P83

23) Renting a Moving Truck

Cost $41.50 per day
Plus 35¢ per mile.
Assume he will move in one day. If he has $150 to spend, how many miles can he put on the truck?
Can the pet oil the truck?

\[ x = \text{miles} \]

Spends \( \frac{9}{10} \) $50 \Rightarrow \$50

\[ 150.00 = 41.50 + 0.35x \]

Jumps

\[ 150.00 - 41.50 = 0.35x \]

\[ 108.50 = 0.35x \]

\[ \frac{0.35}{0.35} \]

\[ x = 310 \]

P84

And Two Rupees
Stock $12 per share
bonds $15 per share

Total Value of Pension Fund:
$1,165,000

How many stocks?
How many bonds?

Two unknowns:
1. Which unknown should be called "x"?
Bonds = x

Stocks = x - 2000

\[ \begin{align*}
165,000 &= 15x + 12(x - 2000) \\
165,000 &= 15x + 12x - 24000
\end{align*} \]

\[ \begin{align*}
165,000 + 24000 &= 27x \\
189,000 &= 27x \\
\frac{189,000}{27} &= x
\end{align*} \]
7000 = x

Bonsos = 7000
Stocks = 7000 - 2000
= 5000

The Base is 3 feet taller than the Statue.
The base is 3 feet taller than the statue.
Find the height of the base and statue.

Two unknowns — base, statue

Base = Base + Statue

305 = (x + 3) + x

305 = 2x + 3

305 - 3 = 2x
\[
\frac{302}{x} = \frac{2}{2}
\]

\[x = 151 = \text{statue base} = 151 + 3 = 154\]

**Classwork**

A board 22 ft long will be cut with a saw into two pieces. One piece will be 1 foot longer than twice the other piece. Find the length of each piece.
1.8 \( \text{DRT} \) mixtures

\[
D = P \cdot T
\]
(speed)

270 = 90 \text{ miles/hr} \cdot (3 \text{ hrs})

Example Page 93

Two cars are 385 miles apart traveling on same road towards each other.

Car A 60 mph

Car B 50 mph
How far will each car travel before they meet?

\[ D = R \cdot T \]

\[ D_A = 60T \]

\[ 385 = D_A + D_B \]

\[ 385 = 60T + 50T \]

Both \( T \)'s are equal
\[ 385 = 60T + 50T \]

\[ \frac{385}{110} = \frac{110T}{110} \]

\[ \frac{385}{110} = T \]

\[ \frac{77}{22} = \frac{7}{2} = T \]

\[ D_A = \frac{30}{60}(\frac{7}{2}) = 20 \]

\[ D_B = \frac{25}{50}(\frac{3}{2}) = 17.5 \]

TOTAL \[ 385 \]

MIXTURE!

\( P/100 \)

\( \times 52 \) Reg Coffee \$8/1lb

Gourmet Coffee \$14/1lb = Has 40 lbs

Make a blend (mixture) that is worth \$10/1lb
8x + 14(40) = 10(40+x)
8x + 560 = 400 + 10x
560 - 400 = 10x - 8x
160 = 2x
\[
\frac{160}{2} = \frac{2x}{2}
\]
80 = x

Check:
40 * 8 = 320
40 + x = 100
560 - 400 = 160
1200

"Method: Neg. & Greater at a Time"
\[53) \quad \text{Pineapple} \times 6.19/\text{lb}\]
\[\text{Banana chips} \times 4.19/\text{lb}\]
\[\text{Raisins} \times 2.39/\text{lb}\]
\[\text{Trail mix} \times 4.19/\text{lb}\]

\[
\begin{array}{c|c|c|c}
\hline
\text{Pine} & \text{Banana} & \text{Raisin} & \text{Total} \\
\hline
\times & \times & \times & \times \times \\
6.19 & 4.19 & 2.39 & 4.19 \\
\hline
\end{array}
\]

\[6.19x + 4.19x + 2(2.39) = (2x+2)(4.19)\]
\[ 10.38 \times 4.78 = 8.38 \times 8.38 \] (1)

\[ 10.38x - 8.38x = 8.38 - 4.78 \]

\[ \frac{2.00x}{2.00} = \frac{3.60}{2.00} \]

\[ x = 1.80 \]

