

PERCENTS

MATH REFRESHER  
PACKET

AT-PERCENT50



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**PERCENTS**  
**REFRESHER PACKET**  
**EDUCATION ENHANCEMENT CENTER**

This percent refresher packet is compiled to assist students in refreshing some of the most common math skills that may have become rusty from lack of use. By reviewing this packet, your memory of the math concepts and practices learned in the past will improve. This packet contains three units. They are

- \_\_\_\_\_ 1.     Review of percent # 1  
              Change Fractions to Percents
  
- \_\_\_\_\_ 2.     Review of percent # 2  
              Finding a Number When a Percent is Given
  
- \_\_\_\_\_ 3.     Review of percent # 3  
              Percent Increase and Decrease Word Problems Using a Calculator

These materials should be reviewed in the order they are listed. Each unit presents materials and then gives you practice exercises. Each unit has an answer key so you may check your own work.

# INFORMATION SHEET #1

## INTERCHANGING PERCENT AND DECIMALS

### PURPOSE

Percent means hundredths. Remember from decimals that hundredths are expressed in two place decimals. In order to work problems involving percent, we must change the percent to a decimal.

### HOW TO CHANGE PERCENT TO A DECIMAL

1. Move the decimal point two (2) places to the left.
2. Drop the "%" sign.
3. REMEMBER: When there is no decimal point, it is always understood to be at the right of the number.

EXAMPLE: 8 is the same as 8., so  $8\% = .08$

### HOW TO CHANGE A DECIMAL TO PERCENT

1. Move the decimal point two (2) places to the right.
2. Add the "%" sign.

EXAMPLE:  $.15 = 15\%$

## ASSIGNMENT SHEET #1

Change each percent to a decimal.

EXAMPLE: 15% move the decimal two (2) number places to the left.

$$\underline{.15}\% = .15$$

1. 12% = \_\_\_\_\_

2. 45% = \_\_\_\_\_

3. 83% = \_\_\_\_\_

4. 1% = \_\_\_\_\_

5. 100% = \_\_\_\_\_

6. 13.5% = \_\_\_\_\_

7. 15.25% = \_\_\_\_\_

8. 95% = \_\_\_\_\_

Change each decimal to a percent.

EXAMPLE: .565 = Move the decimal two (2) number places to the right, add the "%" sign.

$$\underline{.565} = 56.5\%$$

9. .125 = \_\_\_\_\_

10. .50 = \_\_\_\_\_

11. .07 = \_\_\_\_\_

12. .3 = \_\_\_\_\_

13. .43 = \_\_\_\_\_

14. .375 = \_\_\_\_\_

15. 5.00 = \_\_\_\_\_

16. .8 = \_\_\_\_\_

**ANSWERS TO  
ASSIGNMENT SHEET #1**

Change each percent to a decimal.

1.  $12\% = \underline{\quad .12 \quad}$

2.  $45\% = \underline{\quad .45 \quad}$

3.  $83\% = \underline{\quad .83 \quad}$

4.  $1\% = \underline{\quad .01 \quad}$

5.  $100\% = \underline{\quad 1.0 \quad}$

6.  $13.5\% = \underline{\quad .135 \quad}$

7.  $15.25\% = \underline{\quad .1525 \quad}$

8.  $95\% = \underline{\quad .95 \quad}$

Change each decimal to a percent.

9.  $.125 = \underline{\quad 12.5\% \quad}$

10.  $.50 = \underline{\quad 50\% \quad}$

11.  $.07 = \underline{\quad 7\% \quad}$

12.  $.3 = \underline{\quad 30\% \quad}$

13.  $.43 = \underline{\quad 43\% \quad}$

14.  $.375 = \underline{\quad 37.5\% \quad}$

15.  $5.00 = \underline{\quad 500\% \quad}$

16.  $.8 = \underline{\quad 80\% \quad}$

## INFORMATION SHEET #2

### CHANGING FRACTIONS TO PERCENTS

#### PURPOSE

Sometimes it is necessary to find out what percent a fraction stands for or equals. An example of this might be if you needed to know what percent 1 out of 5 people would be. One out of five would be expressed as the fraction  $1/5$ .

#### HOW TO CHANGE FRACTIONS TO PERCENTS

1. Change the fraction to a decimal by dividing the bottom number into the top number.

EXAMPLE:  $1/5 = 5 \overline{)1.0}^{\cdot 2}$

2. Move the decimal point two (2) places to the right.

$$.2 = \underbrace{.20}_{\text{two places}} = 20$$

3. Add the "%" sign.                      20%                      Thus  $1/5 = 20\%$

#### EXAMPLES:

$$\frac{1}{2} = 2 \overline{)1.0}^{\cdot 5} = \underbrace{.50}_{\text{two places}} = 50\%$$

$$\frac{1}{4} = 4 \overline{)1.00}^{\cdot 25} = \underbrace{.25}_{\text{two places}} = 25\%$$

$$\frac{1}{8} = 8 \overline{)1.000}^{\cdot 125} = \underbrace{.125}_{\text{three places}} = 12.5\%$$

-8  
20  
-16  
40  
-40  
0

## ASSIGNMENT SHEET #2

Change the following fractions to percents.

