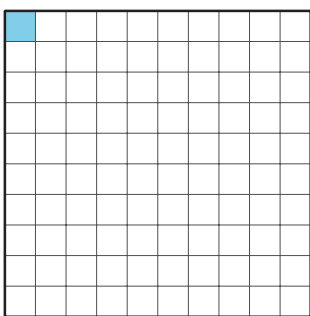
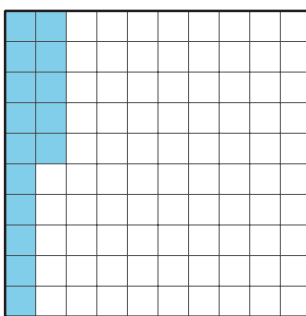
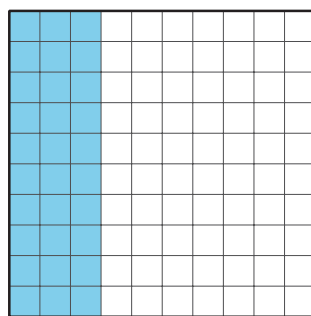
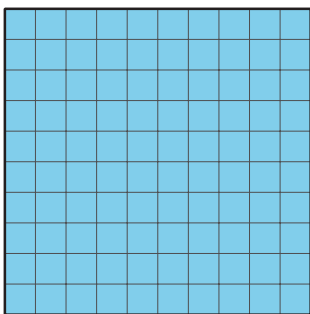
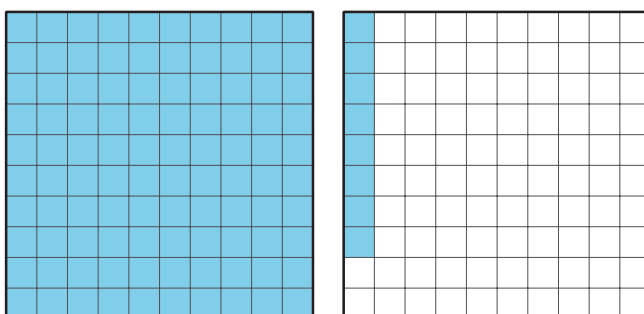


# What Are Percentages?

Let's use double number line diagrams to understand percentages.

## 21.1 A Large Square of 100 Square Units

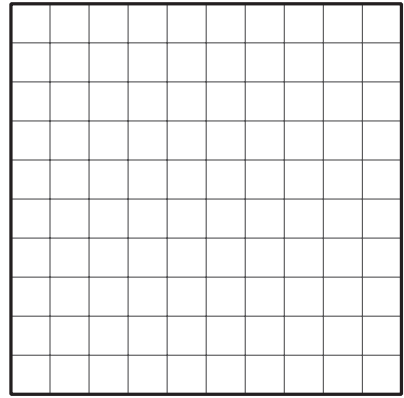
1. A large square represents an area of 100 square units. How many square units are shaded in each diagram?

**A****B****C****D****E**

Pause here so your teacher can review your work.

2. We can say that “1 **percent** of the large square” is shaded in Diagram A and “15 percent of the large square” is shaded in Diagram B.

Shade 50 percent of the area of the large square.

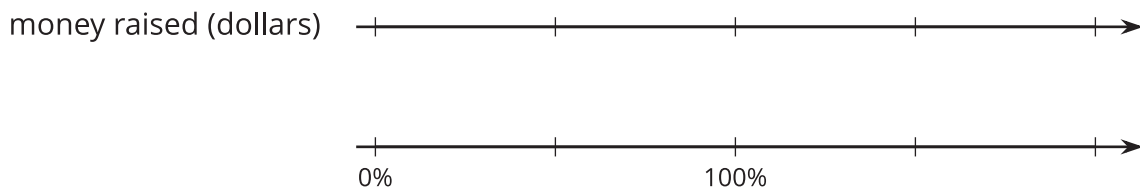


## 21.2 Fundraising Goal

Lin, Diego, Tyler, and Clare had the goal of raising \$40 each.

- Lin raised 100% of her goal.
- Diego raised 50% of his goal.
- Tyler raised 150% of his goal.
- Clare raised 200% of her goal.

