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## MODULE 6

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### 6.1 Introduction to Percent

We use fractions to represent part of a number. Because we are using a decimal number system, it's natural to divide the whole into 100 pieces. Instead of using fractions like  $\frac{7}{100}$ , we use percent like 7%.

#### 6.1.1 Definition of Percent

The % symbol means  $\frac{\quad}{100}$ . For example:

- $50\% = \frac{50}{100}$
- $5\% = \frac{5}{100}$
- $120\% = \frac{120}{100}$

It helps to understand percent by thinking of money. For example, 50% means 50 cents; 5% means 5 cent; and 120% means 120 cents.

#### 6.1.2 Percent and Decimal

Let's look at a few examples:

- $50\% = 0.5$  (50 cents)
- $5\% = 0.05$  (5 cents)
- $120\% = 1.2$  (120 cents)

The pattern is: To change a number from percent to decimal, move the decimal point to the right twice. Instead of memorizing this rule, write down  $50\% = 0.5$  on scratch paper and you can easily see the rule.

Now it's easy to understand the following more complicated conversions:

- $100\% = 1$  (100 cents)
- $200\% = 2$  (200 cents)
- $0.1\% = 0.001$  (one tenth of a cent)
- $22.5\% = 0.225$  (twenty-two and a half cents)

#### 6.1.3 Percent and Fraction

To change percent to fraction, we first change percent to decimal, and then change decimal to fraction. Don't forget to reduce fractions!

- $50\% = 0.5$  (read as "five tenths")  $= \frac{5}{10} = \frac{1}{2}$
- $5\% = 0.05$  (read as "five hundredth")  $= \frac{5}{100} = \frac{1}{20}$
- $12.5\% = 0.125$  (read as "one hundred twenty-five thousandth")  $= \frac{125}{1000} = \frac{125 \div 125}{1000 \div 125} = \frac{1}{8}$
- $150\% = 1.5$  (read as "one and five tenth")  $= 1\frac{5}{10} = 1\frac{1}{2}$

To change fraction to percent, we first change fraction to decimal, and then change decimal to percent. Let's look at a few examples:

- $\frac{1}{2} = 1 \div 2 = 0.5 = 50\%$
- $\frac{7}{5} = 7 \div 5 = 1.4 = 140\%$

Sometimes we need to round the percent. In the following examples, we will round the percent to two decimal places.

- $\frac{2}{3} = 2 \div 3 = 0.66666... \approx 0.6667 = 66.67\%$
- $\frac{8}{7} = 8 \div 7 = 1.142857... \approx 1.1429 = 114.29\%$

### 6.1.4 Percent, Decimal and Fraction

The following conversions will be used very often. They are critical to building your number sense.

Fraction	Decimal	Percent
$\frac{1}{2}$	0.5	50%
$\frac{1}{3}$	0. $\overline{3}$	$\approx 33.33\%$
$\frac{2}{3}$	0. $\overline{6}$	$\approx 66.67\%$
$\frac{1}{4}$	0.25	25%
$\frac{3}{4}$	0.75	75%
$\frac{1}{5}$	0.2	20%
$\frac{2}{5}$	0.4	40%
$\frac{3}{5}$	0.6	60%
$\frac{4}{5}$	0.8	80%
$\frac{1}{8}$	0.125	12.5%
$\frac{3}{8}$	0.375	37.5%
$\frac{5}{8}$	0.625	62.5%
$\frac{7}{8}$	0.875	87.5%
$\frac{1}{10}$	0.1	10%
$\frac{3}{10}$	0.3	30%
$\frac{7}{10}$	0.7	70%
$\frac{9}{10}$	0.9	90%

### 6.1.5 Meaning of More Than 100%

Assume School A has 1,000 students. If School B has 500 students, then School B has 50% of School A's students. This should be easy to understand.

What if School B has 1,500 students? This is one and a half times of School A's students. We say School B has 150% of School A's students.

We use the same rules when we convert 150% to decimal and fraction, except the fraction should be a mixed number:

$$150\% = 1.5 = 1\frac{1}{2}$$

After understanding this section, you should have the number sense that 200% means "twice", and 300% means "three times. A percent bigger than 100% means "more than the whole."