	Mathematics	
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Lesson 81	Using Proportions to Solve Percent Problems	

OVERVIEW

This lesson discusses how to proportions can be used to **solve problems** involving **percents**.

KEY TERMS AND CONCEPTS

❑ **Percent**: a ratio whose denominator always equals 100

Example: Write fifty-three percent as a ratio.

$$53\% = \frac{53}{100}$$

Write 0.25 percent as a ratio.

$$0.25\% = \frac{0.25}{100} = \frac{25}{10000}$$

❑ **How to solve proportions problems that involve percents**:

- Write the percent as a fraction whose denominator is 100. The 100 in the denominator represents the entire group or the total.
- Identify the ratio part of the problem.
- Identify the actual numbers given.
- Write all the information in a table. Include a row for the totals.
- Set up a proportion.
- Solve the proportion using cross products.

Example: Twenty percent of the class knew how to skate. Five students knew how to skate. What is the total number of students in the class?

Write 20% as a fraction.

$$20\% = \frac{20}{100}$$

The ratio parts are 20 and 100. The actual number given is 5.

We write the information in a table as follows:

	Percent	Actual Number
Knew skating	20	5
Did not know skating		
Total	100	

Calculate the number who did not know skating. Since the total in the ratio column is 100, the ratio part of "did not know skating" students is 100 – 20 = 80.

Let *s* represent the total number of students in the class.

	Percent	Actual Number
Knew skating	20	5
Did not know skating	80	
Total	100	*s*

Since we want to calculate the total number of students, use the "Knew Skating" and "Total" rows.

The proportion is given by the following equation.

$$\frac{20}{100} = \frac{5}{s}$$

Calculate the cross products.
$$20 \times s = 100 \times 5$$

Multiply.
$$20s = 500$$

Solve for *s*.
$$s = \frac{500}{20} = 25$$

In all, there were 25 students in the class.

Two percent of the trees in the park were not in bloom. If there were 12 trees that were not in bloom, how many of them were in bloom? Also, how many trees were there in the park?

Write 2% as a fraction.

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$2\% = \dfrac{2}{100}$

The ratio parts are 2 and 100.
The actual number given is 12.
Let b represent the number of trees in bloom and t, the total number of trees in the park.

Calculate the number of trees that are in bloom. Since the total in the ratio column is 100, the ratio part of "in bloom" trees is $100 - 2 = 98$.

We write the information in a table as follows:

	Percent	Actual Number
Not in bloom	2	12
In bloom	98	b
Total	100	t

We use information in the "not in bloom" and the "in bloom" rows.

The proportion is given by the following equation.
$\dfrac{2}{98} = \dfrac{12}{b}$

Calculate the cross products.
$2 \times b = 98 \times 12$

Multiply.
$2b = 1176$

Solve for n.
$b = \dfrac{1176}{2} = 588$

In all, there are 588 trees in bloom in the park!

The total number of trees is given by $t = 12 + b = 12 + 588 = 600$.

Thirty-eight of the 95 animals in the zoo were carnivores. Find the percent of herbivorous animals in the zoo.

The number parts are 38 and 95. Since 38 animals were carnivores, $95 - 38 = 57$ were herbivores.

Let h represent the percent of herbivorous animals in the zoo.

We write the information in a table as follows:

	Percent	Actual Number
Carnivores	c	38
Herbivores	h	57
Total	100	95

We use information in the "herbivores" and the "total" rows.

The proportion is given by the following equation.
$\dfrac{h}{100} = \dfrac{57}{95}$

Calculate the cross products.
$h \times 95 = 100 \times 57$

Multiply.
$95h = 5700$

Solve for h.
$h = \dfrac{5700}{95} = 60$

So, 60 percent of the animals in the zoo were herbivores.