



CHAPTER 3

PERCENTAGES

*Baseball is 90% mental and the other half is physical.
--Yogi Berra*

What is a percentage?

The word **percent** means “per 100” or “out of 100”

The percent symbol (%) is an easy way to write a fraction with a common denominator of 100.

Example

27 out of 100 equals 27%

Example

$19\% = 19/100 = 0.19$

Nineteen percent (19%) is the same as the fraction 19/100 and the decimal 0.19

Writing Decimals as Percents

$2.61 = 261\%$

$3 = 3.00 = 300\%$

$0.5 = 0.50 = 50\%$

$0.004 = 0.4\%$

Move the decimal points over two places to the right and add a percent sign. At times, you may need to insert zeros.

Try the following practice problems

1) 0.27

2) 0.13

3) 0.06

4) 0.2

5) 0.018

6) 1.5

Writing Percents as Decimals

$49\% = 0.49$

$180\% = 1.8$

$3\% = 0.03$

$0.7\% = 0.007$

Move the decimal point over two places to the left and omit the percent sign. You may need to add

zeros.

Try the following practice problems

- | | |
|---------|---------|
| 1) 100% | 4) 50% |
| 2) 77% | 5) 9.3% |
| 3) 1.8% | 6) 0.2% |

1) 1 2) 0.77 3) 0.018 4) 0.5 5) 0.093 6) 0.002

Writing Fractions as Percents

The following is an example of two different ways that you can turn a fraction into a percent.

- You can turn a fraction into an equivalent fraction so that the denominator becomes equal to 100.

$$\frac{1}{5} = \frac{1}{5} \times \frac{20}{20} = \frac{20}{100} = \mathbf{20\%}$$

- Or, you can turn it into a decimal and then shift the decimal two-points to the right.

$$\frac{1}{5} = 1 \div 5 = 0.2 = \mathbf{20\%}$$

Try the following practice problems, convert these fractions into percents.

- | | |
|--------------------|--------------------|
| 1) $\frac{3}{10}$ | 4) $\frac{13}{40}$ |
| 2) $\frac{12}{25}$ | 5) $\frac{13}{20}$ |
| 3) $\frac{3}{8}$ | 6) $\frac{2}{3}$ |

1) 30% 2) 48% 3) 37.5% 4) 32.5% 5) 65% 6) 66.7%

Worksheet 3-1

Name: _____

Date: _____

Express the following decimals as percents.

1) $0.2444 =$ _____

8) $0.1 =$ _____

15) $0.035 =$ _____

2) $0.3 =$ _____

9) $0.8 =$ _____

16) $0.055 =$ _____

3) $0.5 =$ _____

10) $0.36 =$ _____

17) $0.004 =$ _____

4) $0.125 =$ _____

11) $0.52 =$ _____

18) $1.10 =$ _____

5) $0.75 =$ _____

12) $0.4 =$ _____

19) $1.75 =$ _____

6) $0.02 =$ _____

13) $0.65 =$ _____

20) $2 =$ _____

7) $0.09 =$ _____

14) $0.025 =$ _____

Express the following percents as decimals.

21) $33\% =$ _____

29) $75\% =$ _____

22) $24\% =$ _____

30) $83.32\% =$ _____

23) $33.3\% =$ _____

31) $66.66667\% =$ _____

24) $50.5\% =$ _____

32) $18.5\% =$ _____

25) $20\% =$ _____

33) $1.3\% =$ _____

26) $47\% =$ _____

34) $0.25\% =$ _____

27) $93\% =$ _____

35) $0.125\% =$ _____

28) $32.5\% =$ _____

Write the following fractions as percents.

36) $\frac{4}{5} =$ _____

40) $\frac{30}{35} =$ _____

37) $\frac{2}{10} =$ _____

41) $\frac{85}{100} =$ _____

38) $\frac{7}{8} =$ _____

42) $\frac{5}{8} =$ _____

39) $\frac{15}{20} =$ _____

43) $\frac{3}{7} =$ _____

$$44) \quad \frac{6}{20} = \underline{\hspace{2cm}}$$

$$45) \quad \frac{12}{20} = \underline{\hspace{2cm}}$$

$$46) \quad \frac{35}{40} = \underline{\hspace{2cm}}$$

$$47) \quad \frac{40}{50} = \underline{\hspace{2cm}}$$

$$48) \quad \frac{55}{100} = \underline{\hspace{2cm}}$$

$$49) \quad \frac{80}{90} = \underline{\hspace{2cm}}$$

$$50) \quad \frac{32}{64} = \underline{\hspace{2cm}}$$

Writing Percents as Fractions

You can turn percents back into fractions, just remember that percent means out of 100.

