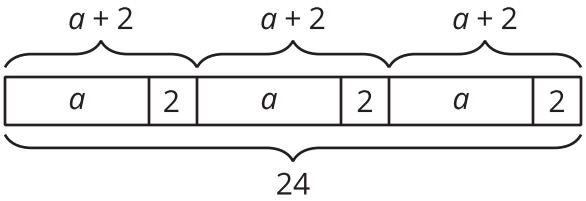
Using Equations to Solve Problems

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

10.1 Remember Tape Diagrams



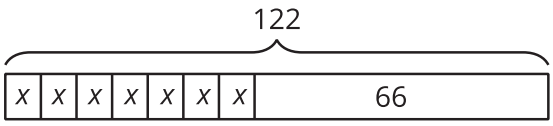
1. Write a story that could be represented by this tape diagram.

2. Write an equation that could be represented by this tape diagram.

10.2 At the Community Festival

1. Tyler makes invitations to the community festival. He has already made some of the invitations, and he wants to finish the rest of them within a week. He plans to make the same number of invitations each day. Tyler draws a diagram to represent the situation.

   a. Explain how each part of the situation is represented in Tyler's diagram:

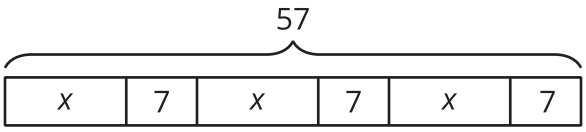
   - How many total invitations Tyler is trying to make
   - How many invitations he has made already
   - How many days he has to finish the invitations

   b. How many invitations should Tyler make each day to finish his goal within a week? Explain or show your reasoning.

   c. Write an equation that represents the situation. Explain how each part of the situation is represented in your equation.

   d. Show how to solve your equation.

2. Noah and his sister make prize bags for a game at the festival. Noah puts 7 pencil erasers in each bag. His sister puts an equal number of stickers in each bag. After filling 3 of the bags, they have used a total of 57 items.



   a. Explain how the diagram represents the situation.

   b. Noah writes the equation $3(x + 7) = 57$ to represent the situation. Do you agree with him? Explain your reasoning.

   c. How many stickers does Noah's sister put in each prize bag? Explain or show your reasoning.

3. A family of 6 goes to the festival. They have a coupon for $1.50 off each ticket. If they pay $46.50 for all their tickets, how much does each ticket cost without the coupon? Explain or show your reasoning. If you get stuck, consider drawing a diagram or writing an equation.

10.3 Running Around

Priya, Han, and Elena, are members of the running club at school.

1. Priya was busy studying this week and ran 7 fewer miles than last week. She ran 9 times as far as Elena ran this week. Elena only had time to run 4 miles this week.
   a. How many miles did Priya run last week?

   b. Elena wrote the equation $\frac{1}{9}(x - 7) = 4$ to represent the situation. She solved the equation by multiplying each side by 9 and then adding 7 to each side. How does her solution compare to the way you found Priya's miles?

2. One day last week, 6 teachers joined $\frac{5}{7}$ of the members of the running club in an after-school run. Priya counted a total of 31 people running that day. How many members does the running club have?

3. Priya and Han plan a fundraiser for the running club. They begin with a balance of -80 dollars because of expenses. In the first hour of the fundraiser, they collect equal donations from 9 people, which brings their balance to -44. How much did each person give?

4. The running club uses the money they raised to pay for a trip to a canyon. At one point during a run in the canyon, the students are at an elevation of 128 feet. After descending at an average rate of 50 feet per minute, they reach an elevation of -472 feet. How long did the descent take?

Are you ready for more?

A musician performed at three local festivals. At the first festival, he doubled his money and spent $30. At the second, he tripled his money and spent $54. At the third, he quadrupled his money and spent $72. In the end, the musician had $48 left. How much did he have before performing at the festivals?

Lesson 10 Summary

Many problems can be solved by writing and solving an equation. Here is an example:

Clare ran 4 miles on Monday. Then for the next 6 days, she ran the same distance each day. Clare ran a total of 22 miles during the week. How many miles did she run on each of the 6 days?

One way to solve the problem is to represent the situation with an equation, $4 + 6x = 22$, where x represents the distance, in miles, Clare ran on each of the 6 days. Solving the equation gives the solution to this problem.

$$\begin{aligned} 4 + 6x &= 22 \\ 6x &= 18 \\ x &= 3 \end{aligned}$$

Clare ran 3 miles each day.