**Pineapple & Banana** 16 lbs

**CLASS WORK**

51. Make a candy mixture: $2.00/lb
   - Licorice $1.90/lb → How many lbs?
   - Gum Drops $2.20/lb → Have 5 lbs
Math 73 Homework

1.7

10, 12, 13, 14, 18, 19, 21, 23, 24, 42

1.8

2, 24, 28, 29, 32, 37, 42, 46, 49, 61
Form  We can now form the equation by substituting 50 for the perimeter \( P \) and \( w + 6 \) for the length \( l \) in the formula for the perimeter of a rectangle.

\[
P = 2l + 2w \\
50 = 2(w + 6) + 2w
\]

Solve

\[
50 = 2(w + 6) + 2w \\
50 = 2w + 12 + 2w \\
50 = 4w + 12 \\
38 = 4w \\
9.5 = w
\]

State  The width of the kennel is 9.5 feet. The length is 6 feet more than this, or 15.5 feet.

Check  If a rectangle has a width of 9.5 feet and a length of 15.5 feet, its length is 6 feet more than its width, and the perimeter is \( 2(9.5) + 2(15.5) = 50 \) feet. The results check.

**Self-Check 6**  Crime Scene. Police used 400 feet of yellow tape to fence off a rectangular lot for an investigation. If the width is 50 feet less than the length, find the dimensions of the lot.

**Now Try**  Problem 37

---

**Section 1.7 Study Set**

**Vocabulary**

*Fill in the blanks.*

1. An **acute** angle has a measure of more than 0° and less than 90°.
2. A **right** angle is an angle whose measure is 90°.
3. If the sum of the measures of two angles equals 90°, the angles are called **complementary** angles.
4. If the sum of the measures of two angles equals 180°, the angles are called **supplementary** angles.
5. If a triangle has a right angle, it is called a **right** triangle.
6. If a triangle has two sides with equal measures, it is called an **isosceles** triangle.
7. The sum of the measures of the **angles** of a triangle is 180°.
8. An **equilateral** triangle has three sides of equal length and three angles of equal measure.

**Concepts**

9. The unit used to measure the intensity of sound is called the **decibel**. Use the comments in the right column to write algebraic expressions that represent the decibel level for a vacuum cleaner, a circular saw, and whispering.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Decibels</th>
<th>Compared to conversation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversation</td>
<td>( d )</td>
<td>—</td>
</tr>
<tr>
<td>Vacuum cleaner</td>
<td>( d + 15 )</td>
<td>15 decibels more</td>
</tr>
<tr>
<td>Circular saw</td>
<td>( 2d - 10 )</td>
<td>10 decibels less than twice</td>
</tr>
<tr>
<td>Whispering</td>
<td>( \frac{d}{2} - 10 )</td>
<td>10 decibels less than half</td>
</tr>
</tbody>
</table>

10. The following table shows the four types of problems an instructor put on a history test.

<table>
<thead>
<tr>
<th>Type of question</th>
<th>Number</th>
<th>Value</th>
<th>Total value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple choice</td>
<td>( x )</td>
<td>5</td>
<td>( 5x )</td>
</tr>
<tr>
<td>True/false</td>
<td>( 3x )</td>
<td>2</td>
<td>( 6x )</td>
</tr>
<tr>
<td>Essay</td>
<td>( x - 2 )</td>
<td>10</td>
<td>( 10(x - 2) )</td>
</tr>
<tr>
<td>Fill-in</td>
<td>( x )</td>
<td>5</td>
<td>( 5y )</td>
</tr>
</tbody>
</table>

Total: 110 points

**Applications**

11. **Airplanes.** Together, a Delta B747 and a Delta B777 seat 681 passengers. If the B777 seats 125 less people than the B747, how many passengers does each seat? (Source: deltawest.com)

\[
B747: 403 \text{ passengers}, B777: 278 \text{ passengers}
\]

