

## 4.4 Finding the Percent of a Number

**Essential Question** How can you use mental math to find the percent of a number?



"I have a secret way for finding 21% of 80."



"10% is 8 and 1% is 0.8."



"So 21% is  $8 + 8 + 0.8 = 16.8$ ."

### 1 EXAMPLE: Finding 10% of a Number

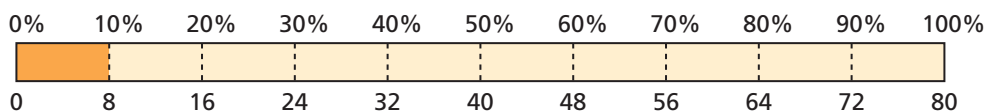
- a. How did Newton know that 10% of 80 is 8?

Write 10% as a fraction.

$$10\% = \frac{10}{100} = \frac{1}{10}$$

Labels: 10 (numerator), per (middle), cent (denominator)

**Method 1:** Using a Model



**Method 2:** Using Multiplication

$$10\% \text{ of } 80 = \frac{1}{10} \text{ of } 80 = \frac{1}{10} \times 80 = \frac{80}{10} = 8$$

- b. How do you move the decimal point to find 10% of a number?

Move the decimal point one place to the left.  $10\% \text{ of } 80. = 8.0$

### 2 ACTIVITY: Finding 1% of a Number

**Work with a partner.**

- How did Newton know that 1% of 80 is 0.8?
- How do you move the decimal point to find 1% of a number?

### 3 EXAMPLE: Using Mental Math

Use mental math to find each percent of a number.

a. 12% of 40

**Think:**  $12\% = 10\% + 1\% + 1\%$

$$\begin{array}{l} \boxed{10\% \text{ of } 40 = 4} \quad \boxed{1\% \text{ of } 40 = 0.4} \\ \swarrow \quad \searrow \quad \downarrow \\ 4 + 0.4 + 0.4 = 4.8 \end{array}$$

b. 19% of 50

**Think:**  $19\% = 10\% + 10\% - 1\%$

$$\begin{array}{l} \boxed{10\% \text{ of } 50 = 5} \quad \boxed{1\% \text{ of } 50 = 0.5} \\ \swarrow \quad \downarrow \quad \searrow \\ 5 + 5 - 0.5 = 9.5 \end{array}$$

### 4 ACTIVITY: Using Mental Math

Work with a partner. Use mental math to find each percent of a number.



a. 20% tip for a \$30 meal

b. 18% tip for a \$30 meal

c. 6% sales tax on a \$20 shirt

d. 9% sales tax on a \$20 shirt



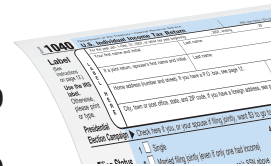
e. 6% commission on selling a \$200,000 house

f. 2% property tax on a \$200,000 house



g. 21% income tax on an income of \$40,000

h. 38% income tax on an income of \$80,000



## What Is Your Answer?

5. **IN YOUR OWN WORDS** How can you use mental math to find the percent of a number?
6. Describe two real-life examples of finding a percent of a number.

### Practice

Use what you learned about finding the percent of a number to complete Exercises 3–10 on page 172.

## Key Idea

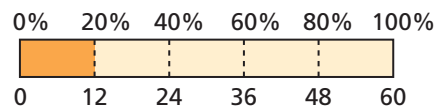
### Finding the Percent of a Number

**Words** Write the percent as a fraction or decimal. Then multiply.

**Numbers** 20% of 60 is 12.

$$\begin{array}{r} \downarrow \quad \quad \downarrow \\ \frac{1}{5} \times 60 = 12 \\ 0.2 \times 60 = 12 \end{array}$$

**Model**



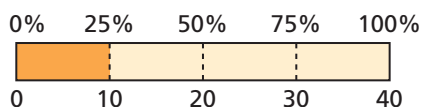
## EXAMPLE 1 Finding the Percent of a Number

Use a fraction to find the percent of the number.

a. Find 25% of 40.

$$\begin{aligned} 25\% \text{ of } 40 &= \frac{1}{4} \times 40 \\ &= \frac{1 \times \overset{10}{\cancel{40}}}{\underset{1}{\cancel{4}}} \\ &= 10 \end{aligned}$$

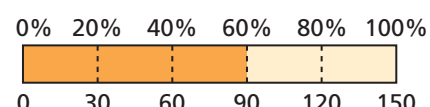
So, 25% of 40 is 10.



b. Find 60% of 150.

$$\begin{aligned} 60\% \text{ of } 150 &= \frac{3}{5} \times 150 \\ &= \frac{3 \times \overset{30}{\cancel{150}}}{\underset{1}{\cancel{5}}} \\ &= 90 \end{aligned}$$

So, 60% of 150 is 90.



