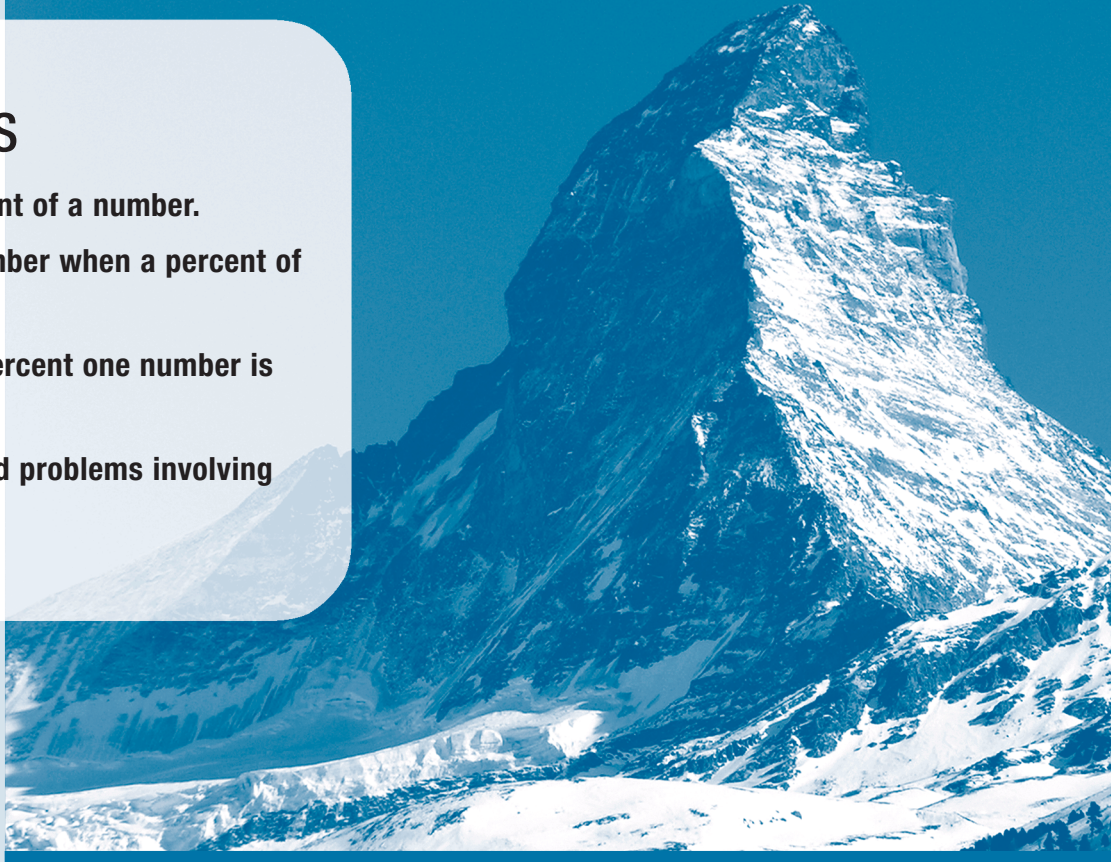


25 Three Types of Percent Problems

CHAPTER OBJECTIVES

- 1 Find a percent of a number.
- 2 Find the number when a percent of it is known.
- 3 Find what percent one number is of another.
- 4 Solve applied problems involving percent.



Finding a Percent of a Number

Problem: Find 14% of 83.

Solution:

Step (1): Change “of” to “times.”
 $14\% \text{ of } 83 = 14\% \times 83$

Step (2): Change the percent to a decimal.
 $14\% \times 83 = .14 \times 83$

Step (3): Complete the multiplication.

$$\begin{array}{r} 83 \\ \times .14 \\ \hline 332 \\ 83 \\ \hline 11.62 \end{array}$$

Therefore, $14\% \text{ of } 83 = 11.62$.

Examples

Example 1: Find 112% of 16.

Solution:

$$\text{Step (1): } 112\% \text{ of } 16 = 112\% \times 16$$

$$\text{Step (2): } 112\% \times 16 = 1.12 \times 16$$

$$\begin{array}{r} \text{Step (3): } \quad 1.12 \\ \quad \times 16 \\ \hline \quad 672 \\ \quad 112 \\ \hline 17.92 \end{array}$$

Therefore, 112% of 16 = 17.92.

