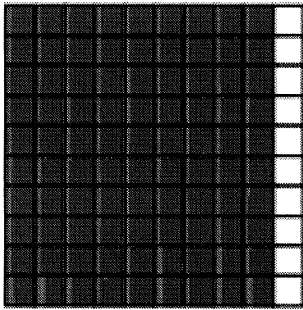


Topic 11.1 - Understanding Percent

Percent – a special kind of ratio in which the first term is compared to 100.

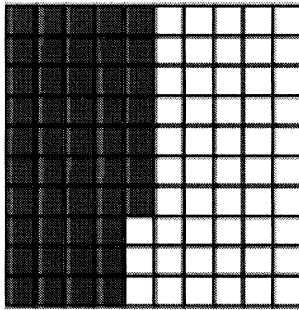
1. Use a grid to model the percent

(a)



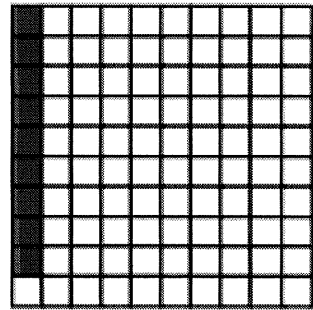
90% or 0.90

(b)



47% or 0.47

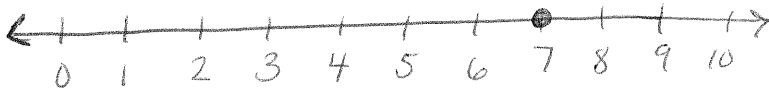
(c)



9% or 0.09

2. Use number lines to model the percent

(a)



$$\frac{7}{10} = \frac{70}{100} = 70\%$$

(b)



3. Use a proportion to find the percent

(a)

$$\begin{aligned} \frac{7}{10} &\times \frac{x}{100} \quad (\text{cross multiply}) \\ \frac{700}{10} &= \frac{10x}{10} \quad (\text{inverse operation}) \\ 70 &= x \\ 70\% \end{aligned}$$

(b)

$$\begin{aligned} \frac{1}{5} &\times \frac{x}{100} \\ \frac{100}{5} &= \frac{5x}{5} \\ 20 &= x \\ 20\% \end{aligned}$$

Topic 11.2 - Fractions, Decimals, and Percents

How are fractions, decimals, and percents related to one another?

- Fractions, decimals, and percents are three ways to show portions of a whole.

A percent compares a number to 100, so you can write 30% as a fraction and a decimal.

$$30\% = \frac{30}{100}$$

Simplify: $\frac{30 \div 10}{100 \div 10} = \frac{3}{10}$

$$30\% = \frac{3}{10} = 0.30 \text{ or } 0.3$$

Use decimal place value to write the decimal 0.10 as a fraction and a percent.

$$0.10 = \frac{10}{100}$$

Simplify: $\frac{10 \div 10}{100 \div 10} = \frac{1}{10}$

$$0.10 \text{ or } 0.1 = \frac{1}{10} = 10\%$$

$$0.10 = \frac{10}{100} = 10\%$$

How can you change a fraction to a decimal and percent? $\frac{3}{5}$

1. Use division: Think "bottom into top"

$$\begin{array}{r} 0.6 \\ 5 \overline{) 3.0} \\ \underline{-3.0} \\ 0 \end{array}$$

$$\frac{3}{5} = 0.60 = 60\%$$

* move the decimal 2 places to the right.

2. Use a proportion: Think $\frac{3}{5}$ equals what percent of 100?

$$\frac{3}{5} \times \frac{x}{100} \text{ (cross multiply)}$$

$$3 \times 100 = 5 \cdot x$$

$$\frac{300}{5} = \frac{5x}{5} \text{ (inverse operation)}$$

$$60 = x$$

$$\frac{3}{5} = 60\%$$

$$\begin{array}{r} \times 60 \\ 5 \overline{) 300} \\ \underline{-300} \\ 00 \\ \underline{-0} \\ 0 \end{array}$$

Topic 11.3 - Percents Greater Than 100 or Less Than 1

How can you express percents greater than 100?