Examples

$$68\% = \frac{68}{100} = \frac{17}{25}$$

$$3\% = \frac{3}{100}$$

Try converting the following practice problems from percentages to fractions.

1) 55%

4) 5%

2) 60%

5) 29%

3) 0.4%

6) 260%

1) $\frac{11}{20}$ 2) $\frac{3}{5}$ 3) $\frac{1}{250}$ 4) $\frac{1}{20}$ 5) $\frac{29}{100}$ 6) $\frac{2}{35}$

Finding a Percentage of a Number

There are two common ways of finding a percentage of a number:

- you can turn your percent into a decimal and multiply it by the total value the percent is out of,
- or you can use the 'is over of' method

Example

How much is 90% out of 20? (*this can be solved 2 ways*)

$$n = 0.9 \times 20$$

$$n = \mathbf{18}$$

or

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

$$\frac{n}{20} = \frac{90}{100}$$

$$(n)(100) = (20)(90)$$

$$n = \mathbf{18}$$

Complete the following practice problems.

1) How much is 75% of 200?

3) How much is 25% of 16?

2) How much is 30% of 50?

4) How much is 12% of 250?

1) 150 2) 15 3) 4 4) 30

Worksheet 3-2

Name: _____

Date: _____

Write the following percentages as fractions (reduce if possible).

1) 50% = _____

6) 100% = _____

11) 12.5% = _____

2) 75% = _____

7) 68% = _____

12) 67% = _____

3) 60% = _____

8) 41% = _____

13) 66.6% = _____

4) 35% = _____

9) 93% = _____

14) 36% = _____

5) 30% = _____

10) 1.2% = _____

15) 110% = _____

Calculate the following problems.

16) 25% of 600 = _____

24) 110% of 5 = _____

17) 20% of 30 = _____

25) 33% of 90 = _____

18) 15% of 20 = _____

26) 5% of 50 = _____

19) 75% of 50 = _____

27) 30% of 120 = _____

20) 12.5% of 24 = _____

28) 40% of 50 = _____

21) 80% of 40 = _____

29) 60% of 150 = _____

22) 90% of 100 = _____

30) 70% of 400 = _____

23) 17% of 10 = _____

Find the value of n:

31) If n is 20% of 50 n = _____

34) If n is 75% of 10 n = _____

32) If n is 35% of 24 n = _____

35) If n is 80% of 15 n = _____

33) If n is 60% of 8 n = _____

36) If n is 40% of 30 n = _____

37) If n is 50% of 100 n = _____

39) If n is 30% of 90 n = _____

38) If n is 25% of 50 n = _____

40) If n is 100% of 50 n = _____

Finding What Percent One Number is of Another

There are two common ways of finding what percentage one number is of another:

- you can divide your parts by the total it is out of to get a decimal and then turn your decimal into a percentage,
- or you can use the 'is over of' method

Example

What percent of 40 is 15? (*this can be solved 2 ways*)

$$n = 15 \div 40 = 0.375 = \mathbf{37.5\%}$$

or

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

$$\frac{15}{40} = \frac{n}{100}$$

$$(n)(40) = (15)(100)$$

$$n = \mathbf{37.5\%}$$

Attempt the following practice problems.

1) What percent of 50 is 2?

4) 20 is what percent of 80?

2) 0.6 is what percent of 20?

5) What percent of 60 is 2.4?

3) What percent of 40 is 8?

6) 10 is what percent of 50?

1) 4% 2) 3% 3) 20% 4) 25% 5) 4% 6) 20%

Finding a Number When a Percent of it is Known

There are two common ways of finding a number when a percent of it is known:

- you can divide your parts by your percentage (as a decimal) and this will provide you with your total,
- or you can use the 'is over of' method

Example

8 is 32% of what number? (*this can be solved 2 ways*)

$$n = 8 \div 0.32 = 25$$

or

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

$$\frac{8}{n} = \frac{32}{100}$$

$$(n)(32) = (8)(100)$$

$$n = 25$$

Attempt the following practice problems.