Example 2: Find $5\frac{3}{4}\%$ of 28.

Solution:

$$\text{Step (1): } 5\frac{3}{4}\% \text{ of } 28 = 5\frac{3}{4}\% \times 28$$

$$\begin{aligned} \text{Step (2): } 5\frac{3}{4}\% \times 28 &= 5.75\% \times 28 \\ &= .0575 \times 28 \end{aligned}$$

$$\begin{array}{r} \text{Step (3): } \quad .0575 \\ \quad \times 28 \\ \hline \quad 4600 \\ \quad 1150 \\ \hline 1.6100 \end{array}$$

Therefore, $5\frac{3}{4}\%$ of 28 = 1.61.



Study Exercise One

Find:

1. 42% of 57
2. 6.2% of 50
3. 120% of 16
4. $2\frac{3}{4}\%$ of 35

Using Percents Changed to Fractions

If we recognize the fractional equivalent of a given percent, we may find the problem easier to work by changing the percent to a fraction instead of a decimal.

Example 1: Find $33\frac{1}{3}\%$ of 12.

Solution: The fractional equivalent of $33\frac{1}{3}\%$ is $\frac{1}{3}$.

$$\text{Line (a): } 33\frac{1}{3}\% \text{ of } 12 = \frac{1}{3} \times 12$$

$$\text{Line (b): } \quad \quad \quad = \frac{1}{3} \times 12^4$$

$$\text{Line (c): } \quad \quad \quad = 4$$

Example 2: Find 75% of 48.

Solution: The fractional equivalent of 75% is $\frac{3}{4}$.

$$\text{Line (a): } 75\% \times 48 = \frac{3}{4} \times 48$$

$$\text{Line (b): } = \frac{3}{4} \times 48$$

$$\text{Line (c): } = 36$$



Study Exercise Two

By changing percents to their fractional equivalents, find:

1. 50% of 86
2. 70% of 420
3. $33\frac{1}{3}\%$ of 96
4. 40% of 25

Finding a Percent of an Amount of Money

Example 1: Find 3% of \$7.28, to the nearest cent.

Solution:

$$\text{Line (a): } 3\% \text{ of } \$7.28 = 3\% \times \$7.28$$

$$\text{Line (b): } = .03 \times 7.28$$

$$\text{Line (c): } = \$2.184$$

$$\text{Line (d): } 3\% \text{ of } \$7.28 = \$2.22, \text{ to the nearest cent}$$

Example 2: Find $33\frac{1}{3}\%$ of \$142, to the nearest cent.

Solution: The fractional equivalent of $33\frac{1}{3}\%$ is $\frac{1}{3}$.

$$\text{Line (a): } 33\frac{1}{3}\% \text{ of } \$142 = 33\frac{1}{3}\% \times \$142$$

$$\text{Line (b): } = \frac{1}{3} \times \$142$$

$$\text{Line (c): } \approx \$47.333$$

$$\text{Line (d): } 33\frac{1}{3}\% \text{ of } \$142 = \$47.33, \text{ to the nearest cent}$$

Computation

$ \begin{array}{r} 47.333 \\ 3 \overline{)142.000} \\ \underline{12} \\ 22 \\ \underline{21} \\ 10 \\ \underline{9} \\ 10 \\ \underline{9} \\ 1 \end{array} $



Study Exercise Three

Find each of the following to the nearest cent:

1. 36% of \$70
2. 6% of \$98.42
3. 125% of \$600
4. $66\frac{2}{3}\%$ of \$70

Applied Problems

Example 1: 20% of the students in Lisa's class received a grade of A. If there are 30 students in Lisa's class, how many received grades of A?

Solution: Let n = the number of students receiving A's.

Line (a): $n = 20\% \text{ of } 30$

Line (b): $= 20\% \times 30$

Line (c): $= .20 \times 30$

Line (d): $= 6$

Therefore, 6 students received A's.

Example 2: 23% of the budget of Midtown City is spent for fire protection. If the budget of Midtown City is \$4,380,000, how much is spent for fire protection?

Solution: Let n = the amount spent for fire protection.

Line (a): $n = 23\% \text{ of } \$4,380,000$

Line (b): $= 23\% \times 4,380,000$

Line (c): $= .23 \times 4,380,000$

Line (d): $= 1,007,400$

Therefore, \$1,007,400 was spent for fire protection.