① 140% $\frac{140}{100}$ (simplify) $= \frac{14}{10} = \frac{7}{5}$

②

OR
XX 1.4
100) 140.0
- 100

400
- 400

0

SO, $140\% = \frac{7}{5} = 1.4$

③

OR
 140% * Move the decimal 2 places to the left

How can you express percents less than 1?

① $\frac{1}{2}\%$ = 0.5% = $\frac{0.5}{100}$ = $\frac{5}{1000}$ = $\frac{1}{200}$

② 0.2% = $\frac{0.2}{100}$ = $\frac{2}{10}\%$ = $\frac{2}{1000}$ = $\frac{1}{500}$ = 0.002

③ $\frac{3}{10}\%$ = 0.3% = $\frac{0.3}{100}$ = $\frac{3}{1000}$ = 0.003

Hint = to change a percent to a decimal: move the decimal 2 places to the left.

= to change a decimal to a percent: move the decimal 2 places to the right.

Topic 11.4 - Estimating Percent

How can you use fractions to estimate percents?

- You can use fraction equivalents and compatible numbers to estimate the percent of a number.

★ Hint: "of" means "multiply"

$$\begin{aligned} \textcircled{a} \quad & 46\% \text{ of } 28 \\ & \downarrow \qquad \downarrow \\ & 50\% \text{ of } 28 \\ & \downarrow \\ & \frac{1}{2} \text{ of } 28 = \underline{14} \end{aligned}$$

$$\begin{aligned} \textcircled{b} \quad & 23\% \text{ of } 118 \\ & \downarrow \\ & 25\% \text{ of } 120 \\ & \downarrow \\ & \frac{1}{4} \text{ of } 120 = \underline{30} \end{aligned}$$

Use these benchmark percents and their fraction equivalents to help you estimate.

Percent	10%	20%	25%	$33\frac{1}{3}\%$	50%	$66\frac{2}{3}\%$	75%
Fraction	$\frac{1}{10}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{4}$

$$\begin{aligned} \textcircled{1} \quad & 74\% \text{ of } 63 \\ & \downarrow \\ & 75\% \text{ of } 60 \\ & \downarrow \\ & \frac{3}{4} \text{ of } 60 \\ & \frac{3}{4} \times \frac{60}{1} = \frac{90}{2} = \underline{45} \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad & 18\% \text{ of } 96 \\ & \downarrow \qquad \downarrow \\ & 20\% \text{ of } 100 \\ & \downarrow \\ & \frac{1}{5} \text{ of } 100 \\ & \frac{1}{5} \times \frac{100}{1} = \frac{100}{5} = \underline{20} \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad & 47\% \text{ of } 183 \\ & \downarrow \qquad \downarrow \\ & 50\% \text{ of } 180 \\ & \downarrow \\ & \frac{1}{2} \text{ of } 180 = \underline{90} \end{aligned}$$

Topic 11.5 - Finding the Percent of a Number

1. Estimate:

$$\begin{array}{l}
 36\% \text{ of } 575 \\
 \downarrow \qquad \qquad \downarrow \\
 33\frac{1}{3}\% \text{ of } 600 \\
 \downarrow \\
 \frac{1}{3} \text{ of } 600
 \end{array}$$

$$\frac{1}{3} \times \frac{600}{1} = \frac{600}{3} = \underline{200}$$

2. Write a decimal:

$$\begin{array}{l}
 36\% \text{ of } 575 \\
 \\
 \underline{36} \text{ of } 575 \\
 \\
 .36 \times 575 \\
 \underline{207}
 \end{array}$$

$$\begin{array}{r}
 \begin{array}{c} 2 \quad 1 \\ 4 \quad 3 \\ 575 \end{array} \\
 \times \quad .36 \\
 \hline
 17250 \\
 + 3450 \\
 \hline
 20700
 \end{array}$$

* 200 is close to 207 so our answer is reasonable.

