

• Word Problems About Comparing and Elapsed Time

Power Up

facts

Power Up F

count aloud

Count by 6s from 6 to 96.

mental math

- Estimation:** Round 285 to the nearest hundred.
- Number Sense:** $300 + 800$
- Number Sense:** 300×8
- Number Sense:** There are 42 beads in each necklace. How many beads are in 5 necklaces? (*Think: 5×42 or half of 10×42 .*)
- Fractional Parts:** $\frac{1}{2}$ of 42 meters
- Percent:** 50% of \$8.00
- Percent:** 25% of \$8.00
- Calculation:** $3 \times 9, + 1, \div 7, + 1, \times 5, - 1, \div 4$

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Montrelyn has a pet dog and a pet cat. Together the two animals weigh 42 pounds. The dog weighs 14 pounds more than the cat. How much does each pet weigh?

New Concept

Numbers are used to describe the quantity of objects.

Seven different containers are on a loading dock awaiting shipment.

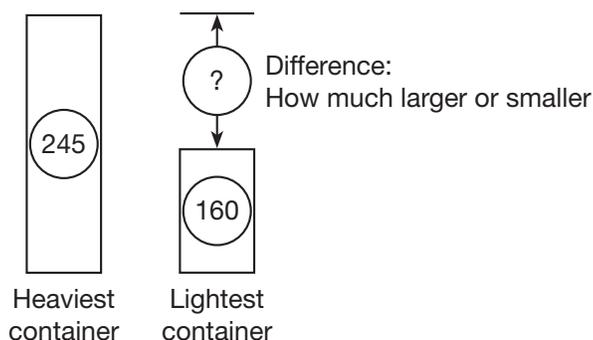
Numbers are also used to describe the size of objects.

The heaviest container weighs 245 pounds.

Some word problems compare numbers of objects or sizes of objects.

The containers range in weight from 245 pounds to 160 pounds. The heaviest container weighs how many pounds more than the lightest container?

In comparison problems, one number is larger and another number is smaller. Drawing a sketch can help us understand a comparison story. We will draw two rectangles, one taller than the other. Then we will draw an arrow from the top of the shorter rectangle to extend as high as the taller rectangle. The length of the arrow shows the difference in height between the two rectangles. The two rectangles and the arrow each have a circle for a number. For this problem, the rectangles stand for the weights of the two containers.



A comparison problem may be solved by using a subtraction formula. If we subtract the smaller number from the larger number, we find the difference between the two numbers. Here we show two ways to write a comparison equation:

$$\begin{array}{r} \text{Larger} \\ - \text{Smaller} \\ \hline \text{Difference} \end{array} \qquad \text{Larger} - \text{Smaller} = \text{Difference}$$

In this problem the number missing is the difference, which we find by subtracting.

$$\begin{array}{r} 245 \text{ pounds} \\ - 160 \text{ pounds} \\ \hline 85 \text{ pounds} \end{array}$$

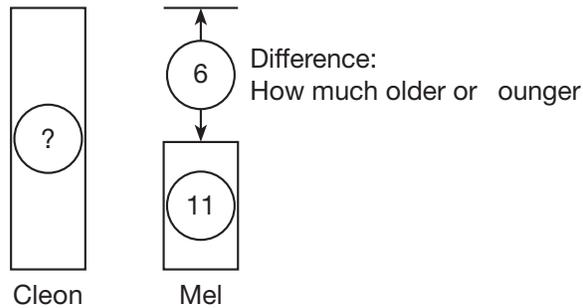
We find that the heaviest container weighs 85 pounds more than the lightest container.

Justify Explain how to decide if the answer is reasonable.

Example 1

Mel is 6 years younger than his brother Cleon. Mel is 11 years old. How old is Cleon?

We will draw two rectangles to illustrate the problem. The rectangles stand for the boys' ages. Since Mel is younger, his rectangle is shorter.



From the story we know that Mel is 11 and that the difference between his age and his brother's age is 6 years. We write the numbers in the circles and use a subtraction pattern to solve the problem.

$$\begin{aligned} \text{Larger} - \text{Smaller} &= \text{Difference} \\ g - 11 &= 6 \end{aligned}$$

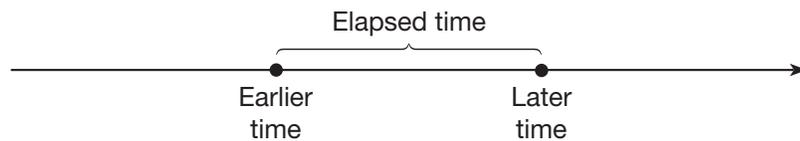
We find the first number of a subtraction problem by adding

$$\begin{array}{r} g \\ - 11 \\ \hline 6 \end{array} \quad \text{so} \quad \begin{array}{r} 6 \\ + 11 \\ \hline g \end{array}$$

Adding 6 and 11, we find that Cleon is **17 years old**.

Verify Why can we use addition to solve a subtraction problem?

Elapsed-time problems are like comparison problems. **Elapsed time** is the amount of time between two points in time.