EXAMPLE:

$$\frac{3}{8} = 8 \overline{) 3.000} = \begin{array}{r} .375 \\ 8 \overline{) 3.000} \\ \underline{-24} \phantom{00} \\ 60 \phantom{0} \\ \underline{-56} \phantom{0} \\ 40 \phantom{0} \\ \underline{-40} \\ 0 \end{array} = \text{Move the decimal two (2) places to the right} = 37.5\%$$

1.  $\frac{3}{5} =$  \_\_\_\_\_

6.  $\frac{9}{10} =$  \_\_\_\_\_

2.  $\frac{3}{4} =$  \_\_\_\_\_

7.  $\frac{7}{8} =$  \_\_\_\_\_

3.  $\frac{2}{5} =$  \_\_\_\_\_

8.  $\frac{1}{8} =$  \_\_\_\_\_

4.  $\frac{3}{10} =$  \_\_\_\_\_

9.  $\frac{1}{16} =$  \_\_\_\_\_

5.  $\frac{5}{8} =$  \_\_\_\_\_

10.  $\frac{2}{3} =$  \_\_\_\_\_



ANSWER SHEET FOR  
ASSIGNMENT SHEET #2

Change the following fractions to percents.

EXAMPLE:

$$\frac{3}{8} = 8 \overline{) 3.000} = \text{Move the decimal two (2) places to the right} = 37.5\%$$
$$\begin{array}{r} .375 \\ 8 \overline{) 3.000} \\ \underline{-24} \phantom{00} \\ 60 \\ \underline{-56} \phantom{0} \\ 40 \\ \underline{-40} \\ 0 \end{array}$$

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

6.  $\frac{9}{10} = 90\%$

2.  $\frac{3}{4} = 75\%$

7.  $\frac{7}{8} = 87.5\%$

3.  $\frac{2}{5} = 40\%$

8.  $\frac{1}{3} = 33.33\%$

4.  $\frac{3}{10} = 30\%$

9.  $\frac{1}{16} = 6.25\%$

5.  $\frac{5}{8} = 62.5\%$

10.  $\frac{2}{3} = 66.68\%$

INFORMATION SHEET #3  
FINDING PERCENT OF A NUMBER  
PERCENTS GREATER THAN 1%

HOW TO FIND THE PERCENT OF A NUMBER (30% OF 90)

- 1 Change the percent to a decimal.  $30\% = .30$
- 2 Multiply  $.30 \times 90 = 27.0$

NOTE: "of" in percent always means "times". When "of" is between a number and a percent number you will multiply.

EXAMPLE:  $15\%$  "of"  $10 = .15$  "x"  $10$

EXAMPLES:

1. Find  $25\%$  of  $120$        $25\% = .25$

$$\begin{array}{r} 120 \\ \times .25 \\ \hline 600 \\ 2400 \\ \hline 30.00 \end{array}$$

So,  $25\%$  of  $120$  is  $30$

2. Find  $12\frac{1}{2}\%$  of  $96$        $12\frac{1}{2}\% = 12.5\% = .125$

$$\begin{array}{r} 96 \\ \times .125 \\ \hline 480 \\ 1920 \\ 9600 \\ \hline 12.000 \end{array}$$

So,  $12\frac{1}{2}\%$  of  $96$  is  $12$

**ASSIGNMENT SHEET #3**  
**PERCENTS GREATER THAN 1%**

Solve for the following percents. Show your work.

**EXAMPLE:**

55% of 60 = \_\_\_\_\_  $\rightarrow$   $.55 \times 60 =$  \_\_\_\_\_ Change percent to decimal

Multiply

$$\begin{array}{r} 60 \\ \times .55 \\ \hline 300 \\ \times 3000 \\ \hline 33.00 \end{array}$$

$\leftarrow$  2 decimals  
 $\leftarrow$  2 decimals

So, 55% of 60 = 33

1. 40% of 20 = \_\_\_\_\_

2. 70% of 35 = \_\_\_\_\_

3.  $35\frac{1}{2}\%$  of 74 = \_\_\_\_\_

4. 25% of 110 = \_\_\_\_\_

5. 60% of 58 = \_\_\_\_\_

6. 30% of 62 = \_\_\_\_\_

7. 15% of 225 = \_\_\_\_\_

8.  $12\frac{1}{2}\%$  of 98 = \_\_\_\_\_

**ANSWER SHEET FOR  
ASSIGNMENT SHEET #3**

1. 40% of 20 = 8

$$\begin{array}{r} 20 \\ \times .40 \\ \hline 8.00 \end{array}$$

2. 70% of 35 = 24.5

$$\begin{array}{r} 35 \\ \times .70 \\ \hline 24.50 \end{array}$$

3.  $35\frac{1}{2}\%$  of 74 = 26.27

$$\begin{array}{r} .355 \\ \times 74 \\ \hline 1420 \\ + 24850 \\ \hline 26.270 \end{array}$$

