

Review What You Know!

GET READY!

TOPIC 3

Vocabulary

Choose the best term from the box. Write it on the blank.

- percent
- proportion
- rate
- ratio

1. A percent is a ratio in which the first term is compared to 100.
2. A ratio that relates two quantities with different units of measure is a _____.
3. A statement that two ratios are equal is called a _____.
4. The relationship "3 students out of 5 students" is an example of a _____.

Fractions, Decimals, and Percents

Write each number in two equivalent forms as a fraction, decimal, or percent.

5. 0.29
6. 35%
7. $\frac{2}{5}$

Proportions

Find the unknown number in each proportion.

8. $\frac{x \text{ days}}{4 \text{ years}} = \frac{365.25 \text{ days}}{1 \text{ year}}$
9. $\frac{33,264 \text{ feet}}{x \text{ miles}} = \frac{5,280 \text{ feet}}{1 \text{ mile}}$

10. A cooking magazine shows a photo of a main dish on the front cover of 5 out of the 12 issues it publishes each year. Write and solve a proportion to determine how many times a photo of a main dish will be on the front cover during the next 5 years.

Solve & Discuss It!

Jaime's older brother and his three friends want to split the cost of lunch. They also want to leave a 15%–20% tip. How much should each person pay?

Reasoning Which line on the receipt will you use to calculate the tip?

Lesson 3-1

Analyze Percents of Numbers

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I can...
understand, find, and analyze percents of numbers.

Focus on math practices

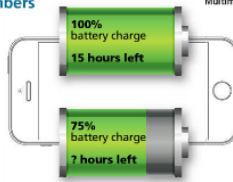
Reasoning How would the amount each person pays change if the tip is determined before or after the bill is split?

Essential Question How do percents show the relationship between quantities?

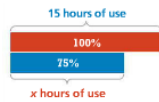
EXAMPLE 1 Find Percents of Numbers

Diego starts a 12-hour road trip with his phone's battery charge at 75%. Given his normal usage, will his phone last the whole trip? Explain.

Look for Relationships How many hours will the phone last when the battery charge is at 75%?



STEP 1 Draw a bar diagram and write equivalent ratios to represent the hours remaining and the battery charge.



$$\frac{75}{100} = \frac{x}{15}$$

STEP 2 Use the equivalent ratios to find 75% of 15.

$$\frac{75}{100} = \frac{x}{15} \quad \text{Solve for } x.$$

$$\frac{75}{100} \cdot 15 = \frac{x}{15} \cdot 15$$

$$11.25 = x$$

75% of 15 is 11.25 hours.

The remaining battery life is 11.25 hours, so the phone will not last the whole 12-hour trip.

Try It!

Kita's phone had a fully charged battery. With normal usage, her phone will last 18 hours. How much time is left on Kita's phone battery with 12% charge remaining?

$$\frac{\square}{100} = \frac{x}{\square}$$

$$\frac{\square}{100} \cdot \square = \frac{x}{\square} \cdot \square$$

$$\square = x$$

Kita's phone battery has hours remaining.



Convince Me! Why is 51% of a number more than half of the number?

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EXAMPLE 2 Use Percents Greater than 100%

A full set of adult teeth includes 160% as many teeth as a full set of baby teeth. How many teeth are there in a full set of adult teeth?

Use the bar diagram to write equivalent ratios. Then solve for t to find the number of adult teeth.



$$\frac{160}{100} = \frac{t}{20}$$

$$160 \cdot 20 = \frac{t}{20} \cdot 20$$

$$32 = t$$

A full set of adult teeth includes 32 teeth.

20 BABY TEETH

Types of Baby Teeth

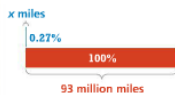
- 4 central incisors (A and F)
- 4 lateral incisors (B and G)
- 4 cuspids (C and H)
- 4 first molars (D and I)
- 4 second molars (E and J)

Adults have 160% as many teeth as babies.

EXAMPLE 3 Use Percents Less than 1%

What is the approximate distance in miles from Earth to the Moon?

STEP 1 Draw a bar diagram and write equivalent ratios.



$$\frac{x}{93,000,000} = \frac{0.27}{100}$$

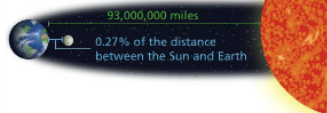
$$\frac{0.27}{100} \cdot 93,000,000 = \frac{x}{93,000,000} \cdot 93,000,000$$

$$251,100 = x$$

The distance from Earth to the Moon is about 251,100 miles.

Check Your Answer Use compatible numbers to estimate the solution. 93,000,000 is approximately 100,000,000. 1% of 100,000,000 miles is 1,000,000 miles.

0.27% is about $\frac{3}{100}$ of 1%, so the distance is about $\frac{3}{100}$ of 1,000,000, or 250,000 miles.



Reasoning The exact distance is close to the estimated distance, so the answer is reasonable.

Try It!

- a. Find 0.08% of 720.
- b. Find 162.5% of 200.
- c. Find 0.3% of 60.

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"pArt is % of Whole"
(Total)

9)
$$\frac{A}{W} = \frac{P\%}{100}$$

Meg

50% of 16
↑
P
Total (Whole)

Meg is missing the "pArt"

Steve

whole
↓

7 of 35
↑
part

Steve is missing the percent.

15. The seed and skin of a typical avocado is about 30%–40% of the avocado's weight. For an 8-ounce avocado, how many ounces of edible fruit does it have?

16. A new health drink has 130% of the recommended daily allowance (RDA) for a certain vitamin. The RDA for this vitamin is 45 mg. How many milligrams of the vitamin are in the drink?

17. **Make Sense and Persevere** 153 is 0.9% of what number? Tell which equivalent ratios you used to find the solution.

18. **Construct Arguments** Brad says that if a second number is 125% of the first number, then the first number must be 75% of the second number. Is he correct? Justify your answer.

19. **Higher-Order Thinking** Mark and Joe work as jewelers. Mark has an hourly wage of \$24 and gets overtime for every hour he works over 40 hours. The overtime pay rate is 150% of the normal rate. Joe makes 5% commission on all jewelry he sells. Who earns more money in a week if Mark works 60 hours and Joe sells \$21,000 worth of jewelry? Explain.

Assessment Practice

20. A forest covers 43,000 acres. A survey finds that 0.2% of the forest is old-growth trees. How many acres of old-growth trees are there?

21. An Olympic-sized pool, which holds 660,000 gallons of water, is only 43% full. How many gallons of water are in the pool?

Ⓐ 244,200 Ⓒ 415,800
Ⓑ 396,000 Ⓓ 425,800

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"time and a half"

Total \$2,160

Mark: Base wage = \$24 · 60 = \$1,440 + \$720
OT wage = \$24 · (60 - 40) · 150% = \$720

Joe
5% of \$21,000 = 1.5
$$\frac{A}{W} = \left(\frac{5}{100}\right) \cdot \frac{21000}{1}$$

$$\frac{5}{1} \cdot \frac{210}{1}$$

Joe Total = \$1,050