12. **Denzel.** As of October 2010, Denzel Washington’s three top domestic grossing films, *American Gangster, Remember the Titans,* and *The Pelican Brief,* had earned a total of $346.7 million. If *American Gangster* earned $14.5 million more than *Remember the Titans,* and if *Remember the Titans* earned $14.9 million more than *The Pelican Brief,* how much did each film earn as of that date? (Source: boxofficemojo.com)

\[
\text{American Gangster: $130.2 million; Titans: $115.7 million; Pelican: $100.8 million.}
\]
13. Statue of Liberty. From the foundation of the large base on which it sits to the top of the torch, the Statue of Liberty National Monument measures 305 feet. The base is 3 feet taller than the statue. Find the height of the base and the height of the statue. Base: 154 ft; statue: 151 ft

14. Woodworking. A carpenter saws a board that is 22 feet long into two pieces. One piece is to be 1 foot longer than twice the length of the shorter piece. Find the length of each piece. 7 ft, 15 ft

15. Flutes. When it is assembled, a flute is 29 inches long. The middle piece is 4 inches less than twice as long as the first piece. The last piece is two-thirds as long as the first piece. Find the length of each piece of the flute. First piece: 9 in.; middle piece: 14 in.; last piece: 6 in.

16. Commercials. For the typical “one-hour” prime-time television slot, the number of minutes of commercials is \( \frac{3}{5} \) of the number of minutes of the actual program. Determine how many minutes of the program are shown in that one hour. 42 min

17. Kitchen Drawers. A woodworker wants to put two partitions crosswise in a drawer that is 28 inches deep, as shown below. He wants to place the partitions so that the spaces created increase by 3 inches from front to back. If the thickness of each partition is \( \frac{1}{2} \) inch, how far from the front end should he place the first partition? 6 in.

18. Shelving. A carpenter wants to put four shelves on an 8-foot wall so that the five spaces created decrease by 6 inches as we move up the wall. (See below.) If the thickness of each shelf is \( \frac{3}{4} \) inch, how far will the bottom shelf be from the floor? \( 30 \frac{3}{5} \) in.

19. Spring Tours. A group of junior high students will be touring Washington, D.C. Their chaperons will have the $1,810 cost of the tour reduced by $15.50 for each student they personally supervise. How many students will a chaperon have to supervise so that his or her cost to take the tour will be $1,500? 20 students

20. Machining. Each pass through a lumber plane shaves off 0.015 inch of thickness from a board. How many times must a board, originally 0.875 inch thick, be run through the planer if a board of thickness 0.74 inch is desired? 9 times

21. Moving. To help move his furniture, a man rents a truck for $41.50 per day plus 35¢ per mile. If he has budgeted $150 for transportation expenses, how many miles will he be able to drive the truck if the move takes 1 day? 310 mi

22. Salaries. A student working for a delivery company earns $5.75 per day plus $4.75 for each package she delivers. How many deliveries must she make each day to earn $200 a day? 30 deliveries

23. IRAs. In an Individual Retirement Account (IRA) valued at $49,050, a couple has twice as many shares of stock in Big Bank Corporation as in Safe Savings and Loan. If Big Bank sells for $115 per share and Safe Savings sells for $97 per share, how many shares of each does the couple own? 300 shares of BB, 150 shares of SS

24. Selling Calculators. Last month, a bookstore ran the following ad. Sales of $5,370 were generated, with 15 more graphing calculators sold than scientific calculators. How many of each type of calculator did the bookstore sell? 35 $12 calculators, 50 $99 calculators
37. e-Readers. The perimeter of the rectangular display screen of Amazon’s Kindle 3 is 16.8 inches. If the height is 1.2 inches greater than the width, find the dimensions of the screen.

Width: 3.6 in., height: 4.8 in.

38. U.S. Currency. The perimeter of a one-dollar bill is 17.5 inches and the length is 0.92 in. more than twice the width. Find the dimensions of a one-dollar bill.

Width: 2.61 in., length: 6.14 in.

39. Swimming Pools. A woman wants to enclose the pool shown and have a walkway of uniform width all the way around. How wide will the walkway be if the woman uses 180 feet of fencing?

10 ft

40. Quilting. Throughout history, most artists and designers have felt that golden rectangles with a length 1.618 times as long as their width have the most visually attractive shape. A woman is planning to make a quilt in the shape of a golden rectangle. She has exactly 22 feet of special lace that she plans to sew around the edge of the quilt. What should the length and width of the quilt be? Round both answers up to the nearest hundredth.