Your age is an example of elapsed time. Your age is the difference between the present time and the time of your birth. To calculate elapsed time, we subtract the earlier time from the later time. Below are two forms of the equation. We use the word *difference* for elapsed time.

$$\begin{array}{r} \text{Later} \\ - \text{Earlier} \\ \hline \text{Difference} \end{array} \quad \text{Later} - \text{Earlier} = \text{Difference}$$

Example 2

How many years were there from 1492 to 1620?¹

To find the number of years from one date to another, we may subtract. We subtract the earlier date from the later date. In this problem we subtract 1492 from 1620 and find that there were **128 years** from 1492 to 1620.

$$\begin{array}{r} 51 \\ 1620 \\ - 1492 \\ \hline 128 \end{array}$$

Example 3

A school day at Edison School begins at 8:10 a.m. The school day ends at 3:15 p.m. What is the length of a school day at Edison School?

We can solve elapsed time problems using the *later* – *earlier* = *difference* equation. The later time is 3:15 p.m., which can also be written as 15:15. The earlier time is 8:10.

$$\begin{array}{r} \text{Later} \qquad 15:15 \\ - \text{Earlier} \qquad 8:10 \\ \hline \text{Difference} \qquad 7:05 \end{array}$$

We find that the length of the school day is **7 hours 5 minutes**.

Lesson Practice

Formulate

For problems **a–e**, write an equation and solve the problem.

- There were 4 more boys than girls in the class. If there were 17 boys in the class, how many girls were there?
- The Mackinac Bridge spans 3800 feet, which is 400 feet less than the span of the Golden Gate Bridge. What is the span of the Golden Gate Bridge?
- From Rome to Paris is 1120 kilometers. From Rome to London is 1448 kilometers. The distance from Rome to London is how much greater than the distance from Rome to Paris?
- How many years were there between the Magna Carta in 1215 and the Declaration of Independence in 1776?
- Elena finished her homework at 8:05 p.m. She began at 6:50 p.m. How long did it take Elena to complete her homework?

¹ Unless otherwise specified, all dates in this book are A.D.

- * 1. Represent** Draw a pair of intersecting oblique lines.
(12, 31)

Formulate For problems 2–5, write an equation and find the answer.

- 2. Justify** In three games Tamyra’s bowling scores were 109, 98, and 135. What was her total score for all three games? Explain why your answer is reasonable.
(11, 33)

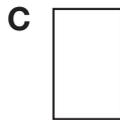
- 3.** Santiago is 8 inches taller than Sancha. If Santiago is 63 inches tall, how tall is Sancha?
(35)

- 4.** How many years were there from the time the Statue of Liberty was built in 1886 to the centennial ceremony in 1986?
(35)

- 5.** The toll for one car to cross the bridge was \$1.50. In ten minutes, 40 cars crossed the bridge. What was the total toll for the 40 cars?
(21, 29)

- 6.** What is the product of nine hundred nineteen and ninety?
(29)

- * 7. a. Multiple Choice** Which two quadrilaterals appear to be similar?
(31, 32)



- b.** Which shape above does not appear to have any perpendicular sides?

- 8. List** Write the factors of 18 and 28. Circle the common factors.
(25)

9. $4m = 432$
(26, 34)

10. $423 \div 6$
(34)

11. $243 \div 8$
(34)

12. $2001 \div 4$
(34)

13. $1020 \div 10$
(34)

14. $420 \div (42 \div 6)$
(24, 34)

- 15.** Round 468 to the nearest hundred.
(33)

$$\begin{array}{r} 16. \quad 4657 \\ \quad \quad 285 \\ + 1223 \\ \hline \end{array}$$

$$\begin{array}{r} 17. \quad 3165 \\ \quad \quad - 1635 \\ \hline \end{array}$$

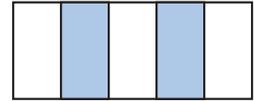
$$\begin{array}{r} 18. \quad \$10.00 \\ \quad \quad - \$ 8.93 \\ \hline \end{array}$$

$$\begin{array}{r} 19. \quad 436 \\ \quad \quad \times 70 \\ \hline \end{array}$$

$$\begin{array}{r} 20. \quad \$8.57 \\ \quad \quad \times 7 \\ \hline \end{array}$$

$$\begin{array}{r} 21. \quad 600 \\ \quad \quad \times 900 \\ \hline \end{array}$$

- *22. Write the shaded part of this rectangle as a fraction, a decimal, and a percent. Is more than or less than 50% of the rectangle shaded?



23. This morning the school bus picked Tevin up at 6:55 a.m. and arrived at Tevin's school at 7:48 a.m. How much time did Tevin spend on the bus this morning?
24. From November 1 of one year to March 1 of the next year is how many months?

25. **Conclude** What are the next three terms in this counting sequence?
 ..., 1900, 2000, 2100, _____, _____, _____, ...

26. Show how to check this division answer. Is the answer correct?

$$\begin{array}{r} 72 \\ 6 \overline{)432} \end{array}$$

27. One half of the 14 animals that were boarded at a kennel last weekend were dogs. How many dogs were boarded at the kennel last weekend?
28. Use words to name the number 68,200.
29. a. **Represent** Draw a right angle.
 b. Draw an acute angle whose opening is half the size of a right angle.
30. **Estimate** A tennis team began the season with about 175 new tennis balls. The balls were purchased in containers called sleeves, with 3 balls in each sleeve. About how many sleeves of balls did the team purchase? Explain why your estimate is reasonable.