## 3.7: Solve Percent Problems

Goals: *Understand percent as a comparison to 100
*Solve percent problems using proportions or equations
*Solve percent of change problems

## **RAPID REVIEW**

- To change a Percent to a Decimal: Move the decimal point two places to the left
- To change a Decimal to a Percent: Move the decimal point two places to the right

Use alphabet if you forget: a b c $\underline{\mathbf{D}}$ e f g......m n o $\underline{\mathbf{P}} \mathrm{q}$ r......

To get from D to P you go right, to get from P to D you go left

Change the following. If decimal, change to percent. If percent, change to decimal.
Ex: $73.5 \%=$ $\qquad$ Ex: $0.175=\ldots 17.5 \%$

Ex: $0.1 \%=$ $\qquad$ 0.001 $\qquad$

- To change a fraction to percent: Make an equivalent fraction with a denominator of 100
- To change a percent to a fraction: Put the $\%$ over 100 and simplify

Change the following. If fraction, change to percent. If percent, change to fraction.
Ex: $\frac{2}{5}=$ $\qquad$ Ex: $73 \%=-\frac{73}{100}-$

$$
\frac{2}{5}=\frac{x}{100}
$$

Ex: $\frac{3}{8}=$ $\qquad$ $37.5 \%$ $\qquad$
Ex: $140 \%=$ $\qquad$

To solve percent problems you can use either the:

PERCENT PROPORTION or
PERCENT EQUATION
(good when want $\%$ of a \#)


Solve using both methods. Then decide which you prefer.
What percent of 25 is 17 ?

Percent Proportion
"Is" is attached to 1
"Of" is attached to 25
We are missing the percent
$\frac{17}{25}=\frac{x}{100}$
Solve like normal
$x=68 \%$

Percent Equation
What percent of 25 is 17 ?
Change "is" and "of" to their appropriate Symbols. Replace "What" with $x$
$x \cdot 25=17$
$x=0.68$
Change the decimal to a percent 68\%

Ex: What percent of 136 is $51 ?$

$$
\begin{aligned}
& \frac{51}{136}=\frac{x}{100} \\
& x=37.5 \%
\end{aligned}
$$

Ex: What percent of 56 is 49 ?

$$
\begin{aligned}
& \frac{49}{56}=\frac{x}{100} \\
& x=87.5 \%
\end{aligned}
$$

Ex: What percent of 55 is 11 ?

$$
\begin{aligned}
& \frac{11}{55}=\frac{x}{100} \\
& x=20 \%
\end{aligned}
$$

Ex: What number is $45 \%$ of 92 ?

$$
\begin{aligned}
& \frac{x}{92}=\frac{45}{100} \\
& x=41.4
\end{aligned}
$$

Ex: What number is $140 \%$ of 50 ?

$$
\begin{aligned}
& \frac{x}{50}=\frac{140}{100} \\
& x=70
\end{aligned}
$$

Ex: What number is $12 \%$ of 85 ?

$$
\begin{gathered}
\frac{x}{85}=\frac{12}{100} \\
x=10.2
\end{gathered}
$$

Ex: A survey asked 220 students to name their favorite pasta dish. Find the percent of students who chose the given dish.
a) Mac N' Cheese

$$
\frac{33}{220}=\frac{x}{100} \quad x=15 \%
$$

b) Lasagna

$$
\frac{40}{220}=\frac{x}{100} \quad x=18 \%
$$

| Type | \# Students |
| :--- | :---: |
| Spaghetti | 83 |
| Lasagna | 40 |
| Mac N' Cheese | 33 |
| Fettuccine Alfredo | 22 |
| Baked Ziti | 16 |
| Pasta Primavera | 15 |
| Other | 11 |

Ex: A survey asked students how much they would tip for a $\$ 28$ meal. Find the percent of students who would tip:
a) $\$ 4.20$

$$
\frac{36}{183}=\frac{x}{100} \quad x=20 \%
$$

b) at least $\$ 5.00$

$$
\frac{55}{183}=\frac{x}{100} \quad x=30 \%
$$

| Amount of Tip | \# Students |
| :--- | :---: |
| $\$ 2.00$ | 19 |
| $\$ 2.80$ | 28 |
| $\$ 3.00$ | 45 |
| $\$ 4.20$ | 36 |
| $\$ 5.00$ | 47 |
| $\$ 5.60$ | 8 |

c) $\$ 5.60$

$$
\frac{8}{183}=\frac{x}{100} \quad x=4 \%
$$

*What is the appropriate amount to leave for a tip if the service was adequate?
$20 \%$ is appropriate which would be $\$ 5.60$

## 3.7 (Continued) Solve Percent of Change Problems

To find percent of change:

$$
\frac{\text { amount of change }}{\text { original }}=\frac{\% \text { of change }}{100}
$$

Ex: A shirt was put on sale. Its original price was $\$ 35$ and it was sold for $\$ 30$. What was the percent of the sale?

$$
\frac{5}{35}=\frac{x}{100} \quad x=14 \%
$$

Ex: A store buys jeans for $\$ 20$ and sells them for $\$ 35$ each. Find the percent of the mark-up.

$$
\frac{15}{20}=\frac{x}{100} \quad x=75 \%
$$

Ex: Find the percent of change if a school's enrollment was 675 students last year and is 725 students this year.

$$
\frac{50}{675}=\frac{x}{100} \quad x=7 \%
$$