4.20 ft by 6.36 ft

41. Ranching. A farmer has 624 feet of fencing to enclose a pasture. Because a river runs along one side, fencing will be needed on only three sides. Find the dimensions of the pasture if its length is double its width.

156 ft by 312 ft

42. Fencing. A man has 150 feet of fencing to build the two-part pen shown below. If one part is a square and the other a rectangle, find the outside dimensions of the pen.

20 ft by 45 ft

43. Solar Heating. One solar panel in the illustration is to be 3 feet wider than the other. To be equally efficient, they must have the same area. Find the width of each.

8 ft, 11 ft

44. Height of a Triangle. If the height of a triangle with a base of 8 inches is tripled, its area is increased by 96 square inches. Find the height of the triangle.

12 in.

45. Briefly explain what should be accomplished in each of the steps (analyze, assign, form, solve, state, and check) of the problem-solving strategy used in this section.

46. Write a problem about a triangle that can be modeled by the following equation.

\[ x + 2x + x + 10 = 180 \]

47. When expressed as a decimal, is \( \frac{7}{9} \) a terminating or repeating decimal?

Repeating

48. Solve: \( x + 20 = 4x - 1 + 2x \)

49. Write the set of integers.

\( \{ \ldots, -2, -1, 0, 1, 2, \ldots \} \)

50. Solve \( T - R = ma \) for \( R \).

\( R = T - ma \)

**CHALLENGE PROBLEMS**

In Problems 51–54, use the following property of levers: A lever will be in balance when the sum of the products of the forces on one side of the fulcrum and their respective distances from the fulcrum is equal to the sum of the products of the forces on the other side of the fulcrum and their respective distances from the fulcrum.

51. Moving a Stone. A woman uses a 10-foot bar to lift a 210-pound stone. If she places another rock 3 feet from the stone to act as the fulcrum, how much force must she exert to move the stone?

90 lb

52. Lifting a Car. A 350-pound football player brags that he can lift a 2,500-pound car. If he uses a 12-foot bar with the fulcrum placed 3 feet from the car, will he be able to lift the car?


**SECTION 1.8 STUDY SET**

**VOCABULARY**

Fill in the blanks.

- 1. Percent means parts per one hundred.
- 2. In the statement, "10 is 20% of 50," 10 is the \( \text{amount} \), and 50 is the \( \text{base} \).
- 3. When the regular price of an item is reduced, the amount of reduction is called the \( \text{markdown} \).
- 4. When an investment is made, the amount of money invested is called the \( \text{principal} \). The money an investment earns is called \( \text{interest} \).

**CONCEPTS**

5. One method to solve applied percent problems is to use the given facts to write a percent sentence. What is the basic form of a percent sentence?

6. Total Paid Circulation: People Magazine
   - 2007: 4,513,318
   - 2008: 3,618,718


   - a. Find the \( \text{amount of increase in circulation of People magazine.} \) 73,101
   - b. Fill in the percent sentence that can be used to find the percent of increase in circulation.
     
     \[73,101 \text{ is what } \% \text{ of } 3,618,718?\]

7. Complete each formula used in this section.
   - a. \( I = Prt \)
   - b. \( d = rt \)
   - c. Total value = amount \( \cdot \) price
   - d. Amount pure = amount \( \cdot \) strength

8. A student inherited $5,000 and deposits \( x \) dollars in American Savings. Write an algebraic expression that represents the amount of money left to deposit in a City Mutual account.

   \[5,000 - x\]

9. Solution 1 is poured into solution 2. Write an algebraic expression that represents the number of ounces in the mixture.

   \[x + 20\]

10. Cashews were mixed with \( p \) pounds of peanuts to make 100 pounds of a mixture. Write an algebraic expression that represents the number of pounds of cashews that were used.

   \[100 - p\]

11. Complete the following table for each investment. Then write an equation that could be used to solve this investment problem.

   \[0.055x + 0.07(10,850 - x) = 1,205\]

<table>
<thead>
<tr>
<th>Principal</th>
<th>Rate</th>
<th>Time</th>
<th>Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonds</td>
<td>( x )</td>
<td>0.055</td>
<td>1</td>
</tr>
<tr>
<td>Stocks</td>
<td>10,850 - ( x )</td>
<td>0.07</td>
<td>1</td>
</tr>
</tbody>
</table>

