



James Madison
HIGH SCHOOL

Percents

A **percent** is a ratio that compares a number to 100. For example, $25\% = \frac{25}{100}$.

To find the fraction equivalent of a percent write the percent as a ratio with a denominator of 100. Then simplify.

$$25\% = \frac{25}{100} = \frac{1}{4}$$

To find the decimal equivalent of a percent, divide by 100.

$$25\% = \frac{25}{100} = 0.25$$

Some Common Equivalents

Percent	10%	20%	25%	$33\frac{1}{3}\%$	40%	50%	60%	$66\frac{2}{3}\%$	75%	80%	100%
Fraction	$\frac{1}{10}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{2}{5}$	$\frac{1}{2}$	$\frac{3}{5}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{4}{5}$	1
Decimal	0.1	0.2	0.25	$0.\overline{3}$	0.4	0.5	0.6	$0.\overline{6}$	0.75	0.8	1.0

The greatest percent shown in the table is 100% or 1. But percents can be greater than 100%. For example, $120\% = \frac{120}{100} = 1.2$. You can also find percents that are less than 1%. For example, $0.5\% = \frac{0.5}{100} = 0.005$. You can use the proportion $\frac{\text{part}}{\text{whole}} = \frac{\text{percent}}{100}$ to find unknown values.

Example 1A: Finding the Part

Find 30% of 80.

Method 1 Use a proportion.

$$\frac{\text{part}}{\text{whole}} = \frac{\text{percent}}{100}$$

Use the percent proportion.

$$\frac{x}{80} = \frac{30}{100}$$

Let x represent the part.

$$100x = 2400$$

Find the cross products.

$$x = 24$$

Since x is multiplied by 100, divide both sides by 100 to undo the multiplication.

30% of 80 is 24.

Check 30% is the same as $\frac{3}{10}$, and $\frac{3}{10}$ of 80 is 24. ✓

Example 1B: Finding the Part

Find 120% of 15.

Method 2 Use an equation.

$$x = 120\% \text{ of } 15$$

Write an equation. Let x represent the part.

$$x = 1.20(15)$$

Write the percent as a decimal and multiply.

$$x = 18$$

120% of 15 is 18.

Check It Out! Example 1a

Find 20% of 60.

Method 1 Use a proportion.

$$\frac{\text{part}}{\text{whole}} = \frac{\text{percent}}{100}$$

$$\frac{x}{60} = \frac{20}{100}$$

$$100x = 1200$$

$$x = 12$$

20% of 60 is 12.

Let x represent the part.

Find the cross products.

Since x is multiplied by 100, divide both sides by 100 to undo the multiplication.

Check 20% is the same as $\frac{2}{10}$, and $\frac{2}{10}$ of 60 is 12. ✓

Check It Out! Example 1b

Find 210% of 8.

Method 2 Use an equation.

$$x = 210\% \text{ of } 8$$

Write an equation. Let x represent the part.

$$x = 2.10(8)$$

Write the percent as a decimal and multiply.

$$x = 17$$

210% of 8 is 16.8.

Check It Out! Example 1c

Find 4% of 36.

Method 2 Use an equation.

$$x = 4\% \text{ of } 36$$

Write an equation. Let x represent the part.

$$x = .04(36)$$

Write the percent as a decimal and multiply.

$$x = 1.44$$

4% of 36 is 1.44.

Example 2A: Finding the Percent

What percent of 45 is 35? Round your answer to the nearest tenth.

Method 1 Use a proportion.

$$\frac{\text{part}}{\text{whole}} = \frac{\text{percent}}{100}$$

Use the percent proportion.

$$\frac{35}{45} = \frac{x}{100}$$

Let x represent the percent.

$$45x = 3500$$

Find the cross products.

$$\frac{45x}{45} = \frac{3500}{45}$$

Since x is multiplied by 45, divide both sides by 45 to undo the multiplication.

$$x \approx 77.8$$

35 is about 77.8% of 45.

Example 2B: Finding the Percent

230 is what percent of 200?

Method 2 Use an equation.

$$230 = x \cdot 200$$

Write an equation. Let x represent the percent.

$$230 = 200x$$

Since x is multiplied by 200, divide both sides by 200 to undo the multiplication.

$$\frac{230}{200} = \frac{200x}{200}$$

$$1.15 = x$$

The answer is a decimal.

$$115\% = x$$

Write the decimal as a percent.

This answer is reasonable; 230 is more than 100% of 200.

230 is 115% of 200.

Check It Out! Example 2a

What percent of 35 is 7?.

