10-31-11

Saturday, October 29, 2011
5:00 PM

6.1 Percent Notation

OBJECTIVES

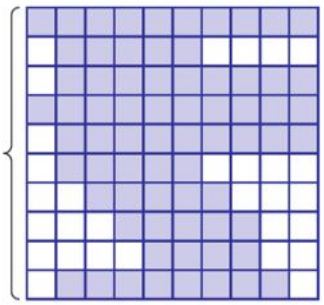
a Write three kinds of notation for percent.

b Convert between percent notation and decimal notation.

a Write three kinds of notation for percent.

70 of 100 squares are shaded.

70% or $\frac{70}{100}$ or 0.70 of the large square is shaded.



a Write three kinds of notation for percent.

Percent notation is used extensively in our everyday lives. Here are some examples:

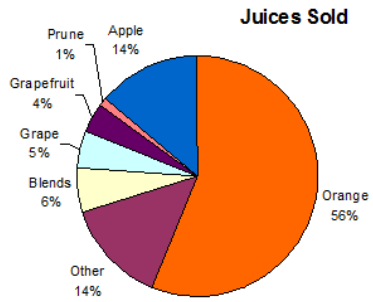
63% of the aluminum used in the United States is recycled.

0.08% blood alcohol level is a standard used by most states at the legal limit for drunk driving.

33% of all U.S. citizens say the day they dread most is the day they go to the dentist.

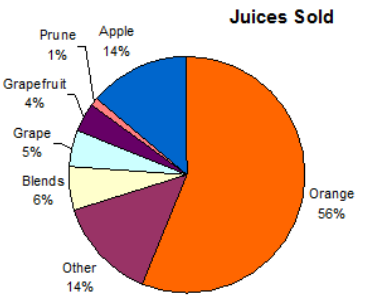
a Write three kinds of notation for percent.

Percent notation is often represented in pie charts to show how the parts of a quantity are related.



a Write three kinds of notation for percent.

To draw the pie chart think of a pie cut into 100 equally sized pieces. Then shade a wedge equal in size to 56 of the pieces to represent 56%. Shade in a wedge equal to 14 of the pieces to represent 14%, and so on.



Percent Notation

The notation ***n*%** means "*n* per hundred."

Notation for *n*%

Percent notation, *n*%, can be expressed using:

ratio → $n\%$ = the ratio of n to 100 = $\frac{n}{100}$,

fraction notation → $n\% = n \times \frac{1}{100}$, or

decimal notation → $n\% = n \times 0.01$.

a Write three kinds of notation for percent.

EXAMPLE A Write three kinds of notation for 45%.

Solution

Using ratio: $45\% = \frac{45}{100}$

Using fraction notation: $45\% = 45 \times \frac{1}{100}$

EXAMPLE B Write three kinds of notation for 73.6%.

Solution

Using ratio: $73.6\% = \frac{73.6}{100}$

Using fraction notation: $73.6\% = 73.6 \times \frac{1}{100}$

100

Using fraction notation: $45\% = 45 \times \frac{1}{100}$

Using decimal notation: $45\% = 45 \times 0.01$

Using fraction notation: $73.6\% = 73.6 \times \frac{1}{100}$

Using decimal notation: $73.6\% = 73.6 \times 0.01$

b Convert between percent notation and decimal notation.

To write decimal notation for a number like 23%, we can replace the "%" with "· 0.01" and multiply:

23% = 23 · 0.01

= 0.23

Similarly,

5.8% = 5.8 · 0.01

= 0.058

324% = 324 · 0.01

= 3.24

To convert from percent notation to decimal notation:

a) replace the percent symbol with · 0.01, and 36.5 × 0.01

b) multiply by 0.01, which means move the decimal point two places to the left. 0.36.5 Move 2 places to the left

36.5% = 0.365

EXAMPLE C Write an equivalent decimal for 67.34%.

Solution

a) Replace the % symbol with · 0.01.

67.34 · 0.01

b) Multiply to move the decimal point two places to the left. 0.67.34

Thus, 67.34% = 0.6734.

EXAMPLE D Write an equivalent decimal for 2.3%.

Solution

a) Replace the % symbol with · 0.01.

2.3 · 0.01

This zero serves as a placeholder.

0.02.3

b) Multiply to move the decimal point two places to the left.

Thus, 2.3% = 0.023.

To convert from decimal notation to percent notation:

Multiply by 100%: 0.675 = 0.675 × 100%

That is,

a) move the decimal point two places to the right, and 0.67.5 Move 2 places to the right

b) write a % symbol. 67.5%

0.675 = 67.5%

EXAMPLE E Write percent notation for 0.6.

Solution

a) Multiply by 100 to move the decimal point two places to the right.

This zero serves as a place holder.

0.60.

b) Write a % symbol.

60%

Thus 0.6 = 60%

EXAMPLE F Write percent notation for 2.35

Solution

a) Multiply by 100 to move the decimal point two places to the right.

2.35.

b) Write a % symbol.

235%

Thus 2.35 = 235%

6.2 Percent Notation and Fraction Notation

OBJECTIVES

a Convert from fraction notation to percent notation.

b Convert from percent notation to fraction notation.

a Convert from fraction notation to percent notation.

To convert from fraction notation to percent notation,

a) find decimal notation by division, and

b) convert the decimal notation to percent notation.

$\frac{3}{5}$ Fraction notation

$$5\overline{)3.0}\quad 0.6,\quad \frac{30}{0}$$

$0.6 = 0.60 = 60\%$ percent notation

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

a Convert from fraction notation to percent notation.

