Indicator 42 Class Notes by Mrs. Joshi

Percents

Accelerated Math

4.1 Lesson

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Key Vocabulary
percent, *p. 160*

A **percent** is a ratio whose denominator is 100. Here are two examples.

$$4\% = \frac{4}{100} = 0.04 \qquad 25\% = \frac{25}{100} = 0.25$$

Key Idea

The Percent Equation

Words To represent "a is p percent of w," use an equation.

percent in fraction or decimal form

$$a = p \cdot w$$

part of the whole — whole

Numbers $15 = 0.5 \cdot 30$

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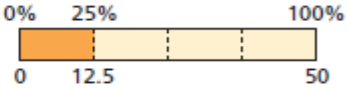
EXAMPLE 1 Finding a Part of a Number

What number is 24% of 50? Estimate



Common Error

Remember to convert a percent to a fraction or decimal before using the percent equation. For Example 1, write 24% as $\frac{24}{100}$.

$a = p \cdot w$ Write percent equation.

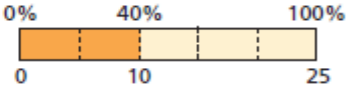
$= \frac{24}{100} \cdot 50$ Substitute $\frac{24}{100}$ for p and 50 for w.

$= 12$ Multiply.

∴ So, 12 is 24% of 50. Reasonable? $12 \approx 12.5$ ✓

EXAMPLE 2 Finding a Percent

9.5 is what percent of 25? Estimate



$a = p \cdot w$ Write percent equation.

$9.5 = p \cdot 25$ Substitute 9.5 for a and 25 for w.

$0.38 = p$ Divide each side by 25.

∴ Because 0.38 equals 38%, 9.5 is 38% of 25. Reasonable? $38\% \approx 40\%$ ✓

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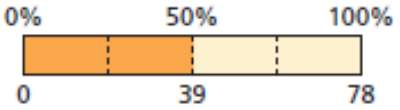
EXAMPLE 3 Finding a Whole

39 is 52% of what number?

Estimate



$a = p \cdot w$	Write percent equation.
$39 = 0.52 \cdot w$	Substitute 39 for a and 0.52 for p.
$75 = w$	Divide each side by 0.52.

∴ So, 39 is 52% of 75.

Reasonable? $75 \approx 78$ ✓

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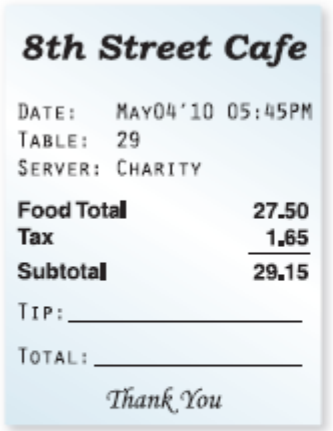
EXAMPLE 4 Real-Life Application



a. Find the percent of sales tax on the food total.

b. Find the amount of a 16% tip on the food total.

a. Answer the question: \$1.65 is what percent of \$27.50?

$a = p \cdot w$	Write percent equation.
$1.65 = p \cdot 27.50$	Substitute 1.65 for a and 27.50 for w.
$0.06 = p$	Divide each side by 27.50.

∴ Because 0.06 equals 6%, the percent of sales tax is 6%.

b. Answer the question: What tip amount is 16% of \$27.50?

$a = p \cdot w$	Write percent equation.
$= 0.16 \cdot 27.50$	Substitute 0.16 for p and 27.50 for w.
$= 4.40$	Multiply.

∴ So, the amount of the tip is \$4.40.

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4.2 Lesson

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Key Vocabulary
percent of change, *p. 166*
percent of increase, *p. 166*
percent of decrease, *p. 166*

A **percent of change** is the percent that a quantity changes from the original amount.

$$\text{percent of change} = \frac{\text{amount of change}}{\text{original amount}}$$

Key Idea

Percents of Increase and Decrease

When the original amount increases, the percent of change is called a **percent of increase**.

$$\text{percent of increase} = \frac{\text{new amount} - \text{original amount}}{\text{original amount}}$$

When the original amount decreases, the percent of change is called a **percent of decrease**.

$$\text{percent of decrease} = \frac{\text{original amount} - \text{new amount}}{\text{original amount}}$$

