage of the dishes he delivered were:

a. desserts?

b. appetizers?

c. entrées?

2. What do your percentages add up to?

### 9.3: 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

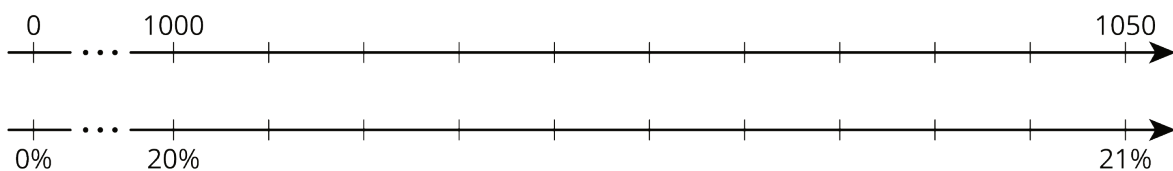
2. 20% of 5,000 is 1,000 and 21% of 5,000 is 1,050. Find each percentage of 5,000 and be prepared to explain your reasoning. If you get stuck, consider using the double number line diagram.

a. 1% of 5,000

b. 0.1% of 5,000

c. 20.1% of 5,000

d. 20.4% of 5,000



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

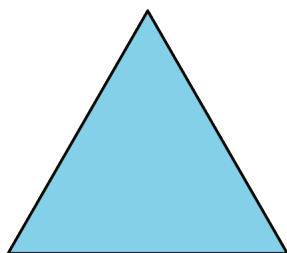
a. 15.1% of 80

b. 15.7% of 80

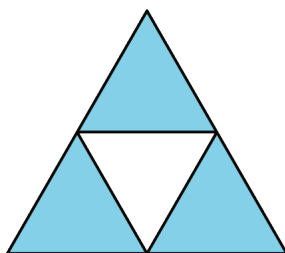
### Are you ready for more?

To make Sierpinski's triangle,

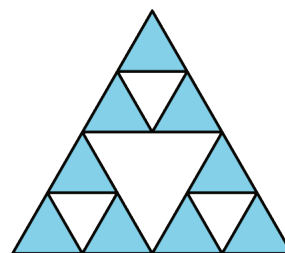
- Start with an equilateral triangle. This is step 1.
- Connect the midpoints of every side, and remove the middle triangle, leaving three smaller triangles. This is step 2.
- Do the same to each of the remaining triangles. This is step 3.
- Keep repeating this process.



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%?

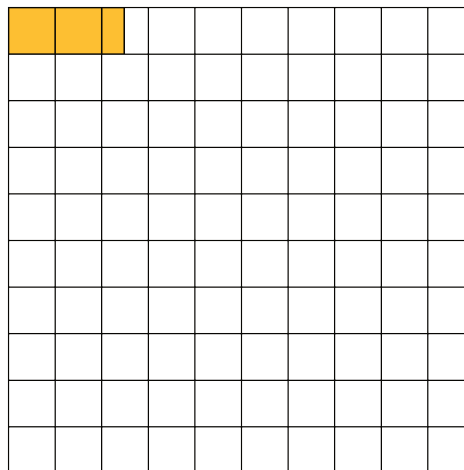
## 9.4: Population Growth

1. The population of City A was approximately 243,000 people, and it increased by 8% in one year. What was the new population?
  
2. The population of city B was approximately 7,150,000, and it increased by 0.8% in one year. What was the new population?

### 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 percents. 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.