   Total: $1,205

12. The following table shows how a retired teacher invested a total of $8,000 in two accounts for 1 year. The investments earned $290 in interest. Complete the table. Then write an equation that could be used to solve this investment problem.

   \[0.03x + 0.04(8,000 - x) = 290\]

<table>
<thead>
<tr>
<th>( P \cdot r \cdot t = I )</th>
</tr>
</thead>
<tbody>
<tr>
<td>S &amp; L ( x )</td>
</tr>
<tr>
<td>Credit Union ( 8,000 - x )</td>
</tr>
</tbody>
</table>

   Total: $290

13. A banker invested the same amount in two money-making opportunities for 1 year and earned $3,300 in interest. Complete the table below. Then write an equation that could be used to solve this investment problem.

   \[0.15x + 0.18y = 3,300\]

<table>
<thead>
<tr>
<th>( P \cdot r \cdot t = I )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle futures ( x )</td>
</tr>
<tr>
<td>Soybeans ( y )</td>
</tr>
</tbody>
</table>

   Total: $3,300

14. A husband and wife drive in opposite directions to work. Their drives last the same amount of time and their workplaces are 40 miles apart. Complete the table. Then write an equation that could be used to solve this uniform motion problem.

   \[35t + 45t = 40\]

<table>
<thead>
<tr>
<th>( r \cdot t = d )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Husband ( 35 )</td>
</tr>
<tr>
<td>Wife ( 45 )</td>
</tr>
</tbody>
</table>

   Total: 40 mi.
15. A 50-pound mixture of plain and peanut M&M’s is to be made. Complete the table. Then write an equation that could be used to solve this mixture problem.

\[7.45p + 8.25(50 - p) = 7.75(50)\]

<table>
<thead>
<tr>
<th>Amount · Price = Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>M&amp;M’s plain</td>
</tr>
<tr>
<td>M&amp;M’s peanut</td>
</tr>
<tr>
<td>Mixture</td>
</tr>
</tbody>
</table>

16. Complete the following table that could be used to solve this problem: How many pints of punch from the orange cooler must be mixed with the entire contents of the blue cooler to get a 12% punch mixture? Then write an equation that could be used to solve this liquid mixture problem.

\[4 + 0.10\( x \) = 0.12(\( x + 20 \))\]

<table>
<thead>
<tr>
<th>Amount · Strength = Pure concentrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too strong</td>
</tr>
<tr>
<td>Too weak</td>
</tr>
<tr>
<td>Mixture</td>
</tr>
</tbody>
</table>

20 pints of punch, 20% concentrate
\( x \) pints of punch, 10% concentrate

17. a. Write 2.5% as a decimal. 0.025
   b. Write 0.06 as a percent. 6%
18. Multiply: 100(0.67\( x \)) 67\( x \)

**NOTATION**

19. What number is 5% of 10.56? \( x = 0.05 \cdot 10.56 \)
20. 16 is what percent of 55? \( 16 = \frac{x \cdot 55}{\text{Hint:}} \)
21. 32.5 is 74% of what number? \( 32.5 = 0.74\( x \) \)
22. What is 83.5% of 245? \( x = 0.835 \cdot 245 \)

**APPLICATIONS**

23. Energy. In 2010, the United States alone accounted for 20.2% of the world’s total energy consumption, using 103.3 quadrillion British thermal units (Btu). What was the world’s energy consumption in 2010? Round to the nearest quadrillion.
   \( \text{Source: U.S. Energy Information Administration} \)
   \( 511 \) quadrillion Btu

24. Computers. In 2010, 78 million, or 68.7%, of U.S. households had personal computers with an Internet connection. How many U.S. households were there in 2010? Round to the nearest million. (Source: U.S. Census) 114 million households

25. Boating Accidents. According to the Insurance Information Institute, 6.5% of the 4,730 recreational boating accidents in 2009 involved alcohol use. How many boating accidents were alcohol-related? Round up to the nearest one accident. (Source: U.S. Coast Guard) 307 accidents

26. Basketball. The following data is for the 2009 NCAA men’s college basketball season. What was the average number of three-point shots made per game? Round to the nearest hundredth. \( 6.31 \) three-point shots