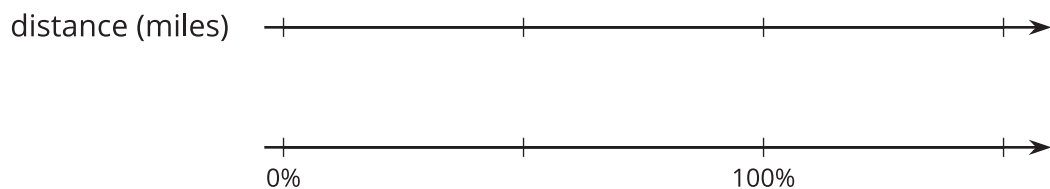
How much money did each person raise? Show your reasoning. Use the double number line diagram, if you find it helpful.



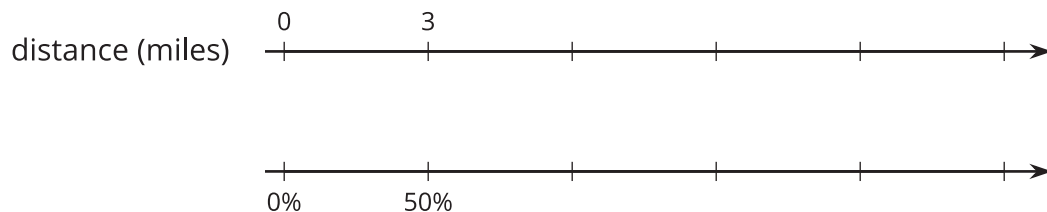
## 21.3 Three-Day Biking Trip

For each question, be prepared to explain or show your reasoning. Use the double number line diagrams, if you find them helpful.

1. Elena biked 8 miles on Saturday.
  - a. What is 100% of her Saturday distance?
  - b. On Sunday, she biked 75% of her Saturday distance. How far was that?
  - c. On Monday, she biked 125% of her Saturday distance. How far was that?



2. Han biked 3 miles on Saturday. That distance is 50% of the distance his uncle biked. How many miles did his uncle bike?



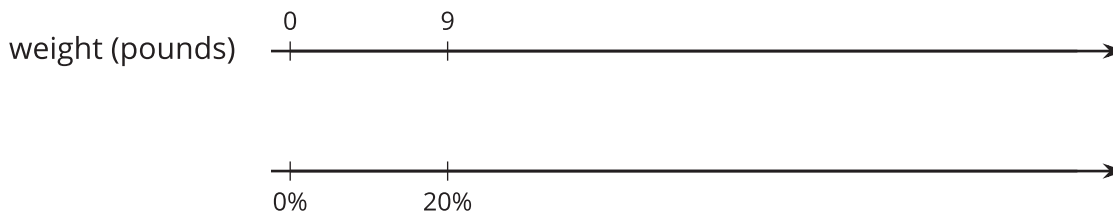
### Are you ready for more?

In July 2021, Austrian cyclist Christoph Strasser broke the record for the distance biked in one day. That distance was nearly 8,000% of Elena's Saturday's distance. About how many miles did he ride? Explain or show how you know.

## 21.4 Puppies Grow Up

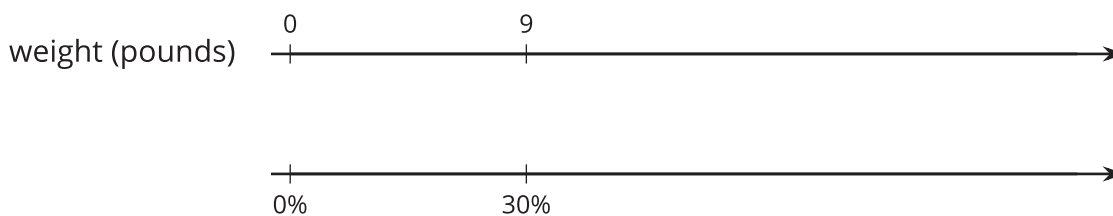
1. Jada has a new puppy that weighs 9 pounds. The vet says that the puppy is now at about 20% of its adult weight.

What will be the adult weight of the puppy?



2. Andre also has a puppy that weighs 9 pounds. The vet says that this puppy is now at about 30% of its adult weight.

What will be the adult weight of Andre's puppy?