## On Your Own

Use a fraction to find the percent of the number.

1. 90% of 20      2. 75% of 32      3. 10% of 110      4. 30% of 75

## EXAMPLE 2 Standardized Test Practice

How many students went on vacation?

- (A) 48      (B) 96      (C) 100      (D) 104

From the survey, you can see that 48% out of 200 students said yes.

$$\begin{aligned} 48\% \text{ of } 200 &= 0.48 \times 200 \\ &= 96 \end{aligned}$$

Write 48% as a decimal.

Multiply.

So, 96 students went on vacation. The correct answer is (B).

**Summer Vacation**  
Did you go on a vacation this past summer?

Yes	48%
No	52%

Note: 200 students surveyed

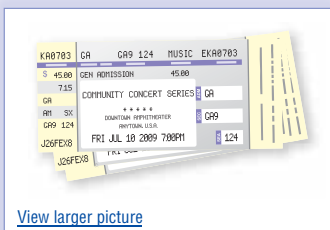
**Now You're Ready**  
Exercises 3–18

**On Your Own**

Use a decimal to find the percent of the number.

5. 15% of 40      6. 78% of 150      7. 35% of 16      8. 4% of 70

**EXAMPLE 3** Using Mental Math



Current bid: **US \$120.00**  
Time remaining: **1 hour 45 min**

Your friend is bidding online for concert tickets. The current bid is shown. The winning bid is 150% of the current bid. How much is the winning bid?

**Method 1:** Write 150% as a decimal and multiply.

$$\begin{aligned} 150\% \text{ of } 120 &= 1.5 \times 120 \\ &= 180 \end{aligned}$$

**Method 2:** Using mental math, think  $150\% = 100\% + 50\%$ .

$$\begin{aligned} 100\% \text{ of } 120 &= 1 \times 120 = 120 \\ 50\% \text{ of } 120 &= \frac{1}{2} \times 120 = 60 \end{aligned}$$

Add:  $120 + 60 = 180$

∴ So, the winning bid is \$180.

**On Your Own**

**Now You're Ready**  
Exercises 23–30

9. **WHAT IF?** In Example 3, the winning bid is 225% of the current bid. How much is the winning bid?

**EXAMPLE 4** Real-Life Application

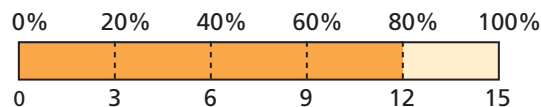
The width of a rectangular room is 80% of its length. What is the area of the room?

Find 80% of 15 feet.



15 ft

$$\begin{aligned} 80\% \text{ of } 15 &= \frac{4}{5} \times 15 \\ &= \frac{4 \times \overset{3}{\cancel{15}}}{\underset{1}{\cancel{5}}} \\ &= 12 \end{aligned}$$



The width is 12 feet.

Use the formula for the area  $A$  of a rectangle.

$$A = 15 \times 12 = 180$$

∴ So, the area of the room is 180 square feet.

**On Your Own**

10. The width of a rectangular stage is 55% of its length. The stage is 120 feet long. What is the area?


**Vocabulary and Concept Check**

1. **DIFFERENT WORDS, SAME QUESTION** Which is different? Find “both” answers.

What is twenty percent of 30?

What is one-fifth of 30?

What is 20 multiplied by 30?

What is 0.2 times 30?

2. **REASONING** If 52 is 130% of a number, is the number greater or less than 52? Explain.


**Practice and Problem Solving**

Find the percent of the number.

