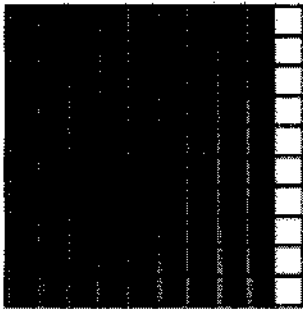


### Topic 11.1 - Understanding Percent

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

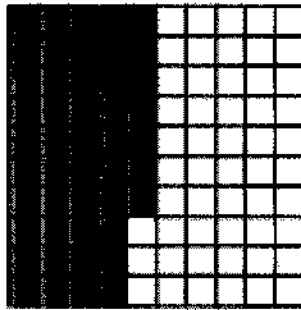
1. Use a grid to model the percent

(a)



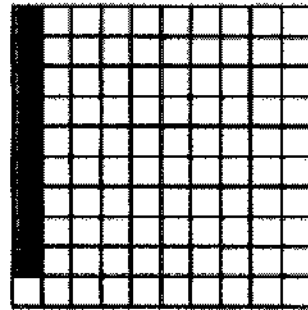
90% or 0.90

(b)



47% or 0.47

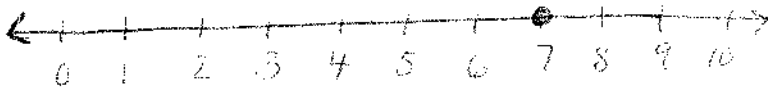
(c)



9% or 0.09

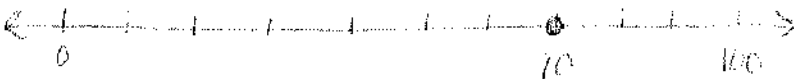
2. Use number lines to model the percent

(a)



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

(b)



3. Use a proportion to find the percent

(a)

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

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

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

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

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

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

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

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

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

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

② OR  
$$\begin{array}{r} \text{XX } 1.4 \\ 100 \overline{) 140.0} \\ \underline{-100} \phantom{0} \\ 400 \\ \underline{-400} \\ 0 \end{array}$$

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"

① 46% of 28  
 $\downarrow$   
 50% of 28  
 $\downarrow$   
 $\frac{1}{2}$  of 28 = 14

② 23% of 118  
 $\downarrow$   
 25% of 120  
 $\downarrow$   
 $\frac{1}{4}$  of 120 = 30

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	$\frac{1}{10}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{4}$

① 74% of 63  
 $\downarrow$   
 75% of 60  
 $\downarrow$   
 $\frac{3}{4}$  of 60  
 $\frac{3}{4} \times \frac{60}{1} = \frac{90}{2} = \underline{45}$

② 18% of 96  
 $\downarrow$   
 20% of 100  
 $\downarrow$   
 $\frac{1}{5}$  of 100  
 $\frac{1}{5} \times \frac{100}{1} = \frac{100}{5} = \underline{20}$

③ 47% of 183  
 $\downarrow$   
 50% of 180  
 $\downarrow$   
 $\frac{1}{2}$  of 180 = 90

Topic 11.5 - Finding the Percent of a Number

1. Estimate:

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

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

2. Write a decimal:

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

$$\begin{array}{r} \begin{array}{cc} 2 & 1 \\ 4 & 3 \end{array} \\ 575 \\ \times .36 \\ \hline 3450 \\ + 17250 \\ \hline 207.00 \end{array}$$

\* 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

$$\begin{array}{l} \frac{x}{575} \times \frac{36}{100} \quad (\text{cross multiply}) \\ \frac{100x}{100} = \frac{20,700}{100} \quad (\text{inverse operation}) \\ x = \underline{207} \end{array}$$

①  $\underline{26\%}$  of 50 = 13

$$\begin{array}{r} 50 \\ \times .26 \\ \hline 300 \\ + 1000 \\ \hline 13.00 \end{array}$$

②  $\underline{47\%}$  of 300 = 141

$$\begin{array}{r} 300 \\ \times .47 \\ \hline 2100 \\ + 12000 \\ \hline 141.00 \end{array}$$

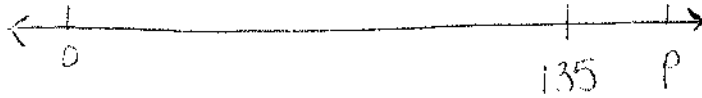
**Topic 11.6 - Finding the Whole**

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

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

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

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

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