3. Write a proportion:

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

Let x = the unknown

$$\frac{x}{575} \times \frac{36}{100} \quad (\text{cross multiply})$$

$$\frac{100x}{100} = \frac{20,700}{100} \quad (\text{inverse operation})$$

$$x = \underline{207}$$

① $\underline{26\%}$ of 50 = $\underline{13}$

$$\begin{array}{r}
 50 \\
 \times .26 \\
 \hline
 300 \\
 + 1000 \\
 \hline
 1300
 \end{array}$$

② $\underline{47\%}$ of 300 = $\underline{141}$

$$\begin{array}{r}
 300 \\
 \times .47 \\
 \hline
 2100 \\
 + 12000 \\
 \hline
 14100
 \end{array}$$

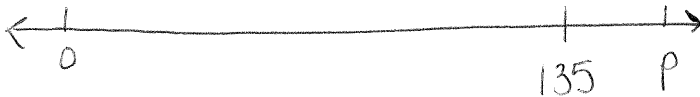
Topic 11.6 - Finding the Whole

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

$$\frac{\text{is}}{\text{of}} = \frac{\%}{100}$$

1. Use number lines to model the relationship.

①



$$\frac{90}{100} = \frac{135}{p}$$

2. Use a proportion.

①

$$\frac{90}{100} = \frac{135}{p}$$

$$90p = 13500$$

$$\frac{90p}{90} = \frac{13500}{90}$$

$$p = 150$$

③ 150% of what number is 48?

$$\frac{\text{is}}{\text{of}} = \frac{\%}{100}$$

$$\frac{48}{x} = \frac{150}{100}$$

$$4800 = 150x$$

$$\frac{4800}{150} = \frac{150x}{150}$$

$$32 = x$$

② 25% of what number is 2?

$$\frac{\text{is}}{\text{of}} = \frac{\%}{100}$$

$$\frac{2}{x} = \frac{25}{100}$$

$$200 = 25x$$

$$\frac{200}{25} = \frac{25x}{25}$$

$$8 = x$$

④ 50% of what number is 15?

$$\frac{\text{is}}{\text{of}} = \frac{\%}{100}$$

$$\frac{15}{x} = \frac{50}{100}$$

$$1500 = 50x$$

$$\frac{1500}{50} = \frac{50x}{50}$$

$$30 = x$$

Topic 11.7 - Problem Solving: Reasonableness

1. The original price of a bicycle was \$150. The bike went on sale for 10% off the original price. The bike didn't sale, and the sale price was raised by 10%. What is the final price of the bicycle?
 - It was calculated that the final price is \$150. Is this answer reasonable? Why or why not.
 - After you solve the problem, look back and check the answer.

10% of \$150 is \$15. The sale price is $\$150 - \$15 = \underline{\underline{\$135}}$

★ \$150 is not a reasonable answer for the final price of the bicycle.

MY WORK

$$\begin{array}{r} 150 \\ \times .10 \\ \hline 000 \\ + 1500 \\ \hline 1500 \end{array}$$

$$\begin{array}{r} 150 \\ - 15 \\ \hline 135 \end{array}$$

2. David wants to buy a sweater for his mother. The original price of the sweater was \$65. The store is having a sale in which all sweaters are 20% off. What is the sale price of the sweater?
 - The sale price is \$52. Is this answer reasonable? Why or why not.

20% of \$65 is \$13 and $65 - 13 = 52$

★ The answer is reasonable!

MY WORK

$$\begin{array}{r} 65 \\ \times .20 \\ \hline 00 \\ + 1300 \\ \hline 1300 \end{array}$$

$$\begin{array}{r} 65 \\ - 13 \\ \hline 52 \end{array}$$