4. 25% of 110 = 27.5

$$\begin{array}{r} 110 \\ \times .25 \\ \hline 550 \\ + 2200 \\ \hline 27.50 \end{array}$$

5. 60% of 58 = 34.8

$$\begin{array}{r} 58 \\ \times .60 \\ \hline 34.80 \end{array}$$

6. 30% of 62 = 18.6

$$\begin{array}{r} 62 \\ \times .30 \\ \hline 18.60 \end{array}$$

7. 15% of 225 = 33.75

$$\begin{array}{r} 225 \\ \times .15 \\ \hline 1125 \\ + 2250 \\ \hline 33.75 \end{array}$$

8.  $12\frac{1}{2}\%$  of 98 = 12.25

$$\begin{array}{r} .125 \\ \times 98 \\ \hline 1000 \\ + 11250 \\ \hline 12.250 \end{array}$$

**INFORMATION SHEET #4**  
**PERCENTS SMALLER THAN 1%**

**HOW TO FIND A PERCENT OF A NUMBER**

1. Change the percent to a decimal

$$1/5\% \text{ of } 1000 = \underline{\hspace{2cm}}$$

STEP 1: Change 1/5% to a decimal percent =  $5 \overline{)1.0} \begin{matrix} .2\% \\ \end{matrix}$   
 $1/5\% = .2\%$

STEP 2: Change .2% to a decimal  
 $.2\% = .002$  (move the decimal two (2) places left)

So

STEP 3: Multiply  $1/5\% \text{ of } 1000 = .002 \times 1000 = 2$

$$\begin{array}{r} 1000 \\ \times .002 \\ \hline 2.000 \end{array} \quad \begin{array}{l} \leftarrow 3 \text{ decimals} \\ \leftarrow 3 \text{ decimals} \end{array}$$

FIND:  $1/4\% \text{ of } 400$   
 $.25\% \times 400$   
 $.0025 \times 400$

→

$$\begin{array}{r} .25\% \\ 4 \overline{)1.00} \\ \underline{-8} \\ 20 \\ \underline{-20} \\ 0 \end{array}$$

SOLUTION:  $1/4\% \text{ of } 400 \text{ is } 1$

$$\begin{array}{r} 400 \\ \times .0025 \\ \hline 2000 \\ 8000 \\ \hline 1.0000 \end{array}$$

## ASSIGNMENT SHEET #4

### PERCENTS SMALLER THAN 1%

Solve for the answer. Show your work.

EXAMPLE:

$$1/2 \% \text{ of } 50 = \underline{\hspace{2cm}}$$

STEP 1:  $1/2\% = 2 \overline{)1.0}^{.5\%} = 1/2\% = .5\%$  (change to decimal percent)

STEP 2:  $.5\% = .005$  (change to decimal)

STEP 3: Multiply:

$$\begin{array}{r} .005 \\ \times 50 \\ \hline .250 \end{array}$$

So  $1/2\%$  of 50 = .25

1.  $3/4\%$  of 500 =                     

2.  $1/4\%$  of 1200 =                     

3.  $1/2\%$  of 95 =                     

4.  $1/8\%$  of 1000 =                     

5.  $1/5\%$  of 20 =                     

6.  $1/3\%$  of 45 =                     

7.  $3/4\%$  of 100 =                     

8.  $1/4\%$  of 30 =

**ANSWERS TO  
ASSIGNMENT SHEET #4**

1.  $3/4\%$  of 500 = 3.75

$3/4\% = .75\% = .0075$

$$\begin{array}{r} .0075 \\ \times 500 \\ \hline 3.7500 \end{array}$$

2.  $1/4\%$  of 1200 = 3

$1/4\% = .25\% = .0025$

$$\begin{array}{r} 1200 \\ \times .0025 \\ \hline .6000 \\ + 24000 \\ \hline 3.0000 \end{array}$$

3.  $1/2\%$  of 95 = .475

$1/2\% = .5\% = .005$

$$\begin{array}{r} .005 \\ \times 95 \\ \hline 25 \\ + 450 \\ \hline .475 \end{array}$$

4.  $1/8$  of 1000 = 1.25

$1/8\% = .125\% = .00125$

$$\begin{array}{r} .00125 \\ \times 1000 \\ \hline 1.25000 \end{array}$$

5.  $1/5\%$  of 20 = .04

$1/5\% = .2\% = .002$

$$\begin{array}{r} .002 \\ \times 20 \\ \hline .040 \end{array}$$

6.  $1/3\%$  of 45 = .1485

$1/3\% = .33\% = .0033$

$$\begin{array}{r} .0033 \\ \times 45 \\ \hline 165 \\ + 1320 \\ \hline .1485 \end{array}$$

7.  $3/4\%$  of 100 = .75

$3/4\% = .75\% = .0075$

$$\begin{array}{r} .0075 \\ \times 100 \\ \hline .7500 \end{array}$$

8.  $1/4\%$  of 30 = .075

$1/4\% = .25\% = .0025$

$$\begin{array}{r} .0025 \\ \times 30 \\ \hline .0750 \end{array}$$

# INFORMATION SHEET #1

## FINDING WHAT PERCENT ONE NUMBER IS OF ANOTHER

To solve percent problems involving finding what percent one number is of another number there is a percent formula to use.

