7.5 Applications

The percent problems solved in the previous section were the most basic type. Real world applications provide a context and meaning to the values that you are given and the value that you need to find. In these problems, there will still be three values where two are given and one needs to be found.

Sales tax, commission rates, and tip amounts are all examples of real world applications of percent problems. While the meaning may vary from problem to problem, in each case the problem can be simplified to the basic problems covered in the previous sections.

Example 1: Julia is going to buy a shirt for $12.00. How much tax will she pay for the shirt if the sales tax rate is 6%?

Statement: Tax is 6% of Shirt Price
Equation: \[ T = 0.06 \times 12 \]

Next, solve this equation for \( T \).

\[ T = 0.06 \times 12 \]

\[ T = 0.72 \]

Tax is $0.72

Practice 1: Julio is going to buy a shirt for $14.00. How much tax will he pay for the item if the tax rate is 7%?

Watch It: http://youtu.be/Pznqi83cJ_c

Answer: $0.98

Example 2: The television that Miguel wants to purchase costs $449. How much tax will he pay if the tax rate is 8%? How much is the total cost?

Statement: Tax is 8% of Television Price
Equation: \[ T = 0.08 \times 449 \]

Next, solve this equation for \( T \).

\[ T = 0.08 \times 449 \]

\[ T = 35.92 \]

Tax is $35.92.

Total cost = television cost + tax
Total cost = $449 + $35.92
Total cost = $484.92

Practice 2: The mixer that Patti wants to purchase costs $229. How much sales tax will she pay if the sales tax rate is 6%? What will the final cost of the mixer be?

Watch It: http://youtu.be/-e3fMxI5uQ4

Answer: tax: $13.74
final cost: $242.74
Example 3: Nathaniel wants to buy a science kit with a sticker price of $37.50. After a 6% sales tax, what is the final cost?

Statement:  
Tax is 6% of Kit Price

Equation:  
\[ T = 0.06 \times 37.50 \]

Next, solve this equation for \( T \).

\[ T = 0.06 \times 37.50 \quad \text{Multiply to solve.} \]
\[ T = 2.25 \]

Tax is $2.25.

Total cost = $37.50 + $2.25

Total cost = $39.75

Practice 3: Catherine wants to buy a couch with a sticker price of $535. After a 6% sales tax, what is the final cost?

Watch It:  
http://youtu.be/v0RXnvHzfKw

Answer: $567.10

Example 4: Jada found a pair of jeans that she would like to purchase. She has $65 to spend. If the price is $62.75 and the tax rate is 8%, does Jada have enough money? Explain your answer.

Statement:  
Tax is 8% of Jeans Price

Equation:  
\[ T = 0.08 \times 62.75 \]

Next, solve this equation for \( T \).

\[ T = 0.08 \times 62.75 \quad \text{Multiply to solve.} \]
\[ T = 5.02 \]

Tax is $5.02.

Total cost = $62.75 + $5.02

Total cost = $67.77

Jada does not have enough money. The total cost for the jeans, including tax is $67.77, which is more than the $65 she has.

Practice 4: Silas found a cell phone that he would like to purchase. He has $84 to spend. If the price is $79 and the tax rate is 6%, does Silas have enough money? Explain your answer.

Watch It:  
http://youtu.be/kmGY0bkSMhA

Answer: yes, needs $83.74
**Example 5:** Samuel bought a computer for $1450 and paid $101.50 in sales tax. What is the tax rate?

**Statement:** Tax is Percent of Computer Price

**Equation:**

\[
101.50 = p \times 1450
\]

Next, solve this equation for \( p \).

\[
101.50 = p \times 1450 \quad \text{Divide both sides by 1450 to solve.}
\]

\[
0.07 = p \quad \text{Convert to a percent.}
\]

Tax rate is 7%

**Practice 5:** Sally bought a pair of earrings for $125 and paid $8.75 in sales tax. What is the tax rate for the state where she bought the item?

**Watch It:** [http://youtu.be/9YgMk8WYyNA](http://youtu.be/9YgMk8WYyNA)  
**Answer:** 7%

**Example 6:** The restaurant bill was $102. Ingrid paid the bill and left a tip of $18.36 for the waiter. What percent of the bill was the tip Ingrid left?

