Math 8

Summer Workbook
Instructions

1) Print out the packet and answers.

2) Do about one-half of a page per day throughout the summer.

3) Check your answers after you do each page.

4) Make sure to show all work on the packet or put work in a notebook or on several pieces of paper that will be turned in with the packet in August.

5) You may NOT use a CALCULATOR on the packet.

6) Bring the finished packet with you to school on the first or second day of school. Please give it to your math teacher. You will receive credit worth five homework assignments for your first grade in math.

7) Remember we offer help at 11:00 at the following places throughout the summer:

   Tuesdays at Mir Park
   Wednesdays at West (Commons)
   Thursdays at Infinity Park
Find the unit rate for each. Make up a rule or equation for each using variables. Make sure to identify each variable.

1. 650 miles on 25 gallons of gasoline
   \[
   \frac{650 \text{ mi}}{25 \text{ gal}} = 26 \text{ mi/gal} \quad m = 26g \quad g = \text{gallons} \quad m = \text{miles}
   \]

2. 3 boxes of Lucky Charms cereal for $7.99

3. 3 movies for $7

4. 9 TV shows in 3 hours

5. $10 for 4 Blizzards at Dairy Queen

6. 300 hot dogs for 75 students

7. 140 students per 6 teachers
### Algebraic Equations

1. | x | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
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Constant Difference:

Equation:

2. | x | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
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Constant Difference:

Equation:

3. | x | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
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<td>y</td>
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<td>11</td>
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Constant Difference:

Equation:

4. | A | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
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<tr>
<td>B</td>
<td>5</td>
<td>15</td>
<td>25</td>
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Constant Difference:

Equation:
Using Proportions

Write a proportion to solve each problem. Then solve.

1. 18 plums weigh 54 ounces. 27 plums weigh \( x \) ounces.
   \[
   \frac{18}{54} = \frac{27}{x} \quad \frac{18x}{54} = \frac{27}{18} \quad x = \frac{9}{2} \text{ oz.}
   \]

2. 40 nails hold 5 rafters. 96 nails hold \( r \) rafters.
   \[
   \frac{40}{5} = \frac{96}{r} \quad \frac{40r}{5} = 96 \quad r = 12
   \]

3. 32 addresses are on 2 pages of the address book. \( a \) addresses are on 9 pages.
   \[
   \frac{32}{2} = \frac{a}{9} \quad \frac{32}{2} = 16 \quad a = 144
   \]

4. 2 quarts fill 8 cups. 5 quarts fill \( c \) cups.
   \[
   \frac{2}{8} = \frac{5}{c} \quad \frac{2c}{8} = 5 \quad c = 20
   \]

5. 360 inches of tape on 3 spools. \( t \) inches of tape on 10 spools.
   \[
   \frac{360}{3} = \frac{t}{10} \quad \frac{360}{3} = 120 \quad t = 1200
   \]

6. 81 rivets on 3 panels. \( r \) rivets on 13 panels.
   \[
   \frac{81}{3} = \frac{r}{13} \quad \frac{81}{3} = 27 \quad r = 351
   \]

7. 60 sliced mushrooms on 4 pizzas. \( m \) sliced mushrooms on 15 pizzas.
   \[
   \frac{60}{4} = \frac{m}{15} \quad \frac{60}{4} = 15 \quad m = 225
   \]

8. 8 carpets in a 5-inch-high pile. \( c \) carpets in a 30-inch-high pile.
   \[
   \frac{8}{5} = \frac{c}{30} \quad \frac{8}{5} = 16 \quad c = 48
   \]

9. Ma assembles 3 clipboards in 2 minutes. She assembles \( c \) clipboards in 15 minutes.
   \[
   \frac{3}{2} = \frac{c}{15} \quad \frac{3}{2} = 7.5 \quad c = 45
   \]

10. 98 beats per minute. \( y \) beats per hour.
    \[
    \frac{98}{60} = \frac{y}{1} \quad \frac{98}{60} = 1.633 \quad y = 159.96
    \]

11. 1.5 ounces of oil to 1 gallon of gasoline. 9 ounces of oil to \( g \) gallons of gasoline.
    \[
    \frac{1.5}{1} = \frac{9}{g} \quad \frac{1.5}{1} = 1.5 \quad g = 6
    \]

12. Dary can type 3 pages in 18 minutes. How many pages can Dary type in 33 minutes?
    \[
    \frac{3}{18} = \frac{x}{33} \quad \frac{3}{18} = 0.167 \quad x = 5.01
    \]
1. Mike averages 3 free-throws for every 5 he attempts. How many free-throws would you expect him to make if he attempts 90 shots?

2. The scale on a map reads: 1 cm: 50 km. How many kilometers would a map distance of 6 cm be?

3. A study shows 7 out of 10 people drive alone to work. How many people were surveyed if 84 people responded that they drive alone to work?

4. There are 12 ping-pong balls in a box. How many balls are there in 12 boxes?

5. Willy earned $1,683 in 9 weeks. How much does this amount to in a two week pay period?

6. Teri can type a 10-page term paper in 3 hours. At this rate, how long will it take her to type a 25-page paper?

7. Carl averages 5 hits for every 8 at bat. At this rate, how many times would he need to be at bat to get 80 hits?

8. A casserole that serves 6 people needs 0.25 L of milk. How much milk is needed to make a casserole that will serve 9 people?

9. Gear 1 makes 11 revolutions to every 4 revolutions of gear 2. How many revolutions will gear 1 make if gear 2 makes 15 revolutions?