### PERCENT FORMULA:

$$\frac{\text{is}}{\text{of}} = \frac{\%}{100}$$

STEP 1: Plug the percent problem into the formula:

PROBLEM: 9 is N% of 45

$$\frac{9 = \text{the number next to "is"}}{45 = \text{the number next to "of"}} = \frac{(\text{is}) 9}{(\text{of}) 45} = \frac{N (\%)}{100 (100)}$$

STEP 2: Cross multiply:

$$\frac{9}{45} = \frac{N}{100} \text{ Cross multiply}$$

$$9 \times 100 = 45 \times N$$

$$900 = 45N$$

STEP 3: Divide by the number with N:

$$\frac{900}{45} = \frac{45N}{45} \text{ divide}$$

$$20 = N,$$

9 is 20% of 45

$$\text{So } \begin{array}{r} 20 \\ 45 \overline{)900} \\ \underline{-90} \\ 00 \end{array}$$



## INFORMATION SHEET #1 CONT.

**FIND:** 3 is \_\_\_\_\_ % of 10

**STEP 1:** Use the percent formula, plug in the numbers.

$$\frac{\text{is}}{\text{of}} = \frac{\%}{100} \rightarrow \rightarrow \rightarrow \frac{3}{10} = \frac{N}{100}$$

**STEP 2:** Cross multiply:

$$\frac{3 = \text{the number next to "is"} = 3}{10 = \text{the number next to "of"} = 10} = \frac{N\%}{100}$$

$$10 \times N = 3 \times 100$$

$$10N = 300$$

**STEP 3:** Divide by the number with N:

$$\frac{10N}{10} = \frac{300}{10}$$

$$\begin{array}{r} 30 \\ 10 \overline{)300} \\ \underline{-30} \\ 00 \end{array}$$

$$300 \div 10 = 30 = N$$

So, 3 is 30% of 10

## ASSIGNMENT SHEET #1

Solve the problems, find the percent. Show your work.

Use the percent formula:

$$\frac{\text{is}}{\text{of}} = \frac{\%}{100}$$

1. 160 is N% of 200

STEP 1: Plug in the numbers using the percent formula:

$$\frac{160}{200} = \frac{N}{100}$$

STEP 2: Cross multiply:

$$160 \times 100 = 200 \times N$$

$$16000 = 200N$$

STEP 3: Divide by the number with N

$$\frac{16000}{200} = \frac{\cancel{2000}}{\cancel{200}} N$$

$$16000 \div 200 = 80 = N$$

$$160 \text{ is } 80\% \text{ of } 200$$

2. 5 is N% of 10

3. 20 is \_\_\_\_\_ % of 8

$$\frac{5}{10} = \frac{N}{100}$$

ASSIGNMENT SHEET #1 CONT.

4. 75 is \_\_\_\_\_ % of 125

5. 9 is \_\_\_\_\_ % of 12

6. 3 is \_\_\_\_\_ % of 10

7. 2 is \_\_\_\_\_ % of 8

ASSIGNMENT SHEET #1 CONT.

8. 63 is \_\_\_\_\_ % of 70

9. 52.5 is \_\_\_\_\_ % of 150

10. 4.5 is \_\_\_\_\_ % of 25.

**ANSWER SHEET TO  
ASSIGNMENT SHEET #1**

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1. 160 is 80% of 200

$$\frac{5}{10} = \frac{N}{100}$$

$$5 \times 100 = 10 \times N$$

$$\frac{500}{10} = \frac{10N}{10}$$

$$50 = N$$

3. 20 is 250% of 8

$$\frac{20}{8} = \frac{N}{100}$$

$$20 \times 100 = 8 \times N$$

$$\frac{2000}{8} = \frac{8N}{8}$$

$$250 = N$$

4. 75 is 60% of 125

$$\frac{75}{125} = \frac{N}{100}$$

$$75 \times 100 = 125 \times N$$

$$\frac{7500}{125} = \frac{125N}{125}$$

$$60 = N$$

5. 9 is 75% of 12

$$\frac{9}{12} = \frac{N}{100}$$

$$9 \times 100 = 12 \times N$$

$$\frac{900}{12} = \frac{12N}{12}$$

$$75 = N$$

6. 3 is 30% of 10

$$\frac{3}{10} = \frac{N}{100}$$

$$3 \times 100 = 10 \times N$$

$$\frac{300}{10} = \frac{10N}{10}$$

$$30 = N$$

7. 2 is 25% of 8

$$\frac{2}{8} = \frac{N}{100}$$

$$2 \times 100 = 8 \times N$$

$$\frac{200}{8} = \frac{8N}{8}$$

$$25 = N$$

**ANSWER SHEET TO  
ASSIGNMENT SHEET #1 CONT.**

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8. 63 is 90% of 70

$$\frac{63}{70} = \frac{N}{100}$$

$$63 \times 100 = 70 \times N$$

$$\frac{6300}{70} = \frac{70N}{70}$$

$$90 = N$$

9. 52.5 is 35% of 150

$$\frac{52.5}{150} = \frac{N}{100}$$

$$52.5 \times 100 = 150 \times N$$

$$5250 = 150N$$

$$\frac{5250}{150} = \frac{150N}{150}$$

$$35 = N$$

10. 4.5 is 18% of 25

$$\frac{4.5}{25} = \frac{N}{100}$$

$$4.5 \times 100 = 25 \times N$$

$$\frac{450}{25} = \frac{25N}{25}$$

$$18 = N$$



## ASSIGNMENT SHEET #2

### HOW TO FIND A NUMBER WHEN ITS PERCENT IS GIVEN

Solve the percent problems. Show your work.

