Unit 6, Lesson 5

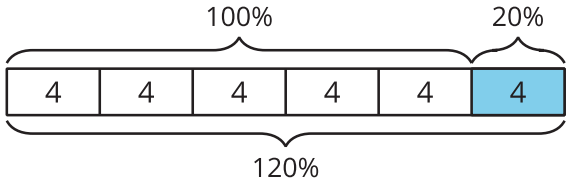
One Hundred Percent

Let's solve more problems about percent increase and percent decrease.

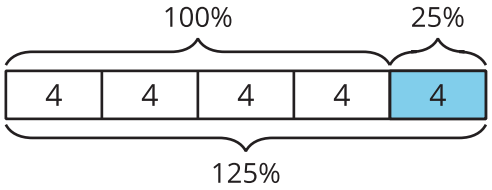
5.1 Which Three Go Together: Representing Percentages

Which three go together? Why do they go together?

A



B



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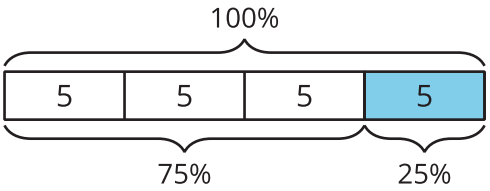

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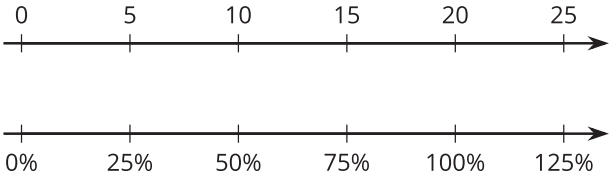

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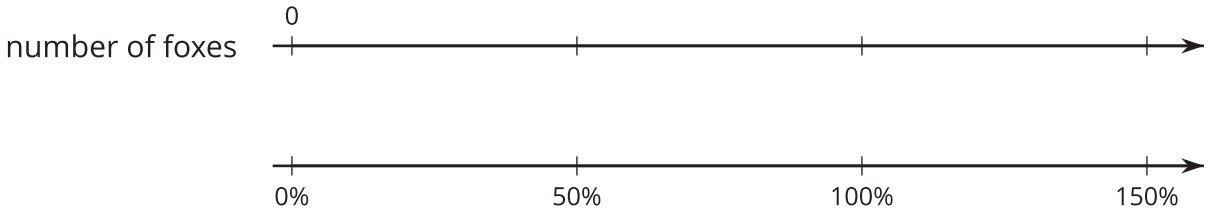
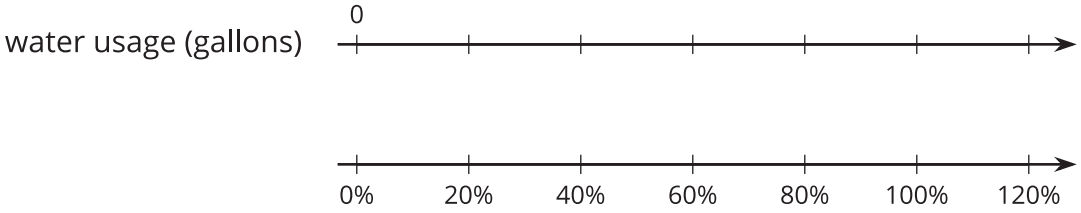
5.2 Double Number Lines

For each problem, complete the double number line diagram to show the percentages that correspond to the original amount and to the new amount.

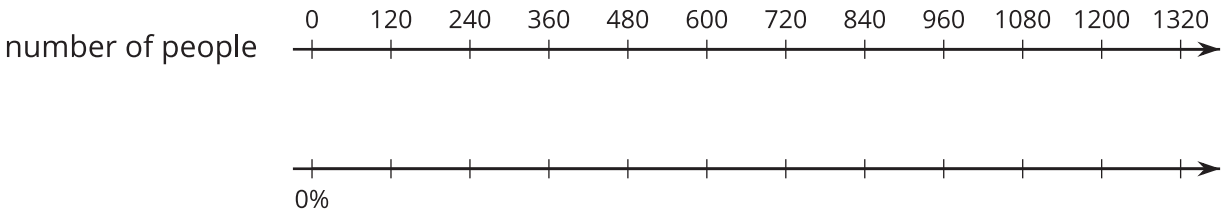
1. Last year, scientists counted 12 foxes in a conservation area. This year, they counted 50% more than that. How many foxes did they count this year?



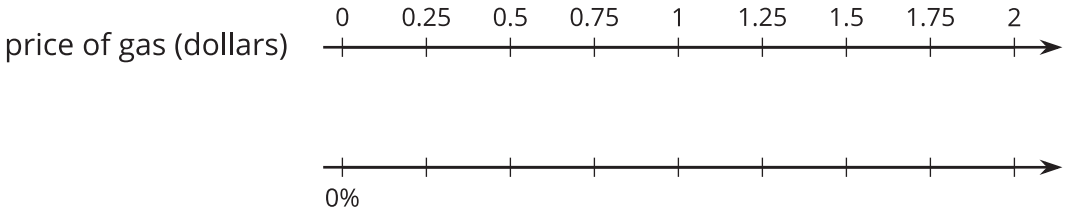
2. After replacing some grass with rocks, a business decreased its water usage by 20%. If their old water usage was 15,000 gallons per week, how much do they use now?