EXAMPLE A Write an equivalent percent for $\frac{5}{8}$.

Solution

a) Find decimal notation by division.

b) Convert the decimal notation to percent notation. To do so, multiply by 100 to move the decimal point two places to the right, and write a % symbol.

$$8\overline{)5.000}\quad 0.625,\quad \frac{48}{20},\quad \frac{16}{40},\quad \frac{40}{0}$$

$\frac{5}{8} = 0.625 = 62.5\%$ or $62\frac{1}{2}\%$

EXAMPLE B Write $\frac{73}{100}$ as an equivalent percent.

Solution

We use the definition of percent as a ratio.

$\frac{73}{100} = 73\%$

To convert from percent notation to fraction notation,

a) use the definition of percent as a ratio, and

b) simplify, if possible.

30% Percent notation

$\frac{30}{100}$

$\frac{3}{10}$ Fraction notation

EXAMPLE C Write an equivalent fraction for 34% and simplify.

Solution

$$34\% = \frac{34}{100} \quad \text{Using the definition of percent}$$
$$= \frac{2 \cdot 17}{2 \cdot 50}$$
$$= \frac{2}{2} \cdot \frac{17}{50} \quad \text{Simplify by removing a factor equal to 1.}$$
$$= \frac{17}{50}$$

EXAMPLE D Write an equivalent fraction for 122.5% and simplify.

Solution

$$122.5\% = \frac{122.5}{100} \quad \text{Using the definition of percent}$$
$$= \frac{122.5}{100} \times \frac{10}{10}$$
$$= \frac{1225}{1000}$$

b Convert from percent notation to fraction notation.

EXAMPLE D Write an equivalent fraction for 122.5% and simplify.

Solution

$$= \frac{5}{5} \cdot \frac{245}{200} = \frac{5}{5} \cdot \frac{49}{40} = \frac{49}{40}$$
$$= \frac{245}{200}$$

6.3 Solving Percent Problems Using Percent Equations

OBJECTIVES

a Translate percent problems to percent equations.

b Solve basic percent problems.

b Convert from percent notation to fraction notation.

To solve a problem involving percents, it is helpful to translate first to an equation.

23%	of	5	is	what?		
↓	↓	↓	↓	↓		
23%	·	5	=	a		This is a *percent equation.*
What	is	11%	of	49?		
↓	↓	↓	↓	↓		
a	=	11%	·	49		Any letter can be used.

Key Words in Percent

"**Of**" translates to "·" or "×".

"**Is**" translates to "=".

"**What**" translates to a variable.

% translates to "$\times\frac{1}{100}$" or "$\times 0.01$".

EXAMPLE A Translate: What is 19% of 82?

Solution

What	is	19%	of	82?
↓	↓	↓	↓	↓
a	=	0.19	·	82

EXAMPLE B Translate: 7 is 10% of what?

Solution

7	is	10%	of	what?
↓	↓	↓	↓	↓
7	=	0.10	·	b

EXAMPLE C Translate: 18 is what percent of 38?

Solution

18	is	what percent	of	38
↓	↓	↓	↓	↓
18	=	p	·	38

The "Amount" Equation

In solving percent problems, we use the Translate and Solve steps in the problem-solving strategy used throughout the text.

Amount = Percent number · Base.

b Solve basic percent problems.

3 Types of Percent Problems

1. Finding the amount (the result of taking the percent)

Example:	What	is	25%	of	60?	
Translation:	a	=	0.25	·	60	

2. Finding the base (the number you are taking the percent of)

Example:	15	is	25%	of	what number?	
Translation:	15	=	0.25	·	b	

(continued)

b Solve basic percent problems.

3 Types of Percent Problems

3. Finding the percent number (the percent itself)

Example:	15	is	what percent	of	60?	
Translation:	15	=	p	·	60	

b Solve basic percent problems.

EXAMPLE D What is 8% of 34?

Solution

Translate: $a = 0.08 \cdot 34$

Solve: The variable is by itself. To solve the equation, we just convert 8% to decimal notation and multiply.

$a = 0.08(34)$

$a = 2.72$

$$\begin{array}{r} 34 \\ \times\ 0.08 \\ \hline 2.72 \end{array}$$

Thus, 2.72 is 8% of 34. The answer is 2.72.

b Solve basic percent problems.

EXAMPLE E 15 is 16% of what?

Solution

Translate: 15 is 16% of what?

$15 = 0.16 \cdot b$

Solve: To solve we divide both sides of the equation by 0.16:

$15 = 0.16b$

$$\frac{15}{0.16} = \frac{0.16b}{0.16}$$

$93.75 = b$

$$\begin{array}{r} 93.75 \\ 0.16\overline{)15.00.00} \\ 144 \\ \hline 60 \\ 48 \\ \hline 120 \\ 112 \\ \hline 80 \\ 80 \\ \hline 0 \end{array}$$

b Solve basic percent problems.

EXAMPLE F 27 is what percent of 36?

Solution

Translate: 27 is what percent of 36?

$27 = p \cdot 36$

Solve: To solve we divide both sides by 36 and convert the answer to percent notation:

$27 = p \cdot 36$

$$\frac{27}{36} = \frac{27p}{36}$$

$0.75 = p$

$p = 75\%$

$$\begin{array}{r} .75 \\ 36\overline{)27.00} \\ 252 \\ \hline 180 \\ 180 \\ \hline 0 \end{array}$$

EXAMPLE F 27 is what percent of 36?