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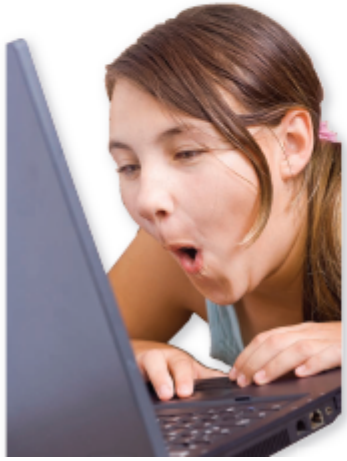
EXAMPLE 1 Finding a Percent of Increase

The table shows the number of hours you spent online last weekend. What is the percent of change in your online time from Saturday to Sunday?

Day	Hours Online
Saturday	2
Sunday	4.5



The number of hours on Sunday is greater than the number of hours on Saturday. So, the percent of change is a percent of increase.

$$\text{percent of increase} = \frac{\text{new amount} - \text{original amount}}{\text{original amount}}$$

$$= \frac{4.5 - 2}{2} \quad \text{Substitute.}$$

$$= \frac{2.5}{2} \quad \text{Subtract.}$$

$$= 1.25, \text{ or } 125\% \quad \text{Write as a percent.}$$

∴ Your online time increased 125% from Saturday to Sunday.

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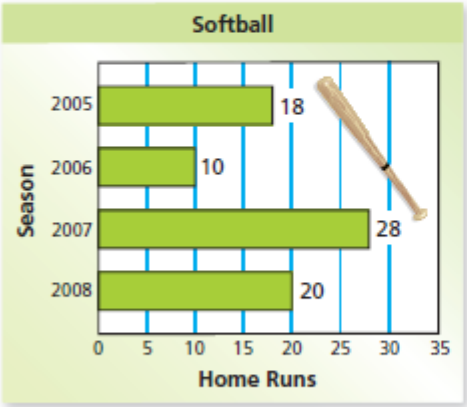
EXAMPLE 2 Finding a Percent of Decrease

The bar graph shows a softball player's home run totals. What was the percent of change from 2007 to 2008?



The number of home runs decreased from 2007 to 2008. So, the percent of change is a percent of decrease.

$$\text{percent of decrease} = \frac{\text{original amount} - \text{new amount}}{\text{original amount}}$$

$$= \frac{28 - 20}{28} \quad \text{Substitute.}$$

$$= \frac{8}{28} \quad \text{Subtract.}$$

$$\approx 0.286, \text{ or } 28.6\% \quad \text{Write as a percent.}$$

∴ The number of home runs decreased about 28.6%.

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EXAMPLE 3 Standardized Test Practice

You have 250 songs on your MP3 player. You delete 20% of the songs. How many songs are left?

(A) 50 (B) 150 (C) 200 (D) 300

Find the amount of decrease.

$20\% \text{ of } 250 = 0.2 \cdot 250$ Write as multiplication.

$= 50$ Multiply.

The decrease is 50 songs. So, there are $250 - 50 = 200$ songs left.

∴ The correct answer is (C).

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4.3 Lesson

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Key Vocabulary
discount, *p. 174*
markup, *p. 174*

Key Ideas

Discounts

A **discount** is a decrease in the original price of an item.

Markups

To make a profit, stores charge more than what they pay. The increase from what the store pays to the selling price is called a **markup**.

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EXAMPLE 1 Finding a Sale Price

The original price of the shorts is $35. What is the sale price?

Method 1: First, find the discount. The discount is 25% of $35.

$a = p \cdot w$ Write percent equation.

$= 0.25 \cdot 35$ Subsitute 0.25 for p and 35 for w.

$= 8.75$ Multiply.

Next, find the sale price.

sale price	=	original price	−	discount
	=	35	−	8.75
	=	26.25		

∴ The sale price is $26.25.

Method 2: First, find the percent of the original price.

$100\% - 25\% = 75\%$

Next, find the sale price.

sale price = 75% of $35

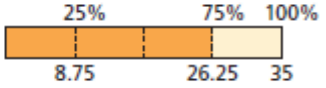
$= 0.75 \cdot 35$

$= 26.25$

Study Tip

A 25% discount is the same as paying 75% of the original price.