1) 12 is 60% of what number?

4) 75% of what number is 60?

2) 95% of what number is 114?

5) 35.7 is 42% of what number?

3) 14 is 35% of what number?

6) 3% of what number is 27?

1) 20 2) 120 3) 40 4) 80 5) 85 6) 900

Worksheet 3-3

Name:

Date:

Fill in the blank boxes with all boxes in the same row being equal.

| <i>Percent</i> | <i>Decimal</i> | <i>Reduced Fraction</i> |
|-----------------------|-----------------------|--------------------------------|
| 20% | | |
| | 0.06 | |
| | | $\frac{7}{8}$ |
| 15% | | |
| | 0.11 | |
| | | $\frac{4}{5}$ |
| 96% | | |
| | 0.55 | |
| | | $\frac{3}{25}$ |
| 53% | | |
| | 1 | |
| | | $\frac{3}{40}$ |

Solve the following problems.

- | | |
|--------------------------------|---------------------------------|
| 1) How much is 4% of 50? | 9) 20% of what number is 3? |
| 2) What percent of 90 is 14.4? | 10) 90% of 112 is how much? |
| 3) 7 is 4% of what number? | 11) 15 is what percent of 75? |
| 4) 99% of 200 is how much? | 12) 70% of what number is 14? |
| 5) 42 is what percent of 150? | 13) How much is 45% of 40? |
| 6) 55% of what number is 1375? | 14) What percent of 80 is 72? |
| 7) How much is 65% of 500? | 15) 20 is 62.5% of what number? |
| 8) What percent of 48 is 12? | 16) 77.5% of 80 is how much? |

17) 23 is what percent of 25?

19) How much is 140% of 30?

18) 88% of what number is 440?

20) What percent of 64 is 52?

Solve the following word problems.

21.) Smart Sally got 2 out of 25 wrong on her math quiz. What percent did she get correct?

22.) 34.8% of the pharm tech class wanted the holiday party to be semi-formal. How many students are in the class if 8 wanted a semi-formal party?

23.) Of the 3,620 people polled, 85% enjoyed mixing IVs. How many people liked mixing IVs?

24.) Frugal Fred saved \$78.25 by purchasing generic medications. He decided to splurge and buy a nice engraved mortar and pestle for himself. The mortar and pestle was \$50.08. What percent of his savings was that?

25.) Alopecia Allen was having a problem with his hair falling out. He lost 112 hairs yesterday which was 4% of his total hair. How many hairs did he have at the beginning of the day?

26.) When asked, 270 out of the 400 patients at the Funny Farm said that they felt a sense of humor was the most important trait in a physician. What percent is this rounded to the nearest whole number?

Worksheet 3-4

Name:

Date:

Convert the following percents to fractions.

- 1) 16%
- 2) 45%
- 3) 6%

Convert the following percents to decimals

- 4) 33%
- 5) 4.5%
- 6) 2.94%

Convert the following fractions to percentages.

- 7) $\frac{12}{48}$
- 8) $\frac{2}{5}$
- 9) $\frac{7}{10}$

Convert the following decimals to percentages.

- 10) 0.7
- 11) 0.467
- 12) 0.006

Solve the following problems involving percents.

- 13) What is 40% of 120?
- 14) What is 20% of 30?
- 15) What percent of 150 is 15?

- 16) What percent of 45 is 30?
- 17) 35 is 14% of what number?
- 18) 30 is 110% of what number?
- 19) What number is 75% of 280?
- 20) What percent of 140 is 7?

Solve the following applied problems.

- 21) At Bidwell Training Center Inc. 28.6% of the instructors in the medical department are male. If there are two male instructors in the medical department, then how many instructors are there in the medical department?
- 22) The recommended daily allowance (RDA) of a particular vitamin is 60 milligrams. If a multivitamin tablet claims to provide 45% of the RDA, how many milligrams of the particular vitamin would a patient receive from the multivitamin tablet.
- 23) A person weighed 130 pounds at his last doctor's visit. At this visit the patient lost 5% of his weight. How many pounds has the patient lost?
- 24) In a drug study, it was determined that 4% of the participants developed the *headache* side effect. If there were 600 participants in the study, how many developed headaches?
- 25) You are employed in a health clinic where each employee must work 25% of 8 major holidays. How many holidays will you be required to work?