**Statement:** Tip is Percent of Bill

**Equation:**

\[
18.36 = p \times 102
\]

Next, solve this equation for \( p \).

\[
18.36 = p \times 102 \quad \text{Divide both sides by 102 to solve.}
\]

\[
0.18 = p \quad \text{Convert to a percent.}
\]

18% of the bill was left for the tip

**Practice 6:** The cost of a salon visit was $55 (not including tip). An $11 tip was given to the stylist. What percent of the cost was the tip?

**Watch It:** [http://youtu.be/R8GYSEFkUMA](http://youtu.be/R8GYSEFkUMA)  
**Answer:** 20%
Example 7: Bridget applied to take classes at the local community college. Due to a program with her employer, she only had to pay 60% of the tuition. If a three-credit class cost $1,101, how much did she have to pay?

Statement: Payment is 60% of Tuition
Equation: \[ T = 0.60 \times 1101 \]

Next, solve this equation for \( T \).
\[ T = 0.60(1101) \]
\[ T = 660.60 \]

Bridget paid $660.60 for a three-credit class.

Practice 7: Bridget applied to take classes at the local community college. Due to a program with her employer, she only had to pay 75% of the tuition. If a three-credit course cost $1,101, how much did she have to pay?

Watch It: http://youtu.be/iuvvLVo-d30 Answer: $825.75

Example 8: Temperance is a real estate agent who earns a 3% commission on each house that she sells. If she sells a house for $225,000 what will her commission be?

Statement: Commission is 3% of House Sales
Equation: \[ T = 0.03 \times 225000 \]

Next, solve this equation for \( T \).
\[ T = 0.03(225000) \]
\[ T = 6750 \]

Temperance earns $6,750 for her commission on this house sale.

Practice 8: Delia sold a house to one of her clients for $125,000. Her commission rate is 5% of the selling price of the house. How much commission did she earn?

Watch It: http://youtu.be/T-GJUZ9lXeM Answer: $6,250
Example 9: Seeley earns a commission of 2% on his sales. He received a commission check of $7,000 for the month of March. How much did he sell in March?

Statement: Commission is 2% of Sales
Equation: 7000 = 0.02 \times W

Next, solve this equation for W.

\[ 7000 = 0.02W \quad \text{Divide to solve.} \]
\[ 350000 = W \]

Seeley’s sales total for March was $350,000.

Practice 9: Jamie earns a commission of 4% on his sales. He received a commission check of $1,440 for the month of April. How much did he sell in April?

Watch It: [http://youtu.be/vAt2dJrHCAk](http://youtu.be/vAt2dJrHCAk) Answer: $36,000

Example 10: Angela sells cars for a living. In one week, she sold $37,500 worth of cars and earned a commission of $1,875. What is her commission rate?

Statement: Commission is Percent of Sales
Equation: 1875 = P \times 37500

Next, solve this equation for p.

\[ 1875 = p(37500) \quad \text{Divide to solve.} \]
\[ 0.05 = p \quad \text{Convert to a percent.} \]

Angela’s commission rate is 5%.

Practice 10: If Josh sold a house for $235,000 last month and got a commission check for $14,100, what was his commission rate?

Watch It: [http://youtu.be/2Awou3xpFg8](http://youtu.be/2Awou3xpFg8) Answer: 6%
Example 11: In the state of Maryland, the sales tax rate had been 5% until January 1, 2008 when it was raised to 6%. Some citizens felt that one percent was not a big deal. Brayden’s car was involved in a wreck and he needed to get a new one. He did his research and finally settled on one that would cost $9900. Suppose he tried to get his paperwork done before the end of 2007, what would his tax be? Suppose the bank took some time to complete the loan work and it did not go through until January 5, 2008, what would he pay in taxes?