Study Exercise Four

1. John leaves a tip equal to 15% of the bill at a restaurant. If the bill is \$19.20, what is the amount of the tip?
2. $33\frac{1}{3}\%$ of the calculators made by a company were defective. If 279 calculators were made, how many were defective?
3. In Fairtown, U.S.A., .7% of the annual budget is spent for trimming trees. If the annual budget is \$10,725,000, how much is spent for trimming trees?

Review of Rule for Finding a Factor

Example 1: Find n if $3 \times n = 12$.

Solution:

$$3 \times n = 12$$

$$n = 12 \div 3$$

$$n = 4$$

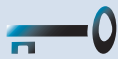
Example 2: Find n if $n \cdot 6 = 24$.

Solution:

$$n \times 6 = 24$$

$$n = 24 \div 6$$

$$n = 4$$



Rule: If a product and one of its factors are known, divide the product by the one factor to find the other factor.

Example 3: Find n if $.3 \times n = 84$

Solution:

$$.3 \times n = 84$$

$$n = 84 \div .3$$

$$n = 280$$

Example 4: Find n if $n \times 210 = 10.5$

Solution:

$$n \times 210 = 10.5$$

$$n = 10.5 \div 210$$

$$n = .05$$



Study Exercise Five

Find n .

1. $6 \times n = 144$

2. $.07 \times n = 21$

3. $n \times 8 = 224$

4. $n \times 250 = 30$

5. $n \times 123 = 17.22$

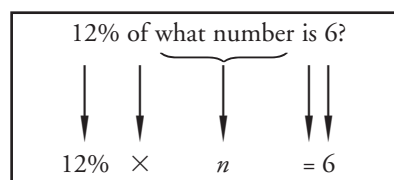
6. $.27 \times n = 9.99$

Finding the Number When a Percent of It Is Known

Example 1: 12% of what number is 6?

Solution:

Step (1): Change the word statement to an equation.



Step (2): Solve the equation.

Line (a): $12\% \times n = 6$

Line (b): $(.12)n = 6$

Line (c): $n = 6 \div .12$

Line (d): $n = 50$

Computation

$$\begin{array}{r} 50. \\ .12 \overline{)6.00} \\ \underline{60} \\ 0 \\ \underline{0} \\ 0 \end{array}$$

Example 2: 42% of what number is 14?

Solution:

Line (a): $42\% \times n = 14$

Line (b): $(.42)n = 14$

Line (c): $n = 14 \div .42$

Line (d): $n = 33\frac{1}{3}$

Computation

$$\begin{array}{r} 33\frac{14}{42} = 33\frac{1}{3} \\ .42 \overline{)14.00} \\ \underline{126} \\ 140 \\ \underline{126} \\ 14 \end{array}$$

Example 3: 75% of what number is 15?

Solution: The fractional equivalent of 75% is $\frac{3}{4}$.

Line (a): $75\% \times n = 15$

Line (b): $\frac{3}{4} \cdot n = 15$

Line (c): $n = 15 \div \frac{3}{4}$

Line (d): $n = \frac{15^5}{1} \times \frac{4}{3_1}$

Line (e): $n = 20$

Example 4: 14% of what number is 2? (Answer to nearest tenth.)

Solution:

Line (a): $14\% \times n = 2$

Line (b): $(.14)n = 2$

Line (c): $n = 2 \div .14$

Line (d): $n = 14.3$ (to the nearest tenth)

Computation

$$\begin{array}{r} 14.28 \\ .14 \overline{)2.00.00} \\ \underline{14} \\ 60 \\ \underline{56} \\ 40 \\ \underline{28} \\ 120 \\ \underline{112} \\ 8 \end{array}$$

Example 5: 23% of what amount is \$5? (Answer to nearest cent.)

Solution:

Line (a): $23\% \times n = \$5$

Line (b): $(.23)n = \$5$

Line (c): $n = \$5 \div .23$

Line (d): $n = \$21.74$ (to the nearest cent)

Computation

$$\begin{array}{r} 21.739 \\ .23 \overline{) \$5.00,000} \\ \underline{46} \\ 40 \\ \underline{23} \\ 170 \\ \underline{161} \\ 90 \\ \underline{69} \\ 210 \\ \underline{207} \\ 3 \end{array}$$



Study Exercise Six

Find each of the following:

1. $33\frac{1}{3}\%$ of what number is 6?
2. 32% of what number is 1.24 (to nearest tenth)?
3. 125% of what number is 15?
4. 70% of what number is 49?
5. $5\frac{3}{4}\%$ of what amount is \$649 (to nearest dollar)?

