Sect 6.3 - The Percent Proportion

Objective a - c: Understanding the percent proportion.

Let's take a closer look at one of the examples from the last section. In example 8a, we were asked to find 50% of 57. In other words, we wanted to know what was 50% of 57? To find the answer, we rewrote 50% as 1/2 and multiplied it with 57. The answer was 28.5. This means that 28.5 is 50% of 57 or 28.5 = 50%•57 = 1/2(57). The 57 is called the base and the answer, 28.5, is called the amount. So,

amount = (percent written as a fraction)•base

Let's solve this equation for the percent written as a fraction. Since that quantity is being multiplied by the base, we need to divide both sides by the base:

$$\text{amount} = (\text{percent written as a fraction}) \bullet \text{base}$$

$$\frac{\text{amount}}{\text{base}} = \frac{(\text{percent written as a fraction}) \bullet \text{base}}{\text{base}}$$

$$\frac{\text{amount}}{\text{base}} = (\text{percent written as a fraction})$$

To write a percent as a fraction, we put the percent over 100, so we can rewrite the above as:

$$\frac{\text{amount}}{\text{base}} = \frac{\text{percent}}{100}$$

The percent proportion:

In the equation amount is a percent of the base, we can put the quantities into the proportion:

$$\frac{\text{amount}}{\text{base}} = \frac{\text{percent}}{100}$$

Then, we can cross multiply and solve.

The amount is always associated with the word "is", the base with the word "of" and the percent is always over 100, so the following is a helpful way to remember how to set-up the proportion:

$$\text{"is"}\ \frac{\text{amount}}{\text{base}}\ \text{"of"} = \frac{\text{percent}}{100}\ \text{"\%"}\ \text{"100"}$$

Keep in mind the "is" over "of" goes alphabetically, so the "is" is on top and the "of" is on the bottom.

Solve the following using the percent proportion:

Ex. 1 What is 65% of 820?

Solution:

The base is 820, the percent is 65%, so we are looking for the amount:

"is" $\frac{A}{820} = \frac{65}{100}$ "%"

"of" "100"

$\frac{A}{820} = \frac{65}{100}$ (cross multiply)

$A \bullet 100 = 820 \bullet 65$ (simplify)

$100A = 53300$ (divide by 100)

$\frac{100A}{100} = \frac{53300}{100}$

$A = 533.$

Ex. 2 What is 35% of 95?

Solution:

The base is 95, the percent is 35%, so we are looking for the amount:

"is" $\frac{A}{95} = \frac{35}{100}$ "%"

"of" "100"

$\frac{A}{95} = \frac{35}{100}$ (cross multiply)

$A \bullet 100 = 95 \bullet 35$ (simplify)

$100A = 3325$ (divide by 100)

$\frac{100A}{100} = \frac{3325}{100}$

$A = 33.25.$

Ex. 3 2280 is 38% of what?

Solution:

The amount is 2280, the percent is 38%, so we are looking for the base:

"is" $\frac{2280}{B} = \frac{38}{100}$ "%"

"of" "100"

$$\frac{2280}{B} = \frac{38}{100} \qquad \text{(cross multiply)}$$

$2280 \bullet 100 = B \bullet (38)$ (simplify)
$228000 = 38B$ (divide by 38)
$\frac{228000}{38} = \frac{38B}{38}$
$B = 6000.$

Ex. 4 250% of what is 200?

Solution:

The amount is 200, the percent is 250%, so we are looking for the base:

"is" $\frac{200}{B} = \frac{250}{100}$ "%"
"of" "100"

$$\frac{200}{B} = \frac{250}{100} \qquad \text{(cross multiply)}$$

$200 \bullet 100 = B \bullet 250$ (simplify)
$20000 = 250B$ (divide by 250)
$\frac{20000}{250} = \frac{250B}{250}$
$B = 80.$

Ex. 5 What percent of 54 is 45?

Solution:

The amount is – 45, the base is 54, so we are looking for the percent:

"is" $\frac{45}{54} = \frac{p}{100}$ "%"
"of" "100"

$$\frac{45}{54} = \frac{p}{100} \qquad \text{(cross multiply)}$$

$45 \bullet 100 = 54 \bullet p$ (simplify)
$4500 = 54p$ (divide by 54)
$\frac{4500}{54} = \frac{54p}{54}$
$p = 83.\overline{3}\%$ or $83\frac{1}{3}\%$

Note, $0.\overline{3} = \frac{1}{3}$ and $0.\overline{6} = \frac{2}{3}$ are two equivalences you should know.

Ex. 6 200 is what percent of 350?

Solution:

The amount is 200, the base is 350, so we are looking for the percent:

"is" $\frac{200}{350} = \frac{p}{100}$ "%"

"of" "100"

$\frac{200}{350} = \frac{p}{100}$ (cross multiply)

$200 \bullet 100 = 350 \bullet p$ (simplify)

$20000 = 350p$ (divide by 350)

$\frac{20000}{350} = \frac{350p}{350}$

$p = \frac{20000}{350}\% = 57\frac{50}{350}\% = 57\frac{5}{35}\% = 57\frac{1}{7}\%.$

Ex. 7 Juan wants to purchase a new CD player priced at $80. If the sales tax is 8.125% of the price, find the sales tax he will have to pay.

Solution:

The sales tax is the amount and the price is the base. So, we are trying to find the sales tax:

A is 8.125% of $80. So, the proportion is:

$\frac{A}{80} = \frac{8.125}{100}$ (cross multiply)

$A \bullet 100 = 80 \bullet 8.125$ (simplify)

$100A = 650$ (divide by 100)

$\frac{100A}{100} = \frac{650}{100}$

A = 6.50. So, Juan had to pay $6.50 in sales tax.

Ex. 8 By setting her thermostat from 75˚ to 78˚ during the summer, Mrs. Schweers saved $55.50 on her electric bill per month as compared to last summer. If this savings was 30% of her last summer's monthly bill, how much was her last summer's bill?

Solution:

The $55.50 is the amount and we are looking for the base:

$55.50 is 30% of B. So, the proportion is:

$$\frac{55.50}{B} = \frac{30}{100} \quad \text{(cross multiply)}$$

$55.50 \bullet 100 = B \bullet 30$ (simplify)
$5550 = 30B$ (divide by 30)
$\frac{5550}{30} = \frac{30B}{30}$
$B = 185.$ Her monthly bill was $185 last year.

Ex. 9 A dress that was originally priced at $45 was discounted by $12.60. Find what percent of the price was discounted.

Solution:

The $45 is the base, the $12.60 is the amount, and we are looking for the percent:

$12.60 is what percent of $45. So, the proportion is:

$$\frac{12.60}{45} = \frac{p}{100} \quad \text{(cross multiply)}$$

$12.60 \bullet 100 = 45 \bullet p$ (simplify)
$1260 = 45p$ (divide by 45)
$\frac{1260}{45} = \frac{45p}{45}$
$p = 28\%$. So, the discount rate was 28%.