- 1 2 3. 20% of 60      4. 10% of 40      5. 18% of 70      6. 32% of 30  
 7. 8% of 90      8. 14% of 20      9. 26% of 50      10. 3% of 60  
 11. 30% of 70      12. 75% of 48      13. 45% of 45      14. 92% of 19  
 15. 40% of 60      16. 38% of 22      17. 70% of 20      18. 87% of 55

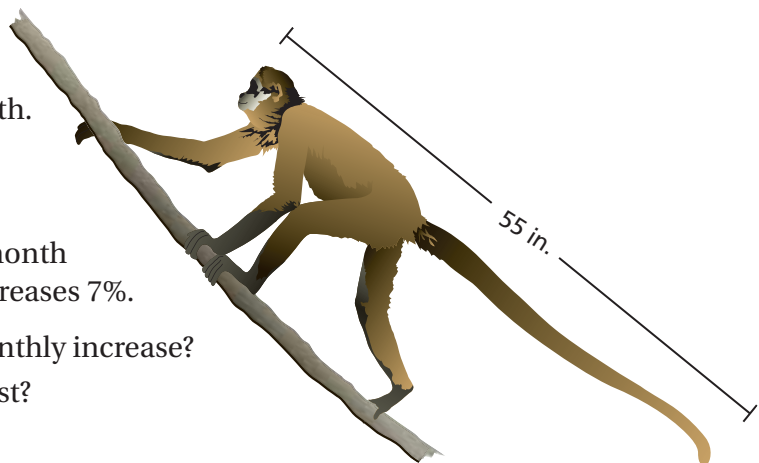
19. **ERROR ANALYSIS** Describe and correct the error in finding 40% of 75.



$$40\% \text{ of } 75 = 40\% \times 75 = 3000$$

20. **MANGROVES** Lake Worth, near West Palm Beach, had about 2120 acres of mangrove trees 40 years ago. Only about 13% of the mangrove trees remain. How many acres of mangrove trees remain?

21. **SPIDER MONKEY** The tail of the spider monkey is 64% of its length. What is the length of its tail?



22. **CABLE** A family pays \$45 each month for cable television. The cost increases 7%.  
 a. How many dollars is the monthly increase?  
 b. What is the new monthly cost?

Find the percent of the number.

- 3 23. 140% of 60      24. 120% of 33      25. 175% of 54      26. 250% of 146  
 27. 4.5% of 50      28. 0.7% of 40      29. 2.8% of 150      30. 7.2% of 235

Copy and complete the statement using  $<$ ,  $>$ , or  $=$ .

31. 80% of 60  60% of 80  
 32. 20% of 30  30% of 40  
 33. 120% of 5  0.8% of 250  
 34. 85% of 40  25% of 136

35. **TIME** How many minutes is 40% of 2 hours?

36. **LENGTH** How many inches is 78% of 3 feet?

37. **GEOMETRY** The width of the rectangle is 75% of its length.

- a. What is the area of the rectangle?  
 b. The length of the rectangle is doubled. What percent of the length is the width now? Explain your reasoning.



24 in.

38. **BASKETBALL** To pass inspection, a new basketball should bounce back to between 68% and 75% of the starting height. A new ball is dropped from 6 feet and bounces back 4 feet 1 inch. Does the ball pass inspection? Explain.



39. **REASONING** You know that 15% of a number  $n$  is 12. How can you use this to find 30% of  $n$ ? 45% of  $n$ ? Explain.

40. **SURFBOARD** You have a coupon for 10% off the sale price of a surfboard.

- a. What is the sale price of the surfboard?  
 b. What is the price of the surfboard after using the coupon?  
 c. Is taking 40% off the regular price the same as taking 30% off the regular price and then 10% off the sale price? Explain your reasoning.

41. **Number Sense** On three geography tests, you earned grades of 88%, 94%, and 90%. Each test was worth 150 points.

- a. The final exam is worth 250 points. How many points do you need on the final exam to earn 93% of the total points on tests?  
 b. What *percent* do you need on the final?



## Fair Game Review What you learned in previous grades & lessons

Multiply. Write the answer in simplest form.

42.  $\frac{2}{3} \times 4$

43.  $\frac{3}{8} \times 4$

44.  $6 \times \frac{3}{5}$

45.  $12 \times \frac{5}{6}$

46. **MULTIPLE CHOICE** What is the quotient of 7.5 and 2.4?

(A) 0.0032

(B) 0.03125

(C) 0.32

(D) 3.125