8.4 Real-World Problems: Equations and Inequalities

Math 6

Homework p33(1-11)
Write algebraic equations to solve real-world problems.

a) Yesterday Kyle had some stamps. Today his father gave him 12 more stamps. Now he has 27 stamps altogether. How many stamps did Kyle have yesterday?

Let $x$ represent the number of stamps Kyle had yesterday.

Kyle had some stamps. Today he has 12 more stamps. Now he has 27 stamps.

$$x + 12 = 27$$

The equation is $x + 12 = 27$.

To find how many stamps Kyle had yesterday, solve the equation.

$$x + 12 - 12 = 27 - 12$$

Subtract 12 from both sides.

$$x = 15$$

Kyle had 15 stamps yesterday.
b) In a pond, there are 3 times as many koi as goldfish. If there are 48 koi, find the number of goldfish in the pond.

Let \( g \) represent the number of goldfish in the pond.

There are **some** goldfish. There are **3 times as many** koi. There are **48** koi.

\[
g \times 3 = 48
\]

To find the number of goldfish in the pond, solve the equation.

\[
3g = 48
\]

\[
3g \div 3 = 48 \div 3 \quad \text{Divide both sides by 3.}
\]

\[
g = 16
\]

There are 16 goldfish in the pond.
Guided Practice

Complete.

1. On Monday, Wendy had some leaves in a collection she was making for biology class. After she collected 23 more leaves on Tuesday, she had 41 leaves. Find the number of leaves Wendy had on Monday.

   Let $r$ represent the number of leaves Wendy had on Monday.

   $r + 23 = ____$

   $r + 23 - ____ = ____ - ____$

   \[ r = ____ \]

   Wendy had ____ leaves on Monday.
Write an algebraic equation for each problem. Then solve.

2. Carlos thinks of a number. When he adds 17 to it, the result is 45. What is the number that Carlos thought of?

3. Sylvia bought some blouses and T-shirts. She paid a total of $63. The T-shirts cost $29. How much did the blouses cost?
Felicia used 153 yellow beads and some green beads for her art project. She used 9 times as many yellow beads as green beads. How many green beads did she use for the project?

Ivan had saved some quarters. He spent 50 quarters, which was \( \frac{2}{5} \) of the quarters he started out with. How many quarters did he start out with?
Write algebraic inequalities to solve real-world problems.

a) Jamal sees the sign shown in a store window.

![Sale sign]

Write an inequality to represent the situation. Use a number line to represent the inequality. Then give the greatest possible cost of a T-shirt.

Let \( c \) represent the cost of a T-shirt.

All T-shirts cost less than $16.

\[
\begin{align*}
\text{All T-shirts cost less than } & \ 16 \\
c & < \ 16
\end{align*}
\]

The inequality \( c < 16 \) represents the situation.

The greatest possible cost of a T-shirt is $15.99.
A ski club is organizing a trip. At least 20 club members have to sign up for the trip to cover the cost of the bus. Write an inequality to represent this situation. Use a number line to represent the inequality.

Let \( w \) represent the number of members who sign up for the trip.

The **number of members** who sign up must be **at least** 20.

\[
\begin{align*}
\downarrow & \quad \downarrow \\
w & \geq 20
\end{align*}
\]

The inequality \( w \geq 20 \) represents the situation.

The graph shows that the least number of members who have to sign up is 20.
Guided Practice

Complete.

6  The figure shows a speed limit sign on a highway.
   \[ \text{Let } x \text{ represent the speed in miles per hour.} \]
   Write an inequality to represent the situation.
   The inequality is \( \_\_\_\_ \).
   \[ \text{Give the maximum legal driving speed on the highway.} \]
   The maximum legal driving speed is \( \_\_\_\_ \) miles per hour.

Solve.

7  More than 35 guests came to Katrina’s birthday party last Sunday.
   \[ \text{Write an inequality to represent the number of guests who turned up for} \]
   \[ \text{the birthday party.} \]
   \[ \text{What is the least possible number of guests who could have come to} \]
   \[ \text{the party?} \]
8 In Mr. Boyle’s class, the students are required to summarize a passage in less than 50 words.
   a) Write an inequality to represent the number of words that the students can use to summarize the passage.
   b) What is the maximum number of words that a student can use?

9 A cargo elevator has a load limit of 240 tons.
   a) Write an inequality to represent the load limit of the cargo elevator.
   b) What is the greatest possible load the cargo elevator can carry?

10 To get a discount coupon at a bookstore, you need to spend at least $50 at the store.
    a) Write an inequality to represent the amount of money that you must spend in order to get a discount coupon.
    b) Andrea has spent $45 at the store, and her friend Alex has spent $55. Which person can get a discount coupon?
Write and solve an algebraic equation for each problem. Show your work.

1. Damien thinks of a number. When he adds 32 to it, the sum is 97. What is the number that Damien thought of?

2. A baker made some bagels in the morning. After selling 85 bagels, there were 64 left. How many bagels did the baker make in the morning?

3. Claudia can text 3 times as fast as Fiona. Claudia can text 78 words per minute. How many words per minute can Fiona text?

4. Eric spent $\frac{2}{5}$ of his allowance on a jacket. The jacket cost him $12. How much was his allowance?

Write and solve an algebraic inequality for each problem.

5. In a science competition, students have to score more than 40 points in order to move on to the next round.

   a) Write an inequality to represent this situation. Use a number line to represent the inequality.

   b) What is the least number of points a student needs to score in order to move on to the next round? Only whole numbers of points are awarded to students.
A stadium has a seating capacity of 65,000 spectators.

a) What is the maximum number of spectators the stadium can hold?

b) Write an inequality to represent this situation. Then use a number line to represent the inequality.

Write and solve an algebraic equation or inequality for each problem. Show your work.

A bicycle store sells \( \frac{4}{7} \) of the mountain bikes in the store. Then only 24 mountain bikes are left. How many mountain bikes were there originally?

Mabel has a total of 54 decorative beads. Some are black and some are white. The ratio of the number of black beads to the number of white beads is 7 : 2. How many more black beads than white beads are there?

Gary has a collection of comic books. After selling 70% of his comic books, he has 42 comic books left. How many comic books did he start with?

There are 30 students in the gym. If there are at least 16 girls, write an inequality to represent the number of boys in the gym.

The marbles in a box are repackaged in equal numbers into 6 smaller bags. If each bag has more than 8 marbles, what is the least possible number of marbles that could have been in the box?