∴ The sale price is $26.25. Check



✓

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EXAMPLE 2 **Finding an Original Price**

What is the original price of the shoes?

The sale price is $100\% - 40\% = 60\%$ of the original price.

Answer the question: 33 is 60% of what number?

$a = p \cdot w$	Write percent equation.
$33 = 0.6 \cdot w$	Substitute 33 for a and 0.6 for p.
$55 = w$	Divide each side by 0.6.

∴ The original price of the shoes is $55.

Check

✓

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EXAMPLE 3 Finding a Selling Price

A store pays $70 for a bicycle. The percent of markup is 20%. What is the selling price?

First, find the markup. The markup is 20% of $70.

$a = p \cdot w$ Write percent equation.

$= 0.20 \cdot 70$ Substitute 0.20 for p and 70 for w.

$= 14$ Multiply.

Next, find the selling price.

selling price = cost to store + markup

$= 70 + 14$

$= 84$

∴ The selling price is $84.

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4.4 Lesson

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Key Vocabulary
interest, *p. 180*
principal, *p. 180*
simple interest, *p. 180*

Interest is money paid or earned for the use of money. The **principal** is the amount of money borrowed or deposited.

Key Idea

Simple Interest

Words **Simple interest** is money paid or earned only on the principal.

Algebra

$$I = Prt$$

- I: Simple interest
- P: Principal
- r: Annual interest rate (in decimal form)
- t: Time (in years)

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EXAMPLE 1 Finding Interest Earned

You put $500 in a savings account. The account earns 3% simple interest per year. (a) What is the interest earned after 3 years? (b) What is the balance after 3 years?

a. $I = Prt$ Write simple interest formula.

$= 500(0.03)(3)$ Substitute 500 for P, 0.03 for r, and 3 for t.

$= 45$ Multiply.

∴ The interest earned is $45 after 3 years.

b. To find the balance, add the interest to the principal.

∴ So, the balance is $500 + $45 = $545 after 3 years.

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EXAMPLE 2 Finding an Annual Interest Rate

You put $1000 in an account. The account earns $100 simple interest in 4 years. What is the annual interest rate?

$I = Prt$	Write simple interest formula.
$100 = 1000(r)(4)$	Substitute 100 for I, 1000 for P, and 4 for t.
$100 = 4000r$	Simplify.
$0.025 = r$	Divide each side by 4000.

∴ The annual interest rate of the account is 0.025, or 2.5%.

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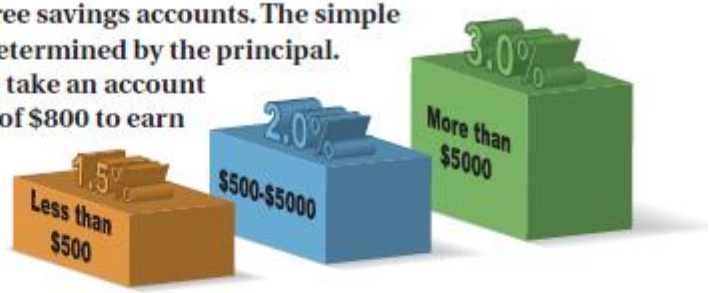
EXAMPLE 3 Finding an Amount of Time

A bank offers three savings accounts. The simple interest rate is determined by the principal. How long does it take an account with a principal of $800 to earn $100 interest?



The pictogram shows that the interest rate for a principal of $800 is 2%.

$I = Prt$	Write simple interest formula.
$100 = 800(0.02)(t)$	Substitute 100 for I, 800 for P, and 0.02 for r.
$100 = 16t$	Simplify.
$6.25 = t$	Divide each side by 16.

∴ The account earns $100 in interest in 6.25 years.

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EXAMPLE 4 Finding Amount Paid on a Loan

You borrow $600 to buy a violin. The simple interest rate is 15%. You pay off the loan after 5 years. How much do you pay for the loan?

$I = Prt$	Write simple interest formula.
$= 600(0.15)(5)$	Substitute 600 for P, 0.15 for r, and 5 for t.
$= 450$	Multiply.

To find the amount you pay, add the interest to the loan amount.

∴ So, you pay $600 + $450 = $1050 for the loan.