2007: Tax is 5%

<table>
<thead>
<tr>
<th>Statement:</th>
<th>Tax is 5% Of Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equation:</td>
<td>( T = 0.05 \times 9900 )</td>
</tr>
</tbody>
</table>

Next, solve this equation for \( T \).

\[
T = 0.05(9900) \quad \text{Multiply to solve.}
\]

\( T = 495 \)

Tax = $495

2008: Tax is 6% of price (9900)

<table>
<thead>
<tr>
<th>Statement:</th>
<th>Tax is 6% Of Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equation:</td>
<td>( T = 0.06 \times 9900 )</td>
</tr>
</tbody>
</table>

Next, solve this equation for \( T \).

\[
T = 0.06(9900) \quad \text{Multiply to solve.}
\]

\( T = 594 \)

Tax = $594

Waiting until the New Year (and the new tax rate), costs $594 – $495 = $99 more in taxes for Brayden’s car.

Practice 11: In the state of Maryland, the sales tax rate had been 5% until January 1, 2008 when it was raised to 6%. Some citizens felt that one percent was not a big deal. The Greens wanted to purchase a big screen television to watch the Super Bowl that year. The television cost $3000. How much would they have saved if they bought it before January 1, 2008?

Watch It: [http://youtu.be/9lkCZslHGHc](http://youtu.be/9lkCZslHGHc)  
Answer: $30
Example 12:  Little Timmy has been sick all week. On Monday his fever was 102.4 degrees. By Friday it had decreased 2.7%. What was his temperature on Friday? Round your answer to the nearest tenth.

The first question we must answer is, “What is 2.7% of 102.4 degrees?” This will tell us how many degrees his fever has gone down. We can do this problem in either method that we learned in Section 7.2. We show this problem using the second method that was discussed.

We need to determine the $ParT$.

$Whole = 102.4$

$Percent = 2.7%$

Fill in the proportion with the known information and solve for the unknown.

\[
\frac{\%}{100} = \frac{ParT}{Whole} \quad \frac{2.7}{100} = \frac{T}{102.4} \\
276.48 = 100\cdot T \quad \text{Cross multiply.} \\
\frac{276.48}{100} = \frac{100\cdot T}{100} \quad \text{Divide.} \\
2.7648 = T
\]

Rounding to the nearest tenth of a degree, Timmy’s fever decreased by 2.8 degrees. To determine what his temperature is now, we will subtract the number of degrees his fever went down from the original temperature.

$102.4 - 2.8 = 99.6$

Timmy’s temperature is now 99.6 degrees.

Practice 12:  The temperature outside was 75 degrees in the afternoon. It dropped 44% during the day. What temperature was it in the evening? Round the answer to the nearest degree.

Watch It:  http://youtu.be/WAptGMBMQzA  Answer: 42 degrees

Example 13:  Glynis earns $43,500 this year. Due to a promotion, she will get a 5% raise for next year. What is the dollar amount of her raise? What will her salary be next year?

Raise = 5% of salary
Raise = 0.05(43500)
Raise = $2175
New salary = present salary + raise
New salary = 43500 + 2175
New salary = $45,675
**Practice 13:** Cassidy earns $54,300 this year. Due to a promotion, she will get a 3% raise for next year. What is the dollar amount of her raise? What will her salary be next year?

**Watch It:** [http://youtu.be/-Zxn-GC0zUo](http://youtu.be/-Zxn-GC0zUo)  
**Answer:** $1629, $55,929

**Example 14:** Gretchen finds that there will be a 20% off sale at her favorite store. She decides to wait to buy the outfit she likes as it costs $82 until the sale. How much will the outfit cost on sale?

**Option A to solve:**
Sale is 20% off the original price.  
20% of 82 = 0.20 × 82 = $16.40  
Sale saves Gretchen $16.40 so it is taken off the original price.  
Sale price = 82 – 16.40  
Sale price = $65.60

**Option B to solve:**
Sale is 20% off, so Gretchen only pays 80% of price.  
80% of 82  
= 0.80 × 82  
= $65.60

**Practice 14:** Heather finds that there will be a 25% off sale at her favorite store. She decides to wait to buy the outfit she likes as it costs $76 until the sale. How much will the outfit cost on sale?

**Watch It:** [http://youtu.be/_3yoZhake2Q](http://youtu.be/_3yoZhake2Q)  
**Answer:** $57

**Example 15:** Carin purchased an item from the electronics store for $60 since it was 25% off. What was the original price of the item?

The item was on sale for 25% off.  
Carin paid 75% of original price.  
75% of original price is $60  
0.75(n) = 60  
\[ n = 80 \]
Original price was $80.00

**Practice 15:** April purchased a Raven’s sweatshirt for $45. This was 30% off the original price. What was the original price of the sweatshirt?