Use the percent formula:

$$\frac{\text{is}}{\text{of}} = \frac{\%}{100}$$

\* "is" can also be the "=" sign \*

1. 75% of what number = 150

$$\frac{\text{is}}{\text{of}} = \frac{150}{N} = \frac{75}{100} = \frac{\%}{100}$$

$$150 \times 100 = 75 \times N$$

$$\frac{15000}{75} = \frac{75N}{75}$$

$$200 = N$$

$$75\% \text{ of } 200 = 150$$

2. 20% of \_\_\_\_\_ is 48

3. 25% of \_\_\_\_\_ is 8

4. 60% of \_\_\_\_\_ is 150

5. 80% of \_\_\_\_\_ is 240



## ASSIGNMENT SHEET #2 CONT.

6. 30% of \_\_\_\_\_ is 75

7. 50% of \_\_\_\_\_ is 75

8. 25% of \_\_\_\_\_ is 50.

9. 35% of \_\_\_\_\_ is 90

10. 10% of \_\_\_\_\_ is 93

**ANSWER SHEET TO  
ASSIGNMENT SHEET #2**

1. 75% of 200 = 150

2. 20% of 240 is 48

$$\frac{48}{N} = \frac{20}{100}$$

$$48 \times 100 = 20 \times N$$

$$\frac{4800}{20} = \frac{20N}{20}$$

$$240 = N$$

4. 60% of 250 is 150

$$\frac{150}{N} = \frac{60}{100}$$

$$150 \times 100 = 60 \times N$$

$$15000 = 60N$$

$$250 = N$$

6. 30% of 250 is 75

$$\frac{75}{N} = \frac{30}{100}$$

$$75 \times 100 = 30 \times N$$

$$\frac{7500}{30} = \frac{30N}{30}$$

$$250 = N$$

3. 25% of 32 is 8

$$\frac{8}{N} = \frac{25}{100}$$

$$8 \times 100 = 25 \times N$$

$$\frac{800}{25} = \frac{25N}{25}$$

$$32 = N$$

5. 80% of 300 is 240

$$\frac{240}{N} = \frac{80}{100}$$

$$240 \times 100 = 80 \times N$$

$$\frac{24000}{80} = \frac{80N}{80}$$

$$300 = N$$

7. 50% of 150 is 75

$$\frac{75}{N} = \frac{50}{100}$$

$$75 \times 100 = 50 \times N$$

$$\frac{7500}{50} = \frac{50N}{50}$$

$$150 = N$$

ANSWER SHEET TO  
ASSIGNMENT SHEET #2 CONT.

8. 25% of 200 is 50

$$\frac{50}{N} = \frac{25}{100}$$

$$50 \times 100 = 25 \times N$$

$$\frac{5000}{25} = \frac{25N}{25}$$

$$200 = N$$

9. 35% of 257.143 is 90

$$\frac{90}{N} = \frac{35}{100}$$

$$90 \times 100 = 35N$$

$$\frac{9000}{35} = \frac{35N}{35}$$

$$257.143 = N$$

10. 10% of 930 is 93

$$\frac{93}{N} = \frac{10}{100}$$

$$93 \times 100 = 10 \times N$$

$$\frac{9300}{10} = \frac{10N}{10}$$

$$930 = N$$

**INFORMATION SHEET #1**  
**FINDING PERCENT OF INCREASE AND DECREASE**  
**STEP 1: SUBTRACT (WHEN NEEDED)**

Word problems involving percent of increase and decrease can be solved by using the following steps.

The steps are:

1. Subtract (when needed) to find the increase or decrease.
2. Divide:  

original amount	quotient (answer) increase or decrease
-----------------	---
3. Move the decimal (in the quotient) two (2) places to the right. Add a % sign to the quotient.

Lets look at each of the three steps individually.

STEP 1: Subtract (if needed) to find the increase or decrease.

**WORD PROBLEM:**

Jose receives a \$90 raise (increase) over his original salary of \$1,200.

What is the percent of increase?

Read over the word problem. How much is Jose's raise?

OR

How much is Jose's salary increasing?

Jose's raise = \$90

Because the word problem states the increase of \$90, it is not necessary to use Step 1: Subtract.

## INFORMATION SHEET #1 CONT.

STEP 1: Subtract (if needed) to find the increase or decrease.

### WORD PROBLEM:

Jose's original salary last year was \$1,251.05. This year he received a raise in January and his new salary increased to \$1,399.05.

What is the percent of increase?