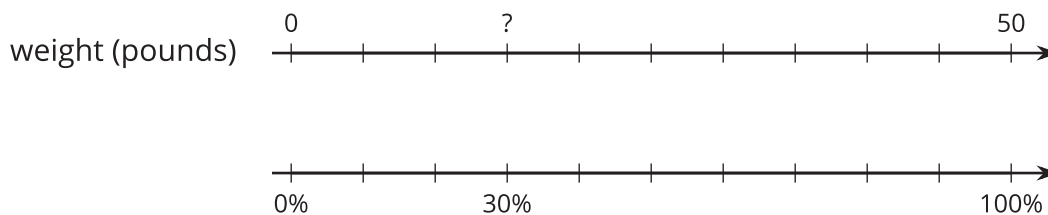
3. What is the same about Jada and Andre's puppies? What is different?



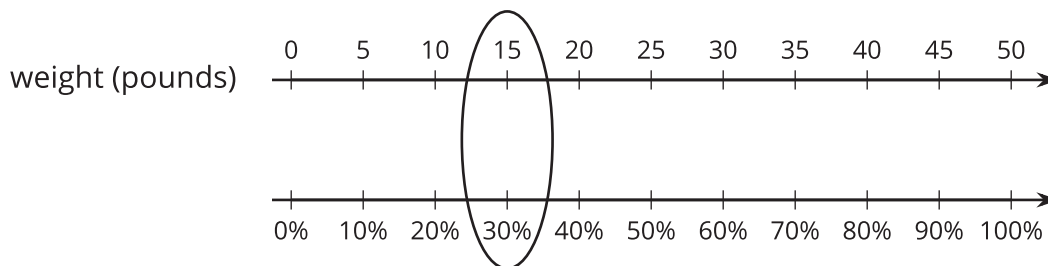
## Lesson 21 Summary

**Percent** means “per 100.” A **percentage** is a *rate per 100*. We can use percentages to describe the relationship between two quantities.

For example, what is 30% of 50 pounds? We can use a double number line diagram to solve problems about percentages. Because we are looking for a percentage of 50 pounds, 100% is aligned to 50 pounds on the double number line diagram, like this:



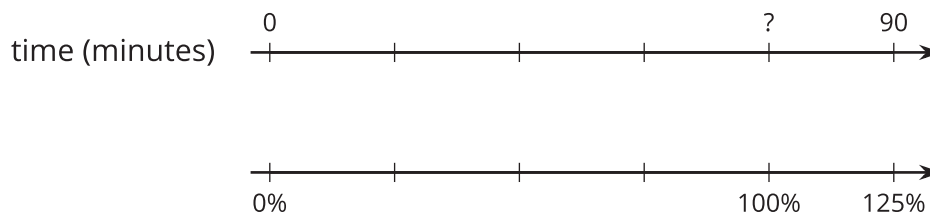
We divide the distance between 0% and 100% and that between 0 and 50 pounds into 10 equal parts. The tick marks on the top line can be labeled by counting by 5s ( $50 \div 10 = 5$ ). Those on the bottom line can be labeled by counting by 10% ( $100 \div 10 = 10$ ). We can see that 30% of 50 pounds is 15 pounds.



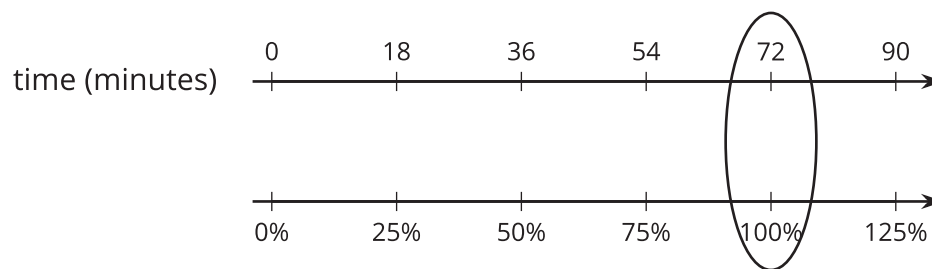
Double number line diagrams can also help us find the value of 100% when we know the value of another percentage.

Suppose Mai read for 90 minutes on Monday and this was 125% as much time as she spent reading on Sunday. How long did she read on Sunday?

In this case, the value we’re looking for is 100% of the number of reading minutes on Sunday. On a double number line diagram, we can align 90 minutes and 125%. Then, we can divide the interval between 0 and 90 and between 0 and 125% into five equal parts.



Each part on the top line represents 18 minutes ( $90 \div 5 = 18$ ) and each part on the bottom line represents 25% ( $125 \div 5 = 25$ ).



From the diagram, we can see that 72 minutes corresponds to 100%, so Mai read for 72 minutes on Sunday.