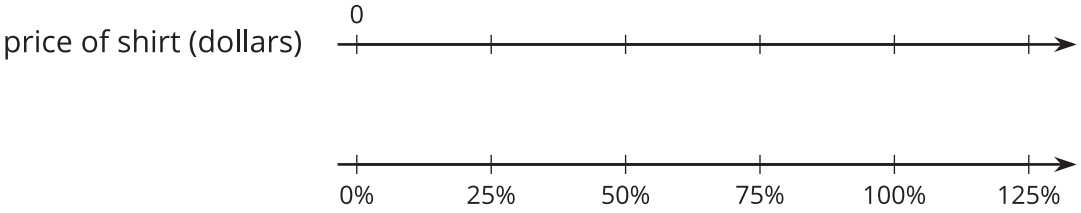
3. A school had 1,200 students last year and only 1,080 students this year. What was the percent decrease in the number of students?



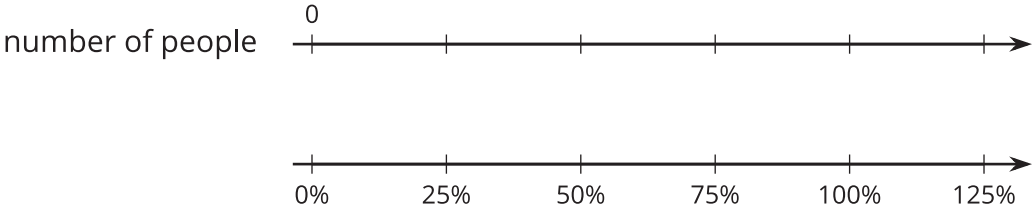
4. One week, gas was $1.25 per gallon. The next week, gas was $1.50 per gallon. By what percentage did the price increase?



5. After a 25% discount, the price of a T-shirt was $12. What was the price before the discount?



6. Compared to last year, the population of Boom Town has increased 25%. The population is now 6,600. What was the population last year?



Are you ready for more?

Employee A gets a pay raise of 10%. Employee B gets a pay raise of 6%. Kiran says, “That means Employee A got the bigger pay raise.” Do you agree or disagree with this statement? Explain your reasoning.

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5.3 Protecting the Green Sea Turtle

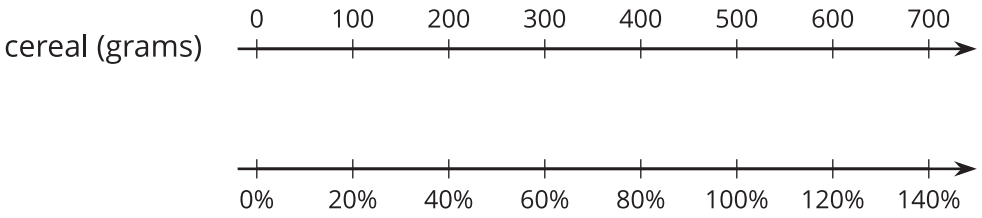
Green sea turtles live most of their lives in the ocean, but they come ashore to lay their eggs. Some beaches where turtles often come ashore have been made into protected sanctuaries so that the eggs will not be disturbed.

1. One sanctuary had 180 green sea turtles come ashore to lay eggs last year. This year, the number of turtles increased by 10%. How many turtles came ashore to lay eggs in the sanctuary this year?

2. At another sanctuary, the number of nesting turtles decreased by 10% between last year and this year. This year there were 234 nesting turtles. How many nesting turtles were at this sanctuary last year?

Lesson 5 Summary

We can use a double number line diagram to show information about percent increase and percent decrease:



The initial amount of cereal is 500 grams, which is lined up with 100% in the diagram. We can find a 20% *increase* by adding 20% of 500:

$$\begin{aligned} 500 + (0.2) \cdot 500 &= (1.20) \cdot 500 \\ &= 600 \end{aligned}$$

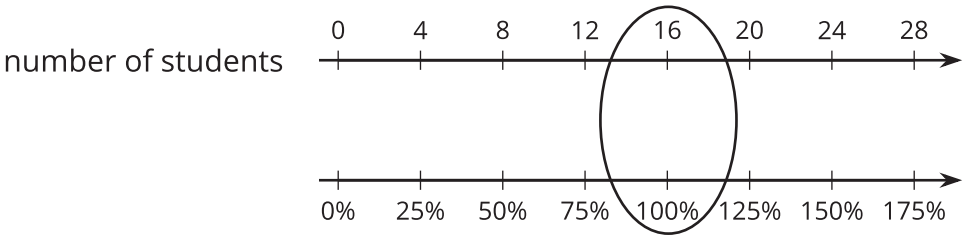
In the diagram, we can see that 600 corresponds to 120%.

If the initial amount of 500 grams is *decreased* by 40%, we can find how much cereal there is by subtracting 40% of the 500 grams:

$$\begin{aligned} 500 - (0.4) \cdot 500 &= (0.6) \cdot 500 \\ &= 300 \end{aligned}$$

So, a 40% decrease is the same as 60% of the initial amount. In the diagram, we can see that 300 is lined up with 60%.

To solve percentage problems, we need to be clear about what corresponds to 100%. For example, suppose there are 20 students in a class, and we know this is an increase of 25% from last year. In this case, the number of students in the class *last* year corresponds to 100%. So the initial amount (100%) is unknown and the final amount (125%) is 20 students.



Looking at the double number line, if 20 students is a 25% increase from the previous year, then there were 16 students in the class last year.

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