How much did Jose's salary increase?

In this word problem subtraction is necessary to find the increase in salary.

EXAMPLE:     \$1,399.05     (new salary)  
                  -1,251.05     (original salary)  
                  \$ 148.00     (salary increase)

A percent of decrease word problem is similar to a percent of increase word problem. Subtraction is used only if needed.

### WORD PROBLEM:

Sarah's state income tax refund was \$225.00 in 1990. In 1991 Sarah's state income tax refund decreased to \$190.00.

What is the percent of decrease?

What is the amount of decrease in Sarah's state tax returns when comparing 1990 and 1991?

Yes, it is necessary to subtract to find the decrease.

EXAMPLE:     \$225.00     (tax return 1990)  
                  - 190.00     (tax return 1991)  
                  \$ 35.00     decrease

Read each word problem. Circle the correct answer.

1. This month, you received a \$150 increase in your salary of \$1,500 per month. What is the percent of increase?

- A. Yes, subtract to find the increase.
- B. No, subtraction is not necessary to find the increase. The increase is stated in the word problem

The increase in your salary is:

- A. \$150 per month
- B. \$1,500 per month
- C. \$505 per month

2. The company you work for had 219 original employees in 1980. In 1990, your company had 301 employees. What is the percent of increase?

- A. Yes, subtract to find the increase.
- B. No, subtraction is not necessary to find the increase. The increase is stated in the word problem.

The increase of employees from 1980 to 1990 is:

- A. 219 employees
- B. 82 employees
- C. 136 employees

3. Rent on your office space is \$524 per month. Next month the rent on your office space will increase to \$633 a month. What is the percent of increase?

- A. Yes, subtract to find the increase.
- B. No, subtraction is not necessary to find the increase. The increase is stated in the word problem.

The increase in the rent for your office space is:

- A. \$109.00
- B. \$524.00
- C. \$ 85.00

## ASSIGNMENT SHEET #1 CONT.

4. Laura's 1989 Mustang convertible sticker price was \$11,599.00 when she bought the new car. In 1992 she traded the Mustang in for a newer model. The trade-in value was \$6,399.00. What is the percent of decrease.

- A. Yes, subtract to find the decrease.
- B. No, subtraction is not necessary to find the decrease. The decrease is stated in the word problem.

The decrease in the car's value is:

- A. \$6,399.00
- B. \$4,390.00
- C. \$5,200.00

5. Mrs. Smith ordered 11.5 reams of paper for her copier in March. In April, she ordered 8.25 reams of paper for the copier. What is the percent of decrease?

- A. Yes, subtract to find the decrease.
- B. No, subtraction is not necessary to find the decrease. The decrease is stated in the word problem.

The decrease in reams of paper ordered is:

- A. 8.25 reams
- B. 5 reams
- C. 3.25 reams

6. Last month Happy Hamburger Cafe made \$7,500 in profits. This month the cafe's profits decreased by \$2,500.00. What is the percent of decrease?

- A. Yes, subtract to find the decrease.
- B. No, subtraction is not necessary to find the decrease. The decrease is stated in the word problem.

The decrease in profits at the cafe between this month and last month was:

- A. \$5,000
- B. \$2,500
- C. \$7,500

ANSWER SHEET FOR  
ASSIGNMENT SHEET #1

1. B No, subtraction  
A \$150 per month
2. A Yes, subtract  
B 82 employees
3. A Yes, subtract  
A \$109.00
4. A Yes, subtract  
C \$5200.00
5. A Yes, subtract  
C 3.25
6. B No, subtraction  
B \$2,500



## INFORMATION SHEET #2

### FINDING PERCENT OF INCREASE OR DECREASE

#### STEP 2: INCREASE OR DECREASE DIVIDED BY ORIGINAL AMOUNT

Word problems involving percent of increase and decrease can be solved by using the following steps:

1. Subtract (if needed) to find the increase or decrease.

2. Divide:

$$\begin{array}{r} \text{original} \\ \text{amount} \end{array} \overline{) \begin{array}{l} \text{increase} \\ \text{or} \\ \text{decrease} \end{array}} \text{ quotient (answer)}$$

3. Move the decimal (in the quotient) 2 places to the right. Add a % sign to the quotient.

In Assignment Sheet #1, you learned when it was necessary to subtract in Step 1: Subtract (if needed).

In this Assignment Sheet you will learn what is divided by what.

STEP 2. Divide:

$$\begin{array}{r} \text{original} \\ \text{amount} \end{array} \overline{) \begin{array}{l} \text{increase} \\ \text{or} \\ \text{decrease} \end{array}}$$

#### WORDS TO KNOW:

**Original amount:** When solving a percent of increase or decrease word problem, the original amount is the number that happened first. In other words, on a time frame, last year happened before this year. Therefore, the number representing last year would be the original amount.

**EXAMPLE:** Original Amount

Last month your store sold \$56,000 worth of lumber supplies. This month the store sold \$69,000 worth of supplies. What is the percent of increase?

The original amount in this word problem is \$56,000 because last month (\$56,000) happened before this month (\$69,000). (Remember: Think about a time frame. What happened first is the original amount.)

