Using Equations to Solve Problems
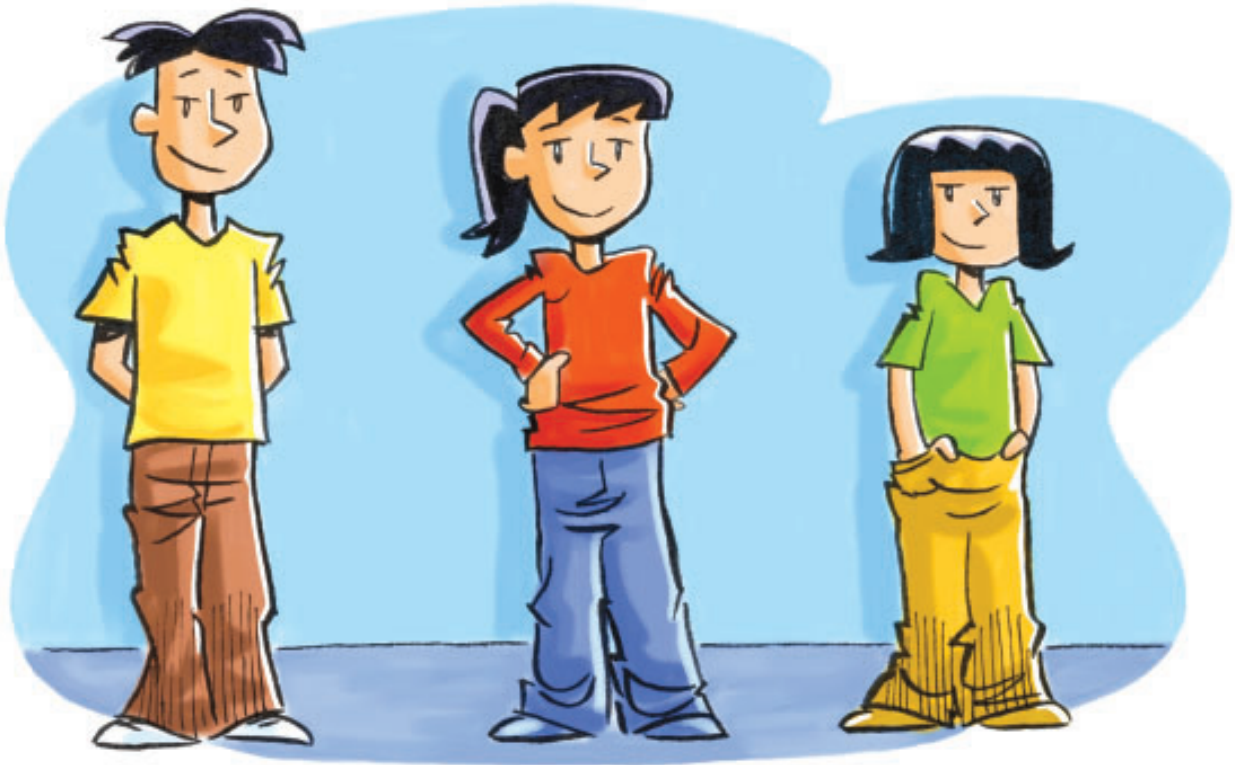
GOAL

Use equations to represent and solve problems.

Clara compared her height with her brother's height and her sister's height. Clara's brother is 5 cm taller than Clara. He is 140 cm tall. Clara's sister is 3 cm shorter than Clara.

How much taller is Clara's brother than her sister?

Justine's Equations

I can start by figuring out Clara's height. I'll write an **equation** to compare Clara's height with her brother's height.

$c + 5 = 140$

To **solve the equation**, I need to figure out the value of c in the equation. What number can be added to 5 to get 140?

I can subtract 5 from 140 to calculate the number.

$140 - 5 = c$
$140 - 5 = 135$, so $c = 135$

Check: $135 + 5 = 140$

Clara is 135 cm tall.

equation

A mathematical sentence in which the value on the left side is the same as the value on the right side

For example,
$4 + 2 = 6$,
$7 = 4 + n$, and
$5 + 3 = 4 + 4$ are equations.

solve the equation

Figure out the value of the missing number in the equation

A. What does the variable c represent in Justine's solution?

B. Write an equation to compare Clara's height with her sister's height. Solve your equation.

C. Write an equation to compare the height of Clara's brother with the height of Clara's sister. How much taller is Clara's brother than her sister?

Reflecting

D. How did Justine choose what the variable in her equation should represent?

E. Could you use the equation $s + 8 = 140$ to determine Clara's sister's height? How do you know?

Checking

1. A Kodiak bear is 120 cm taller than a black bear.
A grizzly bear is 95 cm shorter than the Kodiak bear.
The Kodiak bear is 305 cm tall.
  a) Write an equation with a variable to compare the black bear's height with the Kodiak bear's height. Solve the equation.
  b) Write an equation with a variable to compare the grizzly bear's height with the Kodiak bear's height. Solve the equation.
  c) How tall is the black bear? How tall is the grizzly bear?

Kodiak bear

Practising

2. Malik had $5. His grandfather gave him some more money. Now he has $15. Write an equation with a variable to determine how much money Malik's grandfather gave him. Solve the equation.

3. Solve each equation.
  a) $h + 145 = 200$ **d)** $190 - x = 115$
  b) $46 + b = 122$ **e)** $f - 18 = 35$
  c) $114 + 63 = g$ **f)** $178 - 52 = a$

4. 16 students started playing tag after school. When some students went home, 6 students were left. How many students went home? Use an equation to solve this problem.

5. Terence had some stickers. He gave 14 stickers away. Now he has 32 stickers. How many stickers did Terence have to start with? Use an equation to solve this problem.

6. Julia had some pennies. A friend gave her 4 more pennies. Now she has 11 pennies. How many pennies did she have to start with? Use an equation.

7. Write a problem that can be solved using each equation below. Then use the equation to solve your problem.
  a) $s + 25 = 100$
  b) $16 + n = 34$
  c) $150 - x = 102$
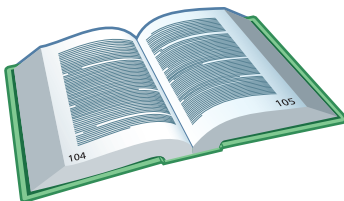 **d)** $k - 77 = 33$

8. Sarah is 6 years older than Louis. Louis is 13 years old. Sarah is 3 years younger than Isaac.
  a) Write an equation to compare Sarah's age with Louis's age.
  b) How old is Sarah?
  c) Write an equation to compare Sarah's age with Isaac's age.
  d) How old is Isaac?

9. Dar read a book in 2 days. The entire book was 225 pages long. On the first day, Dar read 105 pages. How many pages did she read on the second day? Use an equation to solve this problem.

10. Eric had some money in his pocket. He put another quarter in his pocket, and then he had 55¢. Either of the equations below can be used to determine how much money Eric had in his pocket. What does each part of each equation mean?

$m + 25 = 55$

$55 - 25 = m$

11. **a)** Can more than one problem be solved with the same equation? Give an example.
  b) Can a problem be represented by more than one equation? How do you know?