**THREE-POINT SHOTS**
Average number of attempts per game: 18.33
Percent made: 34.40% (Source: NCAA)

27. Buying Appliances. Use the following ad to find the percent of markdown of the sale. \( 20\% \)

**One-Day Sale!**

Regularly \( \$726 \)
Now Only \( \$580.80 \)

28. Buying Furniture. A bedroom set regularly sells for \( \$983 \). If it is on sale for \( \$737.25 \), what is the percent of markdown? \( 25\% \)

29. Flea Markets. A vendor sells tool chests at a flea market for \( \$65 \). If she makes a profit of 30% on each unit sold, what does she pay the manufacturer for each tool chest? \( \text{Hint: The retail price = the wholesale price + the markup.} \) \( \$50 \)

30. Bookstores. A bookstore sells a textbook for \( \$39.20 \). If the book store makes a profit of 40% on each sale, what does the bookstore pay the publisher for each book? \( \text{Hint: The retail price = the wholesale price + the markup.} \) \( \$28 \)

31. Improving Horsepower. The following graph shows how the installation of a special computer chip increases the horsepower of a truck. Find the percent of increase in horsepower for the engine running at 4,000 revolutions per minute (rpm) and round to the nearest tenth of one percent. \( 9.3\% \)
32. **Greenhouse Gases.** The U.S. energy-related carbon dioxide emissions in 2008 were 5,802 million metric tons. In 2007, that figure was 5,967 million metric tons. Find the percent of decrease and round to the nearest tenth of one percent. (Source: Energy Information Administration) 2.8% decrease

33. **Broadway Shows.** Complete the table to find the percent of increase or decrease in attendance at Broadway shows for each season compared with the previous season. Round to the nearest tenth of one percent.

<table>
<thead>
<tr>
<th>Season</th>
<th>Broadway attendance</th>
<th>% of increase or decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-07</td>
<td>12.31 million</td>
<td></td>
</tr>
<tr>
<td>2007-08</td>
<td>12.27 million</td>
<td>0.3% decrease</td>
</tr>
<tr>
<td>2008-09</td>
<td>12.15 million</td>
<td>1.0% decrease</td>
</tr>
</tbody>
</table>

Source: LiveBroadway.com

34. **Drive-Ins.** The number of drive-in movie theaters in the United States peaked in 1958. Since then, the numbers have steadily declined. Determine the percent of decrease in the number of drive-ins. Round to the nearest one percent. 91% decrease

35. **Highest Rates.** Based on the information in the table, a woman invested $12,000, some in an account paying the highest rate and the rest in an account paying the second highest rate. How much was invested in each account if the interest from both investments is $1,060 per year? CD: $10,000; money market: $2,000

36. **Entrepreneurs.** Last year, a women's professional organization made two small-business loans totaling $28,000 to young women beginning their own businesses. The money was lent at 7% and 10% simple interest rates. If the annual income the organization received from these loans was $2,560, what was each loan amount? $8,000 at 7%; $20,000 at 10%

37. **Inheritances.** Paula used some of the money that she received from an inheritance to invest in a certificate of deposit paying 7% annual interest and the rest of the money in a promising biotech company offering an annual return of 10%. She invested twice as much in the 10% investment as she did in the 7% investment. Her combined annual income from the two investments was $4,050.
   a. How much did she invest in each account? $15,000 at 7%; $30,000 at 10%
   b. How much did she inherit? $45,000

38. **Tax Returns.** On a federal income tax form, Schedule B, a taxpayer forgot to write in the amount of interest income he earned for the year. From what is written on the form, determine the amount of interest earned from each investment and the amount he invested in stocks. $495, $495; $9,900

39. **Money-Laundering.** Use the evidence compiled by investigators to determine how much money a suspect deposited in the Cayman Islands bank. $100,000
   - On 6/1/09, the suspect electronically transferred $300,000 to a Swiss bank account paying an 8% annual yield.
   - That same day, the suspect opened another account in a Cayman Islands bank that offered a 5% annual yield.
   - A document dated 6/3/10 was seized during a raid of the suspect's home. It stated, "The total interest earned in one year from the two overseas accounts was 7.25% of the total amount deposited."