Applied Problems

Example 1: Wizard TV store sold 80% of their total stock of TV sets in a big weekend sale. If they sold 96 TV sets, what was their total stock?

Solution: Let n = number of total stock.

Line (a): 80% of $n = 96$

Line (b): $.80 \times n = 96$

Line (c): $n = 96 \div 80$

Line (d): $n = 120$

Therefore, the number of their total stock was 120.

Example 2: A city spent 2% of the total budget for police protection. If the city spent \$208,000 for police protection, what was the amount of the total budget?

Solution: Let n = amount of total budget.

Line (a): 2% of n = \$208,000

Line (b): $.02 \times n = 208,000$

Line (c): $n = 208,000 \div .02$

Line (d): $n = 10,400,000$

Therefore, the amount of the total budget was \$10,400,000.



Study Exercise Seven

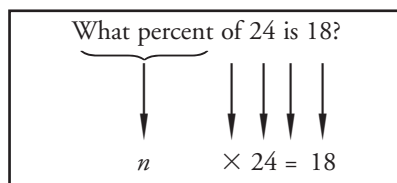
1. At City College, 37% of the students wear glasses. If 7,400 students wear glasses, how many students are there at City College?
2. In Average Town, U.S.A., 9% of the total available workforce is unemployed. If 3,870 citizens are unemployed, how many citizens are there in the total available workforce?
3. In a study of traffic deaths in Florida, it was found that 1.5% of the victims were wearing seat belts. If 9 victims were wearing seat belts, how many deaths were involved in the total study?

Finding What Percent One Number is of Another

Example 1: What percent of 24 is 18?

Solution: Let n = the percent.

Step (1): Rewrite the statement into an equation.



$$n \times 24 = 18$$

Step (2): Write the related division problem.

$$n = 18 \div 24$$

Step (3): Divide with 2 decimal places in the answer.

$$\begin{array}{r} .75 \\ 24 \overline{)18.00} \\ \underline{16 \ 8} \\ 1 \ 20 \\ \underline{1 \ 20} \\ 0 \end{array}$$

Step (4): Change the decimal answer to a percent.

$$n = 75\%$$

Therefore, 75% of 24 is 18.

Example 2: What percent of 15 is 7?

Solution: Let n = the percent.

Step (1): Rewrite the statement into an equation.

$$n \times 15 = 7$$

Step (2): Write the related division problem.

$$n = 7 \div 15$$

Step (3): Divide with 2 decimal places in the answer.

$$\begin{array}{r} .46\frac{2}{3} \\ 15 \overline{)7.00} \\ \underline{6 \ 0} \\ 1 \ 00 \\ \underline{90} \\ 10 \end{array}$$

Step (4): Change the decimal answer to a percent.

$$n = 46\frac{2}{3}\%$$

Therefore, $46\frac{2}{3}\%$ of 15 is 7

Example 3: What percent of 18 is 2? (To nearest whole percent.)

Solution: Let n = the percent.

Line (a): $n \times 18 = 2$

Line (b): $n = 2 \div 18$

Line (c):
$$\begin{array}{r} .111 \\ 18 \overline{)2.00} \\ \underline{1 \ 8} \\ 20 \\ \underline{18} \\ 20 \\ \underline{18} \\ 2 \end{array}$$

.111 rounds off to .11 = 11%.

Line (d): $n = 11\%$ (to nearest whole percent)

Example 4: What percent of 16 is 24?

Solution: Let n = the percent.

Line (a): $n \times 16 = 24$

Line (b): $n = 24 \div 16$

Line (c):
$$\begin{array}{r} 1.50 \\ 16 \overline{)24.00} \\ \underline{16} \\ 80 \\ \underline{80} \\ 0 \end{array}$$

Line (d): $n = 150\%$.



Study Exercise Eight

1. What percent of 6 is 2?
2. What percent of 14 is 30?
3. What percent of 8 is 3? (To nearest whole percent.)
4. What percent of 7 is 3? (To nearest tenth of a percent.)