**Watch It:** [http://youtu.be/fPdppuZAqBE](http://youtu.be/fPdppuZAqBE)  
**Answer:** $64.29

**Watch all:** [http://youtu.be/AjECUu4n1xQ](http://youtu.be/AjECUu4n1xQ)
7.5 Applications Exercises

1. Alberto wants to buy a remote control car with a sales price of $14.50. If the tax rate is 6%, how much will he pay in tax?

2. Benjamin bought camping supplies for an upcoming trip and spent $312. If the tax rate was 6%, what was the total cost of the camping items?

3. Casper bought new furniture with a price tag of $1,250.00, but his total bill was $1,312.50. What was the amount of tax? What was the tax rate?

4. Dave sells $56,000 worth of advertising in one month. If his commission rate is 8%, how much is his commission check?

5. Eliza hopes to earn a commission bonus of $4500. If her commission rate is 5%, how much does she have to sell in order to earn that bonus?

6. Fran sold $4,258,000 worth of real estate last year. Her commission earnings were $63,870. What was her commission rate?

7. The amount of tax paid on a new bed was $37.10 in a state where the tax rate is 7%. What was the price of the bed?

8. What is the commission made on a sale if the commission rate is 3% and the amount of sales is $52,345?

9. The sale price of a dining room set was $1250. If the amount of tax paid was $93.75, what was the tax rate?

10. Tammy Faye sold $178,000 worth of Maybelline products last month. Her commission check was $7,120. What is the percent that she earns for commission?

11. For a hotel stay, the tax rate is much higher than the regular sales tax, often around 12%. If a hotel charges $525 for a two-night stay, how much tax will be charged?

12. With a budget of $95, LaToya wants to purchase a pair of jeans and a shirt. The jeans cost $45 and the shirt costs $40. If the tax rate is 7%, does she have enough money to purchase the outfit?

13. Michelle sells computers in order to earn extra money. Her employer pays a commission of 11%. If she wants to earn $1650 in order to landscape her back yard, what amount of computer sales will meet this goal?


15. The national average cost for gasoline last week was $3.75. There was a 12% increase this week. What is the average cost this week?

16. If you get a 3% raise for the year, what is the amount of your raise and next year’s salary if your salary this year is $36,500?

17. This month you weigh 185 pounds. After dieting and exercising for a month, you weigh 170 pounds. What is your percent weight loss?

18. The Dow Jones was 11560 at the end of week 1. At the end of week 2 it is 11128. How much did it drop and what percent is that of the original? Round the answer to the nearest tenth of a percent.

19. The price tag on a dress is $110 but Crystal has a coupon for 15% off any item. How much will Crystal save if she uses her coupon on the dress?

20. Edward finds a refrigerator listed for $1349.00 that is marked 20% off. What is the sale price of the refrigerator?
7.5 Applications Exercise Answers

1. $0.87
2. $330.72
3. $62.50; 5%
4. $4,480
5. $90,000
6. 1.5%
7. $530
8. $1,570.35
9. 7.5%
10. 4%
11. $63
12. Yes
13. $15,000
14. 84%
15. $4.20
16. $1095; $37,595
17. Approximately 8.1%
18. 432; approximately 3.7%
19. $16.50
20. $1079.20
**CHAPTER 7 SUMMARY**

**Percents and Applications**

### Section 7.1

**Percent:** the number of parts out of 100 parts

The drawing to the right shows 30%. There are 30 shaded squares out of 100 squares.

#### Converting Percents to Fractions

\[ P\% = \frac{P}{100} \quad \text{Divide the percent by 100} \]

**Example:** Write 35% as a fraction.

\[
\begin{align*}
35 & = \frac{7 \times 5}{20 \times 5} \\
& = \frac{7}{20}
\end{align*}
\]

The answer is simplified.