40. **Financial Presentation.** A financial planner showed her client the following investment plan. Find the total amount the client will have to invest to earn $2,700 in interest. $50,000

![3-Part Investment Plan Diagram]
41. Travel Times. A man called his wife to tell her that they needed to switch vehicles so he could use the family van to pick up some building materials after work. The wife left their home, traveling toward his office in their van at 35 mph. At the same time, the husband left his office in his car, traveling toward their home at 45 mph. If his office is 20 miles from their home, how long will it take them to meet so they can switch vehicles? \( \frac{1}{4} \) hr = 15 min

42. Air Traffic Control. An airplane leaves Los Angeles bound for Caracas, Venezuela, flying at an average rate of 500 mph. At the same time, another airplane leaves Caracas bound for Los Angeles, averaging 550 mph. If the airports are 3,675 miles apart, when will the air traffic controllers have to make the pilots aware that the planes are passing each other?

3.5 hr into the flights

43. Cycling. A cyclist leaves his training base for a morning workout, riding at the rate of 18 mph. One hour later, his support staff leaves the base in a car going 45 mph in the same direction. How long will it take the support staff to catch up with the cyclist?

\( \frac{1}{3} \) hr

44. Marathons. Two marathon runners leave the starting gate, one running 12 mph and the other 10 mph. If they maintain the pace, how long will it take for them to be one-quarter of a mile apart?

\( \frac{1}{3} \) hr

45. Radio Communications. At 2 p.m., two military convoys leave Eagle River, Wisconsin, one headed north and one headed south. The convoy headed north averages 50 mph, and the convoy headed south averages 40 mph. They will lose radio contact when the distance between them is more than 135 miles. When will this occur?

3:30 p.m.

46. Search and Rescue. Two search-and-rescue teams leave base camp at the same time, looking for a lost child. The first team, on horseback, heads north at 3 mph, and the other team, on foot, heads south at 1.5 mph. How long will it take them to search a distance of 18 miles between them?

4 hr

47. Jet Skiing. A jet ski can go 12 mph in still water. If a rider goes upstream for 3 hours against a current of 4 mph, how long will it take the rider to return? (Hint: Upstream speed is \( 12 - 4 \) mph; how far can the rider go in 3 hours?)

1 hr

48. Physical Fitness. For her workout, Sarah walks north at the rate of 3 mph and returns at the rate of 4 mph. How many miles does she walk if the round trip takes 3.5 hours?

12 mi

49. Mixing Candy. How many pounds of red licorice bits that sell for $1.90 per pound should be mixed with 5 pounds of lemon gumdrops that sell for $2.20 per pound to make a candy mixture that could be sold for $2 per pound?

10 lb

50. Tea Blends. A store sells regular green tea for $16 a pound and an exotic loose leaf tea for $28 a pound. To get rid of 40 pounds of the exotic loose leaf tea that are not selling, a shopkeeper makes a blend to put on sale for $20 a pound. How many pounds of green tea should he use?

80 lb

51. Health Foods. A pound of dried pineapple bits sells for $6.19, a pound of dried banana chips sells for $4.19, and a pound of raisins sells for $2.39 a pound. Two pounds of raisins are to be mixed with equal amounts of pineapple and banana to create a trail mix that will sell for $4.19 a pound. How many pounds of pineapple and banana chips should be used?

1.8 lb of each

52. Metallurgy. A 1-ounce commemorative coin is to be made of a combination of pure gold, costing $380 an ounce, and a gold alloy that costs $140 an ounce. If the cost of the coin is to be $200, and 300 are to be minted, how many ounces of gold and gold alloy are needed to make the coins? 125 oz pure gold; 375 oz gold alloy

53. Gardening. A wholesaler of premium organic planting mix notices that the retail garden centers are not buying her product because of its high price of $1.57 per cubic foot. She decides to mix sawdust with the planting mix to lower the price per cubic foot. If the wholesaler can buy the sawdust for $0.10 per cubic foot, how many cubic feet of each must be mixed to have 6,000 cubic feet of planting mix that could be sold to retailers for $1.08 per cubic foot?

4,000 ft³ of the premium mix; 2,000 ft³ of sawdust

54. Bronze. A pound of tin is worth $1 more than a pound of copper. Four pounds of tin are mixed with 6 pounds of copper to make bronze that sells for $3.65 per pound. How much is a pound of tin worth?

