

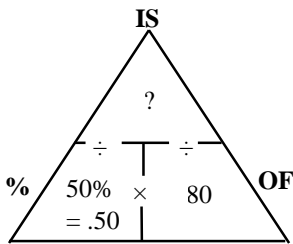
Part 1      Part 2      Part 3

Consider the statement  $\rightarrow$  50% of 80 is 40.  
 $\uparrow$                      $\uparrow$                      $\uparrow$

Refer to each part as  $\rightarrow$  %                    OF                    IS

When we are asked to determine the value of the missing part of a sentence involving percent, we must either divide or multiply the two given parts. The following triangle diagram reminds us when to **divide** or **multiply**.

*Example 1:* Consider the sentence below with the IS-PART missing.



Remove the % symbol and move the decimal point two places to the left (to obtain a decimal).

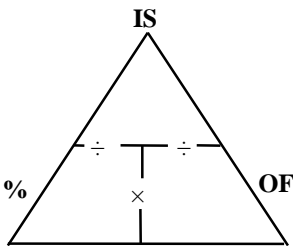
$\rightarrow$  50% of 80 is ?  
 $\uparrow$                      $\uparrow$                      $\uparrow$   
 $\rightarrow$  %                    OF                    IS

Step 1: Identify each part.

$\leftarrow$  Step 2: Fill in the triangle with the given parts.

$\leftarrow$  Step 3: Change the %-part to either a decimal or a fraction.

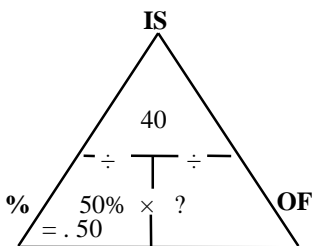
Step 4: Multiply as the triangle indicates.  $\rightarrow$  ? = .50  $\times$  80  
 = **40**



**Exercise 1.** Determine the missing part by first filling in the two given parts of triangle as shown in the above four-step process.

25% of 80 is ?

*Example 2:* Consider the sentence below with the OF-PART missing.



$\rightarrow$  50% of ? is 40

Step 1: Identify each part.  $\rightarrow$  %                    OF                    IS

Step 2: Fill in the triangle with the given parts.

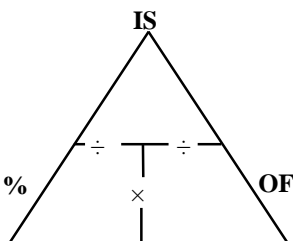
Step 3: Change the %-part to either a decimal or a fraction.

Step 4: Divide as the triangle indicates  $\rightarrow$  .50  $\overline{)40.00} =$  **80**

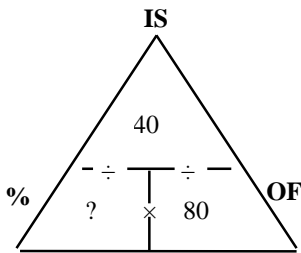
(When the division involves either whole numbers or decimals, the top (IS) number goes **I**nside the box and the bottom number goes outside.)

**Exercise 2.** Determine the missing part by first filling in the two given parts the triangle as shown in the above four-step process.

75% of ? is 15



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**Example 3:** Consider the sentence below with the %-PART missing.

$$\begin{array}{ccccccc} \rightarrow & 40 & \text{is} & ? & \% & \text{of} & 80 ? \\ & | & & | & & & | \\ \rightarrow & \text{IS} & & \% & & & \text{OF} \end{array}$$

**Step 1:** Identify each part.

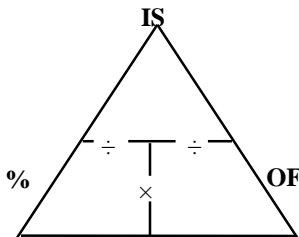
**Step 2:** Fill in the triangle with the given parts.

**Step 3:** Divide as the triangle indicates  $\rightarrow 80 \overline{)40.00} = .50$

(Remember that the top (**IS**) number goes **I**nside the box and the bottom number goes outside).

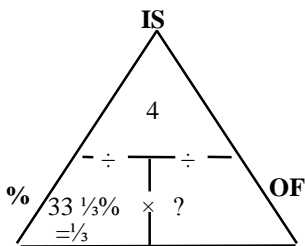
**Step 4:** Move the decimal point two places to the right and write a

% symbol.  $\rightarrow .50 = \boxed{50\%}$



**Exercise 3.** Determine the missing part by first filling in the two given parts of the triangle.

     % of 48 is 12 ?



