

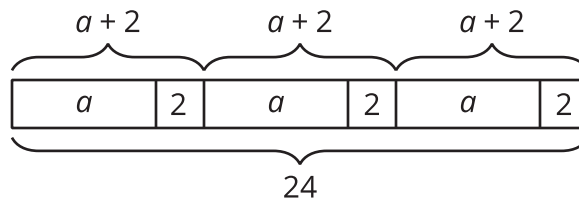


# Using Equations to Solve Problems

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

## 11.1

## 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.

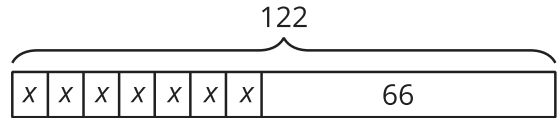
## 11.2

## 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

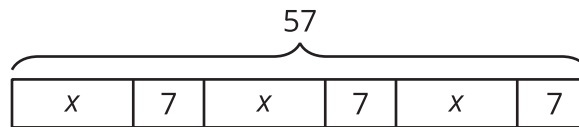
- How many days he has to finish the invitations

- 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.

## 11.3

## 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 11 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.

$$4 + 6x = 22$$

$$6x = 18$$

$$x = 3$$

Clare ran 3 miles each day.