Unit 3, Lesson 11

Solving Problems about Percent Increase or Decrease

Let's use tape diagrams, equations, and reasoning to solve problems with negatives and percents.

11.1 20% Off

An item costs x dollars and then a 20% discount is applied. Select **all** the expressions that could represent the price of the item after the discount.

A. $\frac{20}{100}x$

B. $x - \frac{20}{100}x$

C. $(1 - 0.20)\,x$

D. $\frac{100-20}{100}x$

E. $0.80x$

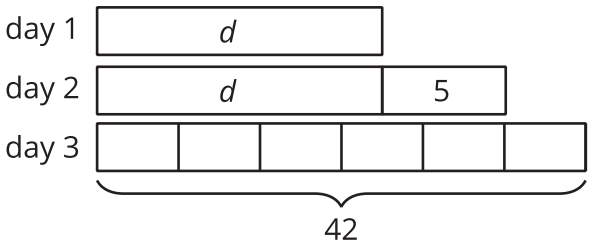
F. $(100 - 20)x$

11.2 Walking More Each Day

1. Mai started a new exercise program. On the second day, she walked 5 minutes more than on the first day. On the third day, she walked for 42 minutes. This was a 20% increase from the second day.

   Mai drew a diagram to show her progress.

   Explain how the diagram represents the situation.



2. Noah said the equation $1.20(d + 5) = 42$ also represents the situation. Do you agree with Noah? Explain your reasoning.

3. Find the number of minutes Mai walked on the first day. Explain or show your reasoning.

4. On Day 4 at noon, Mai tries to decide whether it is too cold to walk outside. The morning weather report says:
   - The temperature has doubled since midnight.
   - The temperature is expected to rise 15 degrees by the afternoon, reaching 9 degrees Celsius.

   Mai writes the equation $2t + 15 = 9$ to represent the situation. Do you agree with Mai? Explain your reasoning.

5. Find what the temperature was at midnight. Explain or show your reasoning.

11.3 A Sale on Shoes

1. A store is having a sale where all shoes are discounted by 20%. Diego has a coupon for $3 off of the regular price for one pair of shoes. The store first applies the coupon and then takes 20% off of the reduced price. If Diego pays $18.40 for a pair of shoes, what was their original price before the sale and without the coupon?

2. Before the sale, the store had 100 pairs of flip flops in stock. After selling some, $\frac{3}{5}$ of the flip flops they have left are blue. If the store has 39 pairs of blue flip flops left, how many pairs of flip flops (any color) did they sell?

3. After selling $\frac{2}{9}$ of the boots that were on display, the store manager brought out another 34 pairs from the stockroom. If that gave them 174 pairs of boots out, how many pairs were on display originally?

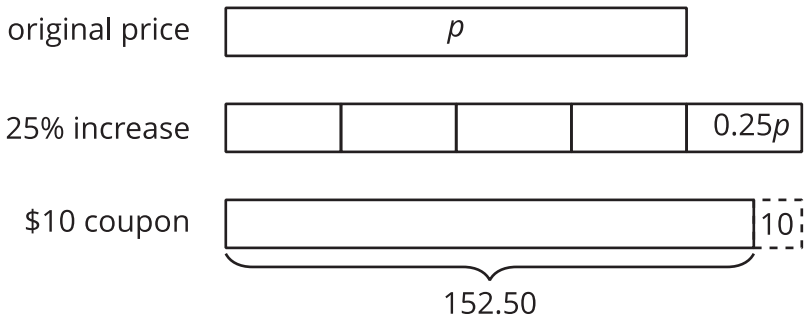
4. On the morning of the sale, the store donated 50 pairs of shoes to a shelter. Then they sold 64% of their remaining inventory during the sale. If the store had 288 pairs after the donation and the sale, how many pairs of shoes did they have at the start?

Are you ready for more?

A coffee shop offers a special: 33% extra free or 33% off the regular price. Which offer is a better deal? Explain your reasoning.

Lesson 11 Summary

We can solve problems where there is a percent increase or decrease by using what we know about equations. For example, a camping store increases the price of a tent by 25%. A customer then uses a $10 coupon for the tent and pays $152.50. We can draw a diagram that shows first the 25% increase and then the $10 coupon.



The price after the 25% increase is $p + 0.25p$ or $1.25p$. An equation that represents the situation including the $10 off for the coupon is $1.25p - 10 = 152.50$. To find the original price before the increase and discount, we can add 10 to each side and divide each side by 1.25, resulting in $p = 130$. The original price of the tent was $130.