**Example 4:** Consider the sentence below with the OF-PART missing.

$$\begin{array}{ccccccc} \rightarrow & 33 \frac{1}{3} \% & \text{of} & ? & \text{is} & 4 ? \\ & | & & | & & & | \\ \rightarrow & \% & & \text{OF} & & & \text{IS} \end{array}$$

**Step 1:** Identify each part.

**Step 2:** Fill in the triangle with the given parts.

**Step 3:** Change the %-part to a fraction.

**Step 4:** Divide as the triangle indicates.  $\rightarrow ? = 4 \div \frac{1}{3} = \boxed{12}$

(When the division involves fractions, the top (**IS**) number goes on the left and the bottom number goes on the right.)

Replace the % symbol with

“ $\times \frac{1}{100}$ ”.

$$33 \frac{1}{3} \times \frac{1}{100} =$$

$$\frac{100}{3} \times \frac{1}{100} = \frac{1}{3}$$

**Exercise 4.** Determine the missing part by first constructing a triangle, and then filling in the two given parts.

     is  $33 \frac{1}{3} \%$  of 12

**Exercise 5.** Determine the missing part by first constructing a triangle, and then filling in the two given parts.

     % of 12 is 4

II. Applications Involving Percent

Restate each word problem into a percent sentence of the form: \_\_\_\_% of \_\_\_\_ is \_\_\_\_.

Example 1: With a 6% sales-tax rate, what is the tax on an item priced at \$60?

Find: the tax (Don't confuse the tax rate of 6% with the tax.)

Key words: tax and price (We must compare the tax with the price.)

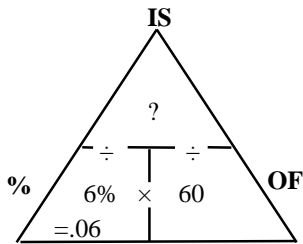
Make sense: Which is correct?

6% of the tax is the price.  
**or**  
 6% of the price is the tax. ✓

Since tax is found by taking a percent of the price, the second statement is correct.

Restate as: 6 % of the price  
\$60 is the tax  
?

Solve with triangle:



$.06 \times 60 =$  **\$3.60**

Use the above format to solve the following problems:

**Exercise 6.** A house sells for \$90,000. If the commission rate is 4%, how much is the commission?

**Exercise 7.** An item was reduced by 25%. This amounted to a savings of \$154. What was the original price of the item?

**Exercise 8.** An item originally selling for \$60 was reduced by \$15. The savings (or discount) is what percent of the original price?

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Example 2: The original price of an item was \$15. The sale price is \$11.25. Find the percent of decrease?

Find: the percent of decrease

**Step 1:** In order to find a percent of decrease (or a percent of increase) we must first find the amount of decrease (or increase); that is, we must find:

The difference between the old amount and the new amount.

For this problem

the old price \$15.00	-	the new price \$11.25	=	the difference \$3.75	.
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**Step 2:** Next we must compare the difference with the old price.  
(Caution: Do not compare the new price with the old price.)

Key words: difference and old price.

Make sense: Which is correct?

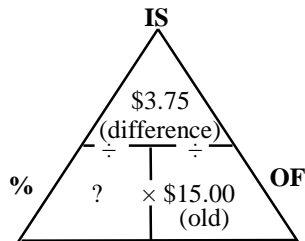
? % of <u>the old price</u> is <u>the difference</u> .	✓
or	
? % of <u>the difference</u> is the <u>old price</u> .	

Since a discount (the difference) is found by taking a percent of the original price, the first statement is correct.

Restate as: ? % of

the old price \$15.00	is	the difference \$3.75
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Solve with triangle:



$$15 \overline{) 3.75} = .25$$

$$= \boxed{25\%}$$

Use the above format to solve the following problems:

**Exercise 9.** If your weight before a diet and exercise program was 216 pounds, and after was 180 pounds, what is the percent of decrease?

**Exercise 10.** If your hourly rate increases from \$8.32 to \$9.24, what is the percent of increase?  
(Round your answer to the nearest tenth percent.)

Answers to Exercises

1. 20    2. 20    3. 25%    4. 4    5.  $33\frac{1}{3}\%$     6. \$3,600    7. \$616    8. 25%    9.  $16\frac{2}{3}\%$     10. 11.1%