Applied Problems

Example 1: At a restaurant, the total bill came to \$75 and a tip of \$12 was left. What percent of the total bill was the tip?

Solution: Let n = the percent.

Line (a): $n \times 75 = 12$

Line (b): $n = 12 \div 75$

Line (c):
$$\begin{array}{r} .16 \\ 75 \overline{)12.00} \\ \underline{75} \\ 450 \\ \underline{450} \\ 0 \end{array}$$

Line (d): $n = 16\%$

Therefore, a tip of 16% was left.

Example 2: Jean earned \$24,000 and paid social security taxes of \$1,608. What percent of Jean's earnings were paid for social security taxes (Find answer to nearest tenth of a percent)?

Solution: Let n = the percent.

Line (a): $n \times 24,000 = 1608$

Line (b): $n = 1608 \div 24,000$
 $.067$

Line (c):
$$\begin{array}{r} 24000 \overline{)1608.000} \\ \underline{1440\ 00} \\ 168\ 000 \\ \underline{168\ 000} \\ 0 \end{array}$$

Line (d): $n = 6.7\%$

Therefore, Jean paid 6.7% in social security taxes.



Study Exercise Nine

- Sam earned \$14,000 and paid \$420 in state income taxes. What percent of his earnings were paid in state income taxes?
- A restaurant bill came to \$96 and a tip of \$15 was left. To the nearest tenth of a percent, what percent of the bill was left for a tip?



REVIEW EXERCISES

- Find the following:
 - 36% of 20
 - 75% of 128
 - 9% of \$384
 - 16% of 36
 - 92% of 1,842
 - 15% of \$34.25
 - 23% of 1.5
 - 20% of 35
(to nearest cent)
- Find the missing number.
 - $12\frac{1}{2}\%$ of what number is 32?
 - 10% of what number is 430?
 - 25% of what number is 60?
 - 35% of what number is 22? (to nearest tenth)
- Find the following:
 - What percent of 6 is 1?
 - What percent of 200 is 46?
 - What percent of 15 is 30?
 - What percent of 60 is 20?
 - What percent of 41 is 11? (to nearest hundredth of a percent)
- Answer the following:
 - Henry paid 8% of his total earnings in federal income taxes. If his total earnings were \$17,500, how much did he pay in federal income taxes?

19. Nancy spent 43% of her savings for a radio. If she spent \$109.65 for the radio, how much was in her savings before the purchase of the radio?
20. In a class with 40 students, 6 students failed the final exam. What percent of the students failed the final exam?



Solutions to Review Exercises

- A. 1. $36\% \text{ of } 20 = 36\% \times 20$
 $= .36 \times 20$
 $= 7.2$
2. $75\% \text{ of } 128 = 75\% \times 128$
 $= \frac{3}{4} \times 128$
 $= 96$
3. $9\% \text{ of } \$384 = 9\% \times \384
 $= .09 \times \$384$
 $= \$34.56$
4. $16\% \text{ of } 36 = 16\% \times 36$
 $= .16 \times 36$
 $= 5.76$
5. $92\% \text{ of } 1842 = 92\% \times 1842$
 $= .92 \times 1842$
 $= 1694.64$
6. $15\% \text{ of } \$34.25 = 15\% \times \34.25
 $= .15 \times \$34.25$
 $= \$5.1375$
 $= \$5.14 \text{ (to nearest cent)}$
7. $23\% \text{ of } 1.5 = 23\% \times 1.5$
 $= .23 \times 1.5$
 $= .345$
8. $20\% \text{ of } 35 = 20\% \times 35$
 $= \frac{1}{5} \times 35$
 $= 7$
- B. 9. $12\frac{1}{2}\% \times n = 32$
 $12.5\% \times n = 32$
 $(.125)n = 32$
 $n = 32 \div .125$
 $n = 256$
10. $10\% \times n = 430$
 $\frac{1}{10} \cdot n = 430$
 $n = 430 \div \frac{1}{10}$
 $n = 430 \times \frac{10}{1}$
 $n = 4300$
11. $25\% \times n = 60$
 $\frac{1}{4} \cdot n = 60$
 $n = 60 \div \frac{1}{4}$
 $n = 60 \times \frac{1}{4}$
 $n = 240$
12. $35\% \times n = 22$
 $(.35)n = 22$
 $n = 22 \div .35$
 $n \approx 62.85$
 $n = 62.9 \text{ (to nearest tenth)}$
- C. 13. $n \times 6 = 1$
 $n = 1 \div 6$
 $n = 16\frac{2}{3}\%$
14. $n \times 200 = 46$
 $n = 46 \div 200$
 $n = 23\%$
15. $n \times 15 = 3$
 $n = 30 \div 15$
 $n = 200\%$
16. $n \times 60 = 20$
 $n = 20 \div 60$
 $n = 33\frac{1}{3}\%$
17. $n \times 41 = 11$
 $n = 11 \div 41$
 $n = 26.83\%$