## INFORMATION SHEET #2 CONT.

**EXAMPLE:** Original Amount

Jose receives a \$90 raise (increase) over his original salary of \$1200.

What is the percent of increase?

What is the original amount? On a time frame his salary of \$1,200/month occurs before his raise(\$90) is added, making this new salary \$1,290/month. The original amount is \$1,200.

We already know that:

STEP 1: Subtract (when needed)

Subtraction is not necessary since Jose's raise is stated in the word problem (\$90). Therefore, \$90 is the increase.

STEP 2: Divide:

original amount  $\overline{\hspace{1.5cm}}$  increase  
or  
decrease

We already know that the original amount is \$1,200.

Let's set up the problem:

$$\text{original amount} \overline{\hspace{1.5cm}} \text{increase} = 1,200 \overline{\hspace{1.5cm}} 90 = 1,200 \overline{\hspace{1.5cm}} 90.000$$

(Adding zeros behind the decimals will not change the value of 90. The zeros are added so that the problem can be divided correctly)

## ASSIGNMENT SHEET #2

Read the word problems. Circle the correct answer.

### WORD PROBLEM:

Jose's original salary last year was \$1251.00. This year he received a raise in January and his new salary increased to \$1399.00.

What is the percent of increase?

STEP 1: Subtract (if needed) to find the increase.

$$\begin{array}{r} 1,399.05 \\ - 1,251.05 \\ \hline 148.00 \end{array} \quad \text{increase}$$

STEP 2: Divide:

$$\frac{\text{increase}}{\text{original amount}}$$

QUESTIONS: Circle the correct answers to the following problems.

- What is the original amount in the above word problem?
  - \$1,251.00
  - \$148.00
  - \$1,399.00
- For the above word problem, which division problem is set up the correct way to solve the following formula?

$$\frac{\text{increase}}{\text{original amount}}$$

- $1,251 \overline{)1,399}$
- $148 \overline{)1,251}$
- $1,251 \overline{)148}$

## ASSIGNMENT SHEET #2 CONT.

### WORD PROBLEM:

This month, you received a \$150 increase to your salary of \$1,500 per month.

What is the percent of increase?

We already know that the increase in salary is \$150/month because it is stated in the word problem.

3. What is the original amount in the above word problem?
- A. \$150.00
  - B. \$1,500.00
  - C. \$1,650.00
4. Set the problem up correctly.

	original amount	increase
--	--------------------	----------

- A. 1,500 150
- B. 150 1,500
- C. 1,500 1,650

### WORD PROBLEM:

Sarah's state income tax refund was \$225.00 in 1990. In 1991 Sarah's state income tax refund decreased to \$190.00.

What is the percent of decrease?

We already know that the decrease is \$35.

225.00	
- 190.00	
<hr/>	
35.00	decrease

## ASSIGNMENT SHEET #2 CONT.

5. What is the original amount?

A. \$190

B. \$225

C. \$35

6. Set the problem up correctly:

original  
amount

decrease

A.  $225 \overline{)190}$

B.  $35 \overline{)225}$

C.  $225 \overline{)35}$

**ANSWER SHEET FOR  
ASSIGNMENT SHEET #2**

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1. A. 1,251.00

2. C. 1,251  $\overline{148}$

3. B \$1,500

4. A 1,500  $\overline{150}$

5. B \$225

6. C 225  $\overline{35}$

### INFORMATION SHEET #3

#### FINDING PERCENT OF INCREASE AND DECREASE

STEP 3: MOVE THE DECIMAL 2 PLACES TO THE RIGHT.

ADD % SIGN

#### WORD PROBLEM:

This month, you received a \$150 increase to your salary of \$1,500 per month.

What is the percent of increase?

The above word problem is set up:

$$\begin{array}{l} \text{original} \\ \text{amount} \end{array} \quad \overline{\text{increase}} = 1500 \overline{150} = 1500 \begin{array}{r} .1 \\ \hline 150.0 \\ 1500 \\ \hline 0 \end{array}$$

STEP 3: In the answer above, move the decimal 2 places to the right and add a % sign.

$$\text{(BOB)} \quad .1 = \underbrace{.10}_{2 \text{ places}} = 10\% \text{ add percent sign}$$

Taking a \$150 raise and adding it to a 1500/month salary gives you a 10% increase in your salary. (Not to mention a \$1650/month salary also.)

#### WORD PROBLEM:

Sarah's state income tax refund was \$225.00 in 1990. In 1991, Sarah's state income tax refund decreased to \$190.

What is the percent of decrease?

## INFORMATION SHEET #3 CONT.

**STEP 1:** Subtract

$$\begin{array}{r} 225 \\ - 190 \\ \hline 35 \end{array} \text{ decrease}$$

**STEP 2:** Divide

$$\begin{array}{r} \text{original amount} = 225 \quad 35 \text{ (decrease)} = 225 \overline{)35.000} \\ \phantom{=} \underline{-225} \\ \phantom{=} 1250 \\ \phantom{=} \underline{-1125} \\ \phantom{=} 1250 \\ \phantom{=} \underline{-1125} \\ \phantom{=} 125 \end{array}$$

**STEP 3:** Move the decimal (2 places right) and add a % sign (round to a whole percent).

$$.155 = \underbrace{.155}_{\text{round}} = 15.5\% = 16\%$$

So Sarah's state income tax refund decreased 16% when comparing 1990's refund to the 1991 refund.