#### Converting Fractions to Percents

\[ \frac{n}{d} \times 100\% = P\% \quad \text{Multiply the fraction by 100\%} \]

**Example:** Write \( \frac{3}{8} \) as a percent.

\[
\begin{align*}
35 \times \frac{100\%}{100} & = 25\% \\
75/2 & = 37.5\%
\end{align*}
\]

#### Converting Percents to Decimals

\[ P\% = \frac{P}{100} \quad \text{Divide percent by 100} \]

**Example:** Write 6% as a decimal.

\[
\begin{align*}
6 & = 6 \div 100 \\
& = 0.06
\end{align*}
\]

#### Converting Decimals to Percents

\[ \text{Decimal} \times 100\% = P\% \quad \text{Multiply decimal by 100\%} \]

**Example:** Write 0.34 as a percent.

\[
0.34 \times 100\% = 34\%
\]

### Section 7.2

**What percent of 35 is 7?**

\[
\frac{P}{100} = \frac{Part}{Whole} = \frac{7}{35}
\]

\[
P = \frac{7 \times 35}{35} = \frac{20\%}{35}
\]

**OR**

\[
\frac{Part}{Percent} = \frac{7}{35}
\]

\[
35P = 700
\]

\[
P = \frac{20\%}{700}
\]

**What is 12% of 50?**

\[
\frac{Percent}{100} = \frac{Part}{Whole} = \frac{12}{50}
\]

\[
T = 6
\]

**OR**

\[
\frac{Percent}{Whole} = \frac{12}{50}
\]

\[
600 = \frac{100T}{100}
\]

**125% of what number is 46?**

\[
\frac{Percent}{Whole} = \frac{125}{46}
\]

\[
125W = \frac{4600}{125}
\]

\[
W = 36.8
\]
### Section 7.3  
**Circle Graph**  
- useful for showing parts out of a whole  
- each sector (pie-sliced wedge) is part of the whole  
- the total of all sectors must equal 100%  

**Example:**  

<table>
<thead>
<tr>
<th>Student Grades</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A, 8</td>
<td>F, 2</td>
<td>D, 3</td>
<td>C, 15</td>
<td>B, 12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. How many total students are in this class?  
   \[ 8 + 12 + 15 + 3 + 2 = 40 \]
2. What percent of students earned A’s?  
   \[ \frac{P}{100} = \frac{8}{40} \]
   \[ 40P = 800 \]
   \[ P = 20\% \]

### Section 7.4  
**Principal:**  
(a) amount of money borrowed OR  
(b) amount of money deposited in an account  

**Interest:**  
(a) fee charged to borrow money OR  
(b) money earned on a deposit  

**Interest Rate:**  
(a) percent charged for money borrowed OR  
(b) percent earned on money deposited  

**Simple Interest:** interest calculated on original principal only  

**Calculating Simple Interest:**  
Interest = Principal × Rate × Time in Years  
OR  
\[ I = Prt \]

**Example:** What is the simple interest on a loan of $9000 for 4 years if the interest rate is 7.5%?  

\[ I = \text{Interest} = ? \]
\[ P = \text{Principal} = $9000 \]
\[ r = \text{Rate} = 7.5\% \]
\[ t = \text{Time (in years)} = 4 \]
\[ I = Prt \]
\[ I = ($9000)(0.075)(4) \]
\[ I = $2700 \]

**Example:** What is the interest on a credit card for the period from March 20 through April 21 if the Average Daily Balance during this period was $189.62 and the APR was 18.6%?  

\[ I = \text{Interest charged} = ? \]
\[ P = \text{Average Daily Balance} = $189.62 \]
\[ r = \text{APR = Annual Percentage Rate} = 18.6\% \]
\[ t = \text{Number of Days} = \frac{33}{365} \]
\[ I = Prt \]
\[ I = ($189.62)(0.186)(\frac{33}{365}) \]
\[ I = $3.19 \]

### Section 7.5  
**Applications:** Sales Tax, Commission Rates, Tips  

**Example:** Jake is buying a shirt for $17. How much sales tax will he pay if the tax rate is 6%?  

Sales Tax = Rate × Purchase  
\[ T = 6\% \times $17 \]
\[ T = 0.06 \times $17 \]
\[ T = $1.02 \]
1. Convert to a percent: 3.8
2. Convert to a decimal: 77\(\frac{3}{4}\)%
3. Convert to a fraction: 2\(\frac{5}{6}\)%
4. Convert to a percent: 4.12
5. 14 is 28% of what?
6. 105 is what percent of 140?