- D. 18. Let n = amount of federal income taxes.
 $n = 8\% \times 17,500$
 $n = .08 \times 17,500$
 $n = 1400$
 Henry paid \$1400 in federal income taxes.

19. Let n = amount in savings.
 $43\% \text{ of } n = \$109.65$
 $.43 \times n = 109.65$
 $n = 109.65 \div .43$
 $n = 255$
 Nancy had \$255 in savings.

20. Let n = the percent.
 $n \times 40 = 6$
 $n = 6 \div 40$
 $n = .15$
 $n = 15\%$
 15% of the students failed the final exam.



SUPPLEMENTARY PROBLEMS

- A. Find the following:

- | | | | |
|-----------------------------|----------------------------|-----------------|----------------|
| 1. 10% of 60 | 2. $66\frac{2}{3}\%$ of 27 | 3. 120% of 160 | 4. 13% of 16 |
| 5. $3\frac{3}{4}\%$ of 30 | 6. $12\frac{1}{2}\%$ of 48 | 7. 90% of 63 | 8. 150% of 1.8 |
| 9. 23% of 1.28 | 10. 4% of 30 | 11. 1% of 3,672 | 12. 7% of 6.3 |
| 13. $33\frac{1}{3}\%$ of 96 | 14. 1% of \$6 | 15. 32% of \$70 | |

- B. Find the missing number.

16. 8% of what number is 32?
17. 3.6% of what number is 40? (to the nearest whole number)
18. 300% of what number is 150?
19. 1 % of what number is 68?
20. $33\frac{1}{3}\%$ of what number is 4.3? (Hint: Change $33\frac{1}{3}\%$ to its fractional equivalent.)

- C. Find the following:

21. What percent of 12 is 8?
22. What percent of 144 is 96?
23. What percent of 50 is 60?
24. What percent of 49 is 13? (to the nearest whole percent)
25. What percent of 300 is 45?
26. What percent of 45 is 300?
27. What percent of 200 is 38?
28. What percent of 21 is 5? (to the nearest tenth of a percent)

- D. Answer the following:

29. The bill in a restaurant comes to \$35. What will be the amount of a tip of 15%?

30. John's bill in a restaurant is \$8.50. If John leaves a tip equal to 16% of the bill, how much was the tip? Altogether how much did John spend at the restaurant?
31. Mr. Brown took his family to a restaurant, and the bill for the food was \$54. In addition, sales tax of 6% was added to the food bill. If Mr. Brown left a tip of 15% of the food portion of the bill, how much did he spend altogether at the restaurant?
32. Bill earned \$27,000 last year and paid \$1,809 in social security taxes. What percent of his earnings was paid in social security taxes?
33. Donna earned \$37,000 last year and paid \$8,880 in federal income taxes. What percent of her earnings was paid in federal income taxes?
34. Mr. Jones's taxable income last year was \$42,500. His federal income tax obligation was equal to \$6,274 plus 33% of the amount of taxable income above \$35,200. What was his total federal income tax obligation?
35. Dorothy paid \$5,238 in state income taxes last year. If she paid 9.7% of her earnings in state income taxes, how much were her earnings last year?