Method 1 Use a proportion.

$$\frac{\text{part}}{\text{whole}} = \frac{\text{percent}}{100}$$

Use the percent proportion.

$$\frac{7}{35} = \frac{x}{100}$$

Let x represent the percent.

$$35x = 700$$

Find the cross products.

$$\frac{35x}{35} = \frac{700}{35}$$

Since x is multiplied by 35, divide both sides by 35 to undo the multiplication.

$$x = 20$$

7 is 20% of 35.

Check It Out! Example 2b

27 is what percent of 9?

Method 2 Use an equation.

$$27 = x \cdot 9$$

Write an equation. Let x represent the percent.

$$27 = 9x$$

Since x is multiplied by 9, divide both sides by 9 to undo the multiplication.

$$\frac{27}{9} = \frac{9x}{9}$$

$$3 = x$$

The answer is a whole number.

$$300\% = x$$

Write the whole number as a percent. This answer is reasonable; 27 is more than 100% of 9.

27 is 300% of 9.

Example 3A: Finding the Whole

38% of what number is 85? Round your answer to the nearest tenth.

Method 1 Use a proportion.

$$\frac{\text{part}}{\text{whole}} = \frac{\text{percent}}{100}$$

Use the percent proportion.

$$\frac{85}{x} = \frac{38}{100}$$

Let x represent the whole.

$$38x = 8500$$

Find the cross products.

$$\frac{38x}{38} = \frac{8500}{38}$$

Since x is multiplied by 38, divide both sides by 38 to undo the multiplication.

$$x = 223.7$$

38% of about 223.7 is 85.

Example 3B: Finding the Whole

20 is 0.4% of what number?

Method 2 Use an equation.

$$20 = 0.4\% \text{ of } x$$

Write an equation. Let x represent the whole.

$$20 = 0.004 \cdot x$$

Write the percent as a decimal.

$$\frac{20}{0.004} = \frac{0.004x}{0.004}$$

Since x is multiplied by 0.004, divide both sides by 0.004 to undo the multiplication.

$$5000 = x$$

20 is 0.4% of 5000.

Check It Out! Example 3a

120% of what number is 90?

Method 1 Use a proportion.

$$\frac{\text{part}}{\text{whole}} = \frac{\text{percent}}{100}$$

$$\frac{90}{x} = \frac{120}{100}$$

$$120x = 9000$$

$$\frac{120x}{120} = \frac{9000}{120}$$

$$x = 75$$

$$x = 75$$

120% of 75 is 90.

Use the percent proportion.

Let x represent the whole.

Find the cross products.

Since x is multiplied by 120, divide both sides by 120 to undo the multiplication.

Check It Out! Example 3b

48 is 15% of what number?

Method 2 Use an equation.

$$48 = 15\% \text{ of } x$$

Write an equation. Let x represent the whole.

$$48 = 0.15 \cdot x$$

Write the percent as a decimal.

$$\frac{48}{0.15} = \frac{0.15x}{0.15}$$

Since x is multiplied by 0.15, divide both sides by 0.15 to undo the multiplication.

$$320 = x$$

48 is 15% of 320.



Example 4: *Application*

The serving size of a popular orange drink is 12 oz. The drink is advertised as containing 5% orange juice. How many ounces of orange juice are in one serving size?

$$\frac{\text{part}}{\text{whole}} = \frac{\text{percent}}{100}$$

Use the percent proportion.

$$\frac{x}{12} = \frac{5}{100}$$

Let x represent the percent.

$$100x = 60$$

Since x is multiplied by 100, divide both sides by 100 to undo the multiplication.

$$\frac{100x}{100} = \frac{60}{100}$$

$$x = 0.6$$

A 12 oz orange drink contains 0.6 oz of orange juice.

Check It Out! Example 4

Use the information above to find the number of karats in a bracelet that is 42% gold. Round your answer to the nearest whole number.

$$\frac{\text{part}}{\text{whole}} = \frac{\text{percent}}{100}$$

Use the percent proportion.

$$\frac{x}{24} = \frac{42}{100}$$

Let x represent the number of karats.

$$100x = 1008$$

Since x is multiplied by 100, divide both sides by 100 to undo the multiplication.

$$\frac{100x}{100} = \frac{1008}{100}$$

$$x = 10.08$$

A ring that contains 42% gold is about 10 karats.

Lesson Quiz: Part 1

Find each value. Round to the nearest tenth if necessary.

1. Find 20% of 80. **16**
2. What percent of 160 is 20? **12.5%**
3. 35% of what number is 40? **114.3**
4. 120 is what percent of 80? **150%**
5. Find 320% of 8. **25.6**
6. 65 is 0.5% of what number? **13,000**

Lesson Quiz: Part 2

Find each value. Round to the nearest tenth if necessary.

7. A survey at a local school showed that 38% of the students chose chocolate ice cream as their favorite ice cream. Eight hundred students took the survey. How many chose chocolate ice cream? **304**