200 students are put into different rooms. The percentage of students in each room is described in the graph below. Use this graph to answer #7 – 9.

7. How many students are in room B?
8. How many students are in A and C?
9. What is the percent of students in rooms B, D, and E?
10. A bank charges 2% simple interest. How much interest must you pay on a loan of $5000 for 5 years?
11. If you want to triple the value of $5000 investment earning 10% simple interest, how long will it take?
12. How many years does it take to turn $5,000 into $8,600 if it is invested at 2% simple interest?
13. How much interest is earned from depositing $2500 at 12% simple interest for 18 months?
14. A car costs $12,500. If a company is charging 8% simple interest for 7 years, how much is paid in total for the car?
15. Anton did not use his credit card this past month, but carried a balance of $4115. He just received his statement covering the period March 15 through April 14, and his average daily balance is the $4115 carried over from last month. If the APR is 4.59%, how much interest was added to the balance?

16. Carin bought a kayak for $312. The sales tax rate is 5% so how much did she pay in taxes?

17. Cora bought camping supplies for an upcoming trip and spent $1030. If the tax rate was 8%, what was the total cost of the camping supplies?

18. The amount of tax paid on a television was $87.10 in a state where the sales tax rate is 4%. What was the price of the television?

19. Aaron answered 13 problems correctly of the 27 problems on the test. What percent of the problems did Aaron get correct? Round to the nearest whole percent.

20. Felipe felt the service at the restaurant was good and wanted to leave a 20% tip on his $212.00 bill. How much did he leave for the tip?

21. Colin has a job where he earns a 16% commission on his sales each month. What monthly sales would earn him $4000 for the month?

22. Last month you weighed 194 pounds. After dieting and exercising for a month, you now weigh 176 pounds. What is your percent weight loss? Round to the nearest tenth of a percent.

23. Lucy hopes to earn a commission bonus of $3500. If her commission rate is 8%, how much does she have to sell in order to earn that bonus?

24. The Black Friday sale will have 35% off all TVs so Sebastian decides to use that day to purchase the TV he wanted which was regularly $1499. How much did he spend for the TV on Black Friday?

Mixed Review

25. \( \frac{2}{3} + \frac{1}{2} \)

26. \(-5^2 + 8 \div 4 - (6 + 3)^2\)

27. \(\sqrt{9} + |4 - 6| - (1 + 2)^2\)

28. \(-9(3x - 5)\)

29. \(\frac{6}{7} - \frac{3}{4}\)

30. \(\frac{4}{3} + \frac{2}{3} + \frac{1}{3}\)

31. \(\left(\frac{-3}{4}\right) \left(\frac{-7}{9}\right) \left(\frac{-8}{11}\right)\)

32. \((3.1 - 5.6) + |4.2 - 4.9|\)

33. \(-3x = -12\)

34. \(4x - 5 = 39\)

35. \(3x - 6x + 2 = -13\)

36. \(-2(3x - 4) + 14\)

37. Is this true? \(\frac{5}{8} = \frac{25}{40}\)

38. \(\frac{x}{7} = \frac{45}{63}\)

39. \(\frac{24}{40} = \frac{w}{35}\)

40. \(\frac{28}{49} = \frac{16}{m}\)
Chapter 7 Review Answers

1. 380%  
2. 0.7775  
3. \(
\frac{17}{600}
\)  
4. 412%  
5. 50  
6. 75%  
7. 48  
8. 70  
9. 65%  
10. $500  
11. 20 years  
12. 36 years  
13. $450  
14. $19,500  
15. $16.04  
16. $15.60  
17. $1112.40  
18. $2177.50  
19. 48%  
20. $42.40  
21. $25,000  
22. 9.3%  
23. $43,750  
24. $974.35  
25. 1  
26. -104  
27. -4  
28. -27x + 45  
29. \(2\frac{3}{8}\)  
30. 2  
31. \(-\frac{14}{33}\)  
32. -1.8  
33. \(x = 4\)  
34. \(x = 11\)  
35. \(x = 5\)  
36. -6x + 22  
37. Yes, it is true  
38. \(x = 5\)  
39. \(w = 21\)  
40. \(m = 28\)