Solutions to Study Exercises

Study Exercise One ■ ■ ■

1. $42\% \text{ of } 57 = 42\% \times 57$
 $= .42 \times 57$
 $= 23.94$
2. $6.2\% \text{ of } 50 = 6.2\% \times 50$
 $= .062 \times 50$
 $= 3.1$
3. $120\% \text{ of } 16 = 120\% \times 16$
 $= 1.2 \times 16$
 $= 19.2$
4. $2\frac{3}{4}\% \text{ of } 35 = 2\frac{3}{4}\% \times 35$
 $= 2.75\% \times 35$
 $= .0275 \times 35$
 $= .9625$

Study Exercise Two ■ ■ ■

1. $50\% \text{ of } 86 = 50\% \times 86$
 $= \frac{1}{2}_1 \times \frac{86^{43}}{1}$
 $= 43$
2. $70\% \text{ of } 420 = 70\% \times 420$
 $= \frac{7}{10}_1 \times \frac{420^{42}}{1}$
 $= 294$
3. $33\frac{1}{3}\% \text{ of } 96 = 33\frac{1}{3}\% \times 96$
 $= \frac{1}{3}_1 \times \frac{96^{32}}{1}$
 $= 32$
4. $40\% \text{ of } 25 = 40\% \times 25$
 $= \frac{2}{5}_1 \times \frac{25^5}{1}$
 $= 10$

Study Exercise Three ■ ■ ■

$$\begin{aligned} 1. \quad 36\% \text{ of } \$70 &= 36\% \times \$70 \\ &= .36 \times \$70 \\ &= \$25.20 \end{aligned}$$

$$\begin{aligned} 2. \quad 6\% \text{ of } \$98.42 &= 6\% \times \$98.42 \\ &= .06 \times \$98.42 \\ &= \$5.9052 \\ &= \$5.91 \text{ (to nearest cent)} \end{aligned}$$

$$\begin{aligned} 3. \quad 125\% \text{ of } \$600 &= 125\% \times 600 \\ &= 1.25 \times \$600 \\ &= \$750 \end{aligned}$$

$$\begin{aligned} 4. \quad 66\frac{2}{3}\% \text{ of } \$70 &= 66\frac{2}{3}\% \times \$70 \\ &= \frac{2}{3} \times \$70 \cdot 3 \\ &= \frac{\$140}{3} \\ &= \$46.67 \text{ (to nearest cent)} \end{aligned}$$

Computation

	46.666
3	140.000
	<u>12</u>
	20
	<u>18</u>
	20
	<u>18</u>
	20
	<u>18</u>
	20
	<u>18</u>
	2

Study Exercise Four ■ ■ ■

$$\begin{aligned} 1. \quad \text{Let } n &= \text{the amount of the tip.} \\ n &= 15\% \text{ of } \$19.20 \\ &= 15\% \times 19.20 \\ &= .15 \times 19.20 \\ &= 2.88 \\ \text{The tip is } &\$2.88. \end{aligned}$$

$$\begin{aligned} 2. \quad \text{Let } n &= \text{the number of defective calculators.} \\ n &= 33\frac{1}{3}\% \text{ of } 279 \\ &= 33\frac{1}{3}\% \times 279 \\ &= \frac{1}{3} \times \frac{279}{1} \\ &= 93 \\ \text{Therefore, } &93 \text{ calculators were defective.} \end{aligned}$$

$$\begin{aligned} 3. \quad \text{Let } n &= \text{the amount spent for trimming trees.} \\ n &= .7\% \text{ of } \$10,725,000 \\ &= .7\% \times 10,725,000 \\ &= .007 \times 10,725,000 \\ &= 75,075 \\ \text{Therefore, } &\$75,075 \text{ is spent for trimming trees.} \end{aligned}$$

Study Exercise Five ■ ■ ■

$$\begin{aligned} 1. \quad 6 \times n &= 144 \\ n &= 144 \div 6 \\ n &= 24 \end{aligned}$$

$$\begin{aligned} 2. \quad .07 \times n &= 21 \\ n &= 21 \div .07 \\ n &= 300 \end{aligned}$$

$$\begin{aligned} 3. \quad n \times 8 &= 224 \\ n &= 224 \div 8 \\ n &= 28 \end{aligned}$$

$$\begin{aligned}
 4. \quad n \times 250 &= 30 \\
 n &= 30 \div 250 \\
 n &= .12
 \end{aligned}$$

$$\begin{aligned}
 5. \quad n \times 123 &= 17.22 \\
 n &= 17.22 \div 123 \\
 n &= .14
 \end{aligned}$$

$$\begin{aligned}
 6. \quad .27 \times n &= 9.99 \\
 n &= 9.99 \div .27 \\
 n &= 37
 \end{aligned}$$