$4.25

55. Mixing Paint. The colors on the paint chip card below are created by adding different amounts of red tint to a white latex base. How many gallons of Fruit Shake should be mixed with 1 gallon of Watermelon to obtain Mellow Coral?

6 gal of Fruit Shake

56. Insect repellant. The active ingredient used in most insect repellents is known as DEET (N-Diethyl-meta-toluamide). How many ounces of a 1.25% DEET solution and how many ounces of a 5% DEET solution should be mixed to produce 10 ounces of a 2.5% DEET solution? (Hint: Express the results as mixed numbers)

1.25% solution: \( \frac{5}{4} \) oz, 5% solution: \( \frac{1}{8} \) oz

57. from Campus to Careers

Registered Dietitian

Suppose, as registered dietitian for a school district, you must make sure that only extra lean ground beef (16% fat) is served in the cafeteria. Further suppose that the kitchen has 8 pounds of regular ground beef (30% fat) on hand. How many pounds of extra lean ground beef (12% fat) must be purchased and added to the regular ground beef to obtain a mixture that has the correct fat content?

28 lb

58. Pharmacists. How many liters of a 1% glucose solution should a pharmacist mix with 0.5 liter of a 5% glucose solution to obtain a 2% glucose solution?

1.5 L

59. Dairy Foods. Cream is approximately 22% butterfat. How many gallons of cream must be mixed with milk testing at 2% butterfat to get 20 gallons of milk containing 4% butterfat?

2 gal
60. **Flood Damage.** One website recommends a 6% chlorine bleach–water solution to remove mildew. A chemical lab has 3% and 15% chlorine bleach–water solutions in stock. How many gallons of each should be mixed to obtain 100 gallons of the mildew spray? 75 gallons of 3%; 25 gallons of 15%.

61. **Diluting Solutions.** How much water should be added to 20 ounces of a 15% solution of alcohol to dilute it to a 10% alcohol solution? 10 oz.

![Diagram of diluting solutions]

62. **Evaporation.** The beaker shown below contains a 2% saltwater solution.

a. How much water must be boiled away to increase the concentration of the salt solution from 2% to 3%? 100 ml.

b. Where on the beaker would the new water level be? (mL means milliliter.) 200-ml mark

![Diagram of evaporation]

63. **Writing.** If a car travels at 60 mph for 30 minutes, explain why the distance traveled is not 60 · 30 = 1,800 miles.

64. **Writing.** If a mixture is to be made from solutions with concentrations of 12% and 30%, can the mixture have a concentration less than 12%? Can the mixture have a concentration greater than 30%? Explain.

65. Write a dry mixture problem that can be modeled by the following equation.

\[ 4x + 7(40 - x) = 5(40) \]

66. Write a liquid mixture problem that can be modeled by the following equation.

\[ 0.02(50) + 0.07x = 0.05(50 + x) \]

67. Solve the following problem. Then explain why the solution does not make sense.

Adult tickets cost $4 and student tickets cost $2. Sales of 71 tickets bring in $245. How many of each were sold?

68. Write a uniform-motion problem using the facts entered in the table.

<table>
<thead>
<tr>
<th></th>
<th>( r \cdot t = d )</th>
</tr>
</thead>
<tbody>
<tr>
<td>West</td>
<td>8 ( t = 8t )</td>
</tr>
<tr>
<td>East</td>
<td>6 ( t = 6t )</td>
</tr>
</tbody>
</table>

Total: 24 mi.

**Review**

Solve each equation.

69. \( 9x = 6x \)

70. \( 7a + 2 = 12 - 4(a - 3) \)

71. \( \frac{8(y - 5)}{3} = 2(y - 4) \)

72. \( \frac{t - 1}{3} = \frac{t + 2}{6} + 2 \)

**Challenge Problems**

73. **Raising Grades.** A student had a score of 70% on a test that contained 30 questions. To improve his score, the instructor agreed to let him work 15 additional questions. How many of those must he get right to raise his grade to 80%?

15 questions

74. **Financial Planning.** A retired teacher has a choice of two investment plans:

- An insured fund that pays 11% interest
- A risky investment that pays a 13% return

If the same amount invested at the higher rate would generate an extra $150 per year than it would at the lower rate, how much does the teacher have to invest? $7,500