# Increasing and Decreasing

Let's use percentages to describe increases and decreases.

## 4.1 Improving Their Game

Here are the scores from three different sports teams from their last two games.

| sports team | total points in Game 1 | total points in Game 2 |
|---|---|---|
| football team | 22 | 30 |
| basketball team | 100 | 108 |
| baseball team | 4 | 12 |

1. What do you notice about the teams' scores? What do you wonder?

2. Which team improved the most? Explain your reasoning.

## 4.2  More Shampoo and a Discounted Shirt

1. A shampoo bottle says that now it contains 20% more. Originally, it came with 18.5 fluid ounces of shampoo. How much shampoo does the bottle come with now?

2. The price of a shirt is $18.50, but you have a coupon that lowers the price by 20%. What is the price of the shirt after using the coupon?
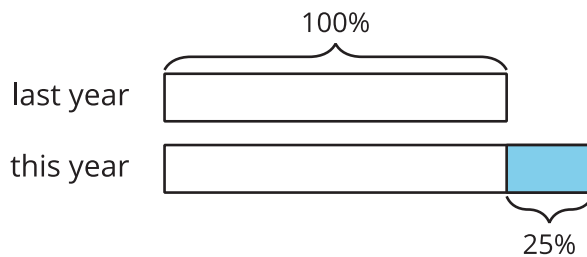
### 💡 Are you ready for more?

Shirts are on sale for 20% off. You buy two of them. As you pay, the cashier says, "20% off of each shirt means 40% off of the total price."

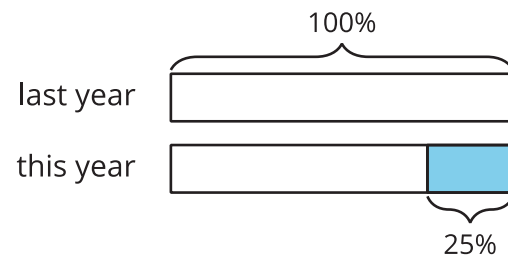Do you agree or disagree with this statement? Explain your reasoning.

## 4.3 Using Tape Diagrams

1. Match each situation to a diagram. Be prepared to explain your reasoning.

   a. Compared with last year's strawberry harvest, this year's strawberry harvest is a 25% increase.

   b. This year's blueberry harvest is 75% of last year's.

   c. Compared with last year, this year's peach harvest decreased 25%.

   d. This year's plum harvest is 125% of last year's plum harvest.

**A**

100%

last year

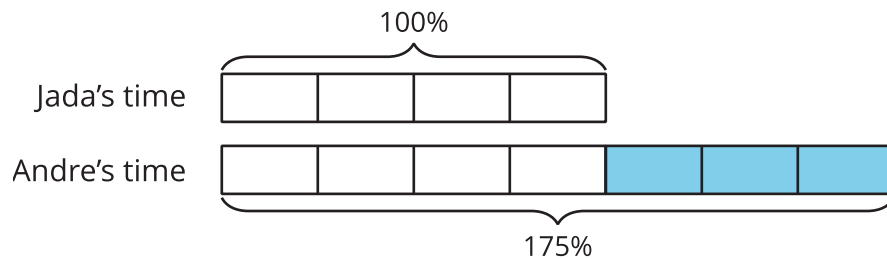this year

25%

**B**

100%

last year

this year

25%

2. Draw a diagram to represent these situations.

   a. The number of ducks living at the pond increased by 40%.

   b. The number of mosquitoes decreased by 80%.

## 💡 Are you ready for more?

What could it mean to say there is a 100% decrease in a quantity? Give an example of a quantity where this makes sense.

## 👥 Lesson 4 Summary

Imagine that it takes Andre $\frac{3}{4}$ more than the time it takes Jada to get to school. Then we know that Andre's time is $1\frac{3}{4}$, or 1.75, times Jada's time. We can also describe this in terms of percentages:



We say that Andre's time is 75% more than Jada's time. We can also see that Andre's time is 175% of Jada's time. In general, the terms **percent increase** and **percent decrease** describe an increase or decrease in a quantity as a percentage of the starting amount.

For example, if there were 500 grams of cereal in the original package, then "20% more" means that 20% of 500 grams has been added to the initial amount, $500 + (0.2) \cdot 500 = 600$, so there are 600 grams of cereal in the new package.



We can see that the new amount is 120% of the initial amount because $500 + (0.2) \cdot 500 = (1 + 0.2)500$.

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