Study Exercise Six ■ ■ ■

$$\begin{aligned}
 1. \quad 33\frac{1}{3}\% \times n &= 6 \\
 \frac{1}{3} \cdot n &= 6 \\
 n &= 6 \div \frac{1}{3} \\
 n &= 6 \times \frac{3}{1} \\
 n &= 18
 \end{aligned}$$

$$\begin{aligned}
 2. \quad 32\% \times n &= 1.24 \\
 (.32)n &= 1.24 \\
 n &= 1.24 \div .32 \\
 n &= 3.9 \text{ (to the nearest tenth)}
 \end{aligned}$$

Computation

$$\begin{array}{r}
 3.87 \\
 .32 \overline{)1.24.00} \\
 \underline{96} \\
 280 \\
 \underline{256} \\
 240 \\
 \underline{224} \\
 16
 \end{array}$$

$$\begin{aligned}
 3. \quad 125\% \times n &= 15 \\
 (1.25)n &= 15 \\
 n &= 15 \div 1.25 \\
 n &= 12
 \end{aligned}$$

Computation

$$\begin{array}{r}
 12. \\
 1.25 \overline{)15.00} \\
 \underline{125} \\
 250 \\
 \underline{250} \\
 0
 \end{array}$$

$$\begin{aligned}
 4. \quad 70\% \times n &= 49 \\
 \frac{7}{10} \cdot n &= 49 \\
 n &= 49 \div \frac{7}{10} \\
 n &= 49 \times \frac{10}{7} \\
 n &= 70
 \end{aligned}$$

$$\begin{aligned}
 5. \quad 5\frac{3}{4}\% \times n &= \$649 \\
 5.75\% \times n &= \$649 \\
 (.0575)n &= \$649 \\
 n &= \$649 \div .0575 \\
 n &= \$11,287 \text{ (to nearest dollar)}
 \end{aligned}$$

Computation

$$\begin{array}{r}
 11286.9 \\
 .0575 \overline{)649.0000.0} \\
 \underline{575} \\
 740 \\
 \underline{575} \\
 1650 \\
 \underline{1150} \\
 5000 \\
 \underline{4600} \\
 4000 \\
 \underline{3450} \\
 5500 \\
 \underline{5175} \\
 325
 \end{array}$$

Study Exercise Seven ■ ■ ■

1. Let n = number of students at City College.
 37% of n = 7400
 $.37 \times n = 7400$
 $n = 7400 \div .37$
 $n = 20,000$
 Therefore, there are 20,000 students at City College.

2. Let n = number of citizens in total workforce.
 9% of n = 3870
 $.09 \times n = 3870$
 $n = 3870 \div .09$
 $n = 43,000$
 Therefore, there are 43,000 citizens in the total workforce.

3. Let n = number of deaths in total study.

$$1.5\% \text{ of } n = 9$$

$$.015 \times n = 9$$

$$n = 9 \div .015$$

$$n = 600$$

Therefore, the total study involved 600 deaths.

Study Exercise Eight ■ ■ ■

1. Let n = the percent.

$$n \times 6 = 2$$

$$n = 2 \div 6$$

$$n = \frac{1}{3}$$

$$n = 33\frac{1}{3}\%$$

3. Let n = the percent.

$$n \times 8 = 3$$

$$n = 3 \div 8$$

$$n = .375$$

$$n = 38\% \text{ (to nearest whole percent)}$$

2. Let n = the percent.

$$n \times 14 = 30$$

$$n = 30 \div 14$$

$$n = 2.14\frac{2}{7}$$

$$n = 214\frac{2}{7}\%$$

4. Let n = the percent.

$$n \times 7 = 3$$

$$n = 3 \div 7$$

$$n = .4285$$

$$n = 42.9\% \text{ (to nearest tenth of a percent)}$$

Study Exercise Nine ■ ■ ■

1. Let n = the percent.

$$n \times 14000 = 420$$

$$n = 420 \div 14000$$

$$n = .03$$

$$n = 3\%$$

Therefore, 3% of his earnings were paid in state income taxes.

2. Let n = the percent.

$$n \times 96 = 15$$

$$n = 15 \div 96$$

$$n = .1562$$

$$n = 15.6\% \text{ (to nearest tenth of a percent)}$$

Therefore, 15.6% of the bill was left for a tip.