Let's practice: Use your calculator

$$\text{Increase} = 75 \quad \text{original amount} = 125$$

Percent of increase

$$\begin{array}{r} \phantom{125} \overline{)75 \text{ increase}} \\ \phantom{125} \underline{-60} \\ \phantom{125} 15 \end{array}$$

*original amount*

Calculator use:

Enter 75 first  
 Press  $\div$  key  
 Enter 125  
 Press = key  
 Answer .6

Change .6 to a percent .6 = 60%

60% increase



### ASSIGNMENT SHEET #3

Solve the (percent of increase and decrease) word problems. Show your work. You may use a calculator. Round your answer to a whole percent. Use these steps.

1. Subtract (if needed) to find increase or decrease.
2. Divide  $\frac{\text{original amount}}{\text{increase or decrease}}$
3. Move decimal and add percent sign.

1. Last year John Smith drove 12,000 miles for business. This year he drove 18,000 miles. What is the percent of increase in mileage.

2. Decrease = 35  
Original amount = 140  
Percent of decrease = \_\_\_\_\_

3. Increase = 75  
Original amount = 375  
Percent of increase = \_\_\_\_\_

4. Decrease = 56  
Original amount = 86  
Percent of decrease = \_\_\_\_\_

## ASSIGNMENT SHEET #3 CONT.

5. Increase = 250

Original amount = 356

Percent of increase = \_\_\_\_\_

6. Increase = 92

Original amount = 102

Percent of increase = \_\_\_\_\_

7. Mrs. Smith ordered 11.5 reams of paper for her copier in March. In April, she ordered 8.25 reams of paper for the copier. What is the percent of decrease?

8. Rent on your office space is \$524.00 a month. Next month the rent on your office space will increase to \$633.00 a month. What is the percent of increase?



**ANSWER SHEET FOR  
ASSIGNMENT SHEET #3**

1.  $18,000 \qquad \qquad \qquad .5 \qquad = 50\%$

$$\begin{array}{r} 18,000 \\ -12,000 \\ \hline 6,000 \end{array} \text{ Increase} \qquad \begin{array}{r} 12,000 \\ 6,000.0 \end{array} \text{ Original Increase Amount}$$

2.  $.25$   
 $140 \overline{) 35.00} = 25\%$

3.  $.2$   
 $375 \overline{) 75.0} = 20\%$

4.  $.651$   
 $86 \overline{) 56.000} = 65\%$

5.  $.702$   
 $356 \overline{) 250.000} = 70\%$

6.  $.901$   
 $102 \overline{) 92.000} = 90\%$

7.  $11.50$   
 $- 8.25$   
 $3.25 \text{ decrease}$

$.282$   
 $11.5 \overline{) 3.2500} = 28\%$

8.  $633.00$   
 $- 524.00$   
 $109.00$

$.208$   
 $524 \overline{) 109.000} = 21\%$

**ANSWER SHEET FOR  
ASSIGNMENT SHEET #3 CONT.**

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9. 
$$7500 \overline{) 2500.00} \quad .333 \quad = 33\%$$

10. 
$$\begin{array}{r} 11,599 \\ - 6,399 \\ \hline 5,200 \end{array} \quad \text{decrease}$$

$$11,599 \overline{) 5,200.000} \quad .448 \quad = 45\%$$

INFORMATION SHEET #4  
PERCENTS SMALLER THAN 1%

HOW TO FIND A PERCENT OF A NUMBER

1. Change the percent to a decimal

$$1/5\% \text{ of } 1000 = \underline{\hspace{2cm}}$$

STEP 1: Change 1/5% to a decimal percent =  $5 \overline{)1.0} \begin{matrix} .2\% \\ \end{matrix}$

$$1/5\% = .2\%$$

- STEP 2: Change .2% to a decimal

$$.2\% = .002 \text{ (move the decimal two (2) places left)}$$

So

- STEP 3: Multiply  $1/5\% \text{ of } 1000 = .002 \times 1000 = 2$

$$\begin{array}{r} 1000 \\ \times .002 \\ \hline 2.000 \end{array} \quad \begin{array}{l} \leftarrow 3 \text{ decimals} \\ \leftarrow 3 \text{ decimals} \end{array}$$

FIND:  $1/4\% \text{ of } 400$

$$.25\% \times 400$$

$$.0025 \times 400$$

→

$$\begin{array}{r} .25\% \\ 4 \overline{)1.00} \\ \underline{-8} \\ 20 \\ \underline{-20} \\ 0 \end{array}$$

SOLUTION:  $1/4\% \text{ of } 400 \text{ is } 1$

$$\begin{array}{r} 400 \\ \times .0025 \\ \hline 2000 \\ 8000 \\ \hline 1.0000 \end{array}$$