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Unit 4, Lesson 6: Increasing and Decreasing

Let's use percentages to describe increases and decreases.

6.1: Improving Their Game

Here are the scores from 3 different sports teams from their last 2 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.

6.2: More Cereal and a Discounted Shirt

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



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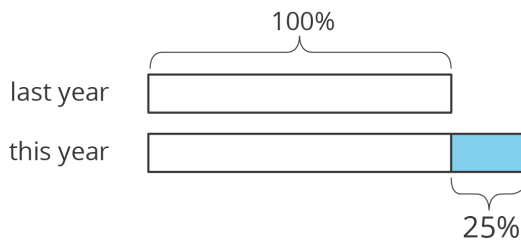
2. The price of a shirt is \$18.50, but you have a coupon that lowers the price by 20%.
What is the price of the shirt after using the coupon?



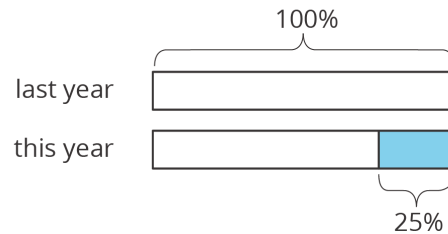
6.3: Using Tape Diagrams

1. Match each situation to a diagram. Be prepared to explain your reasoning.
- Compared with last year's strawberry harvest, this year's strawberry harvest is a 25% increase.
 - This year's blueberry harvest is 75% of last year's.
 - Compared with last year, this year's peach harvest decreased 25%.
 - This year's plum harvest is 125% of last year's plum harvest.

A



B



2. Draw a diagram to represent these situations.
- The number of ducks living at the pond increased by 40%.

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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.

6.4: Agree or Disagree: Percentages

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

1. Employee A gets a pay raise of 50%. Employee B gets a pay raise of 45%. So Employee A gets the bigger pay raise.

2. 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."

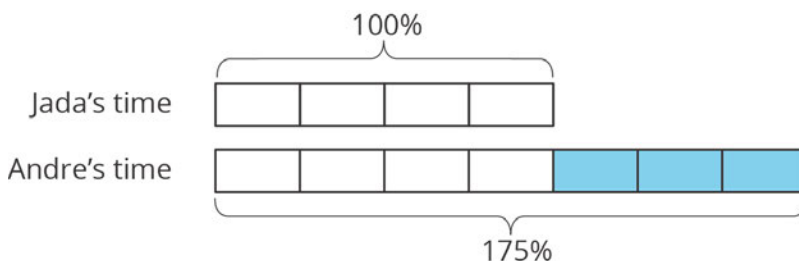
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Lesson 6 Summary

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:



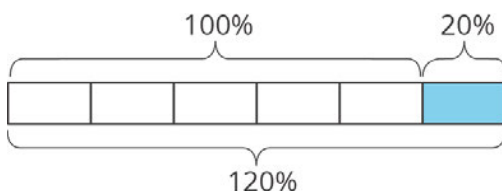
We say that Andre’s time is 75% more than Jada’s time. We can also see that Andre’s time is 175% of Jada’s time. In general, the terms **percent increase** and **percent decrease** describe an increase or decrease in a quantity as a percentage of the starting amount.

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

$$500 + (0.2) \cdot 500 = (1 + 0.2)500$$



Lesson 6 Glossary Terms

- percentage increase
- percentage decrease

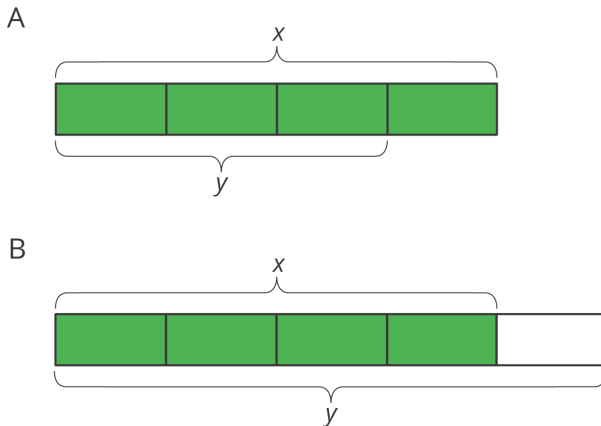
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Unit 4, Lesson 6: Increasing and Decreasing

1. For each diagram, decide if y is an increase or a decrease relative to x . Then determine the percent increase or decrease.



2. Draw diagrams to represent the following situations.

a. The amount of flour that the bakery used this month was a 40% increase relative to last month.

b. The amount of milk that the bakery used this month was a 75% decrease relative to last month.

3. Write each percent increase or decrease as a percentage of the initial amount. The first one is done for you.

a. This year, there was 40% more snow than last year.

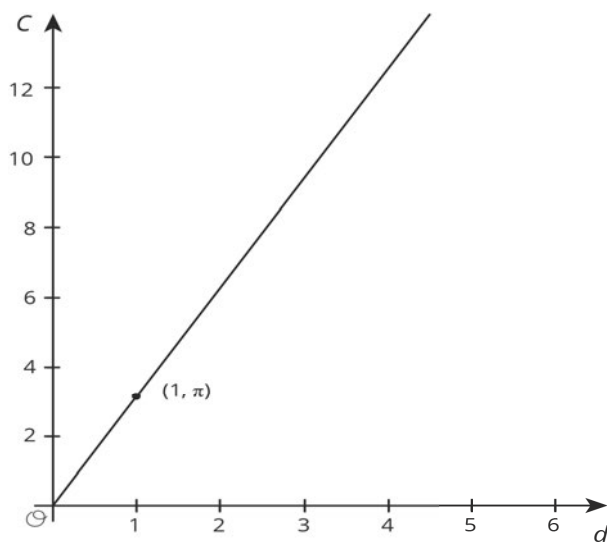
The amount of snow this year is 140% of the amount of snow last year.

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- b. This year, there were 25% fewer sunny days than last year.
- c. Compared to last month, there was a 50% increase in the number of houses sold this month.
- d. The runner's time to complete the marathon was a 10% less than the time to complete the last marathon.
4. The graph shows the relationship between the diameter and the circumference of a circle with the point $(1, \pi)$ shown. Find 3 more points that are on the line.



(from Unit 3, Lesson 3)

5. Priya bought x grams of flour. Clare bought $\frac{3}{8}$ more than that. Select **all** equations that represent the relationship between the amount of flour that Priya bought, x , and the amount of flour that Clare bought, y .
- A. $y = \frac{3}{8}x$
- B. $y = \frac{5}{8}x$
- C. $y = x + \frac{3}{8}x$
- D. $y = x - \frac{3}{8}x$
- E. $y = \frac{11}{8}x$

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(from Unit 4, Lesson 4)