10. The student-to-teacher ratio at Bedford High is 77 to 4. How many teachers are there if there are 693 students?

11. Randy can wash 3 cars in 2 hours. How long will it take him to wash 7 cars?

12. Hal drove 252 km in 3 hours. How far can he drive in 17 hours?
A Super Sale

Everyone loves a bargain. Let's explore this super sale!

1. The video game you've been wanting is on sale this week. The original price was $35.00, but the game is on sale for 20% off. How much will the game cost this week? Explain how you figured out your answer.

2. The video store has a Super Saturday Sale. On Super Saturday, customers receive an additional 10% off the sale price. How much will the video game cost on Super Saturday? Explain how you determined this special price.

3. Complete the table below to show the sale price and Super Saturday price for each item.

<table>
<thead>
<tr>
<th>Items</th>
<th>Original price</th>
<th>Sale price 20% off</th>
<th>Super Saturday price Additional 10% off sale price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video games</td>
<td>$ 35.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDs</td>
<td>$ 20.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD storage case</td>
<td>$ 13.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cassette tapes</td>
<td>$ 9.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video play station</td>
<td>$140.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. If you buy one of each item during the Super Saturday Sale, what will be your total savings compared to the original cost? Explain how you determined your total savings.
Washing Cars for Fun and Profit

To raise money, the Mega Middle School Band has decided to have a car wash. One of the trumpet players, Mike Muggle, is in charge of planning it.

**Problem.** Mike must decide how much to charge for each wash. Based on a survey, he estimates how many car washes will be sold each day at different prices. The results are shown in the graph that Mike made.

Based on Mike's graph, complete the table below.

<table>
<thead>
<tr>
<th>Price of a Wash</th>
<th>$5</th>
<th>$6</th>
<th>$7</th>
<th>$8</th>
<th>$9</th>
<th>$10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Number</td>
<td>100</td>
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</tbody>
</table>

**Income.** Income is equal to the price per wash times the number of washes. Write an equation to show this relationship. Use \( I \) for income, \( p \) for price, and \( n \) for the number of cars washed.

**Expenses.** Mike estimates that the expenses of operating the car wash will be $100 per day plus $2 per car. Write an equation to show this relationship. Use \( E \) for total daily expenses and \( n \) for the number of cars washed.

**Profit.** Profit equals income minus expenses. Write an equation to show this relationship.

**Choose a Price.** To determine the best price to charge, Mike computes the expected profit for each price. Complete the table and graph to show what he finds.

<table>
<thead>
<tr>
<th>Price</th>
<th>Number</th>
<th>Income</th>
<th>Expenses</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$6</td>
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<td>$10</td>
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What price should Mike choose? Explain.
Percent of a Number

Express each ratio as a percent.

1. \( \frac{7}{10} \)  
   \[ 0.7 \times 100 = 70\% \]

Express each fraction as a percent.

2. \( \frac{6}{25} \)

3. \( \frac{18}{50} \)

4. \( \frac{3}{5} \)

5. \( \frac{12}{5} \)

6. \( \frac{15}{40} \)

Solve each problem. Round answers to the nearest tenth.

7. What number is 18% of 450?
   \[ \frac{18}{100} \times 450 = 81 \]

9. 37\(\frac{1}{2}\) is 30% of what number?

10. 45% of 156 is what number?

11. 96 is 30% of what number?

12. Forty percent of 80 is what number?

13. What number is 58% of 200?

14. 33\(\frac{1}{3}\)% of 249 is what number?

15. What number is 12% of one-hundred fifty?

16. Find 82\(\frac{1}{2}\)% of 400.

17. What number is 72% of 1,024?

18. Find 12% of 12.
Use the percent proportion and your calculator to help discover some interesting facts about the United States. Round your answers to the nearest tenth of a percent.

1. The United States produced 67,832 million eggs in 1990. The state of Indiana produced 5,445 million eggs—the most of any state. What percent of the eggs produced in the United States were produced outside Indiana?

\[
\begin{array}{c}
\text{67,832} \\
\underline{- 5,445} \\
\text{62,387}
\end{array}
\]

\[
\begin{array}{c}
\text{62,387} \\
\underline{67,832} \\
\text{927} \%
\end{array}
\]

2. The population of the United States in 1990 was 248,709,873 people. Of these people, 121,239,418 were male. What percent of the population was female?

3. In the 1988 presidential election, 48,881,221 people voted for George Bush, and 41,805,422 people voted for Michael Dukakis. Of the people that voted for these two candidates, what percent voted for George Bush?

4. During the period 1980–1990, Moreno Valley, California, was the fastest growing city in the United States. Its population grew from 28,309 to 118,779 people. By what percent did the population increase during this period?

5. The public debt of the United States in 1980 was 907.7 billion dollars. In 1990, it was 3,233.3 billion dollars. By what percent did the public debt increase from 1980 to 1990?

6. In 1986, the average annual pay in the United States was $19,966. In 1990, it rose to $22,563. By what percent did the average annual pay increase from 1986 to 1990?

7. During the period 1980–1990, Naples, Florida, was the fastest growing metropolitan area in the United States. The 1980 population of Naples was 85,980, and its 1990 population was 152,099. By what percent did the population of Naples increase from 1980 to 1990?
1. A poll was conducted of 540 voters asking for which candidate they planned to vote. The results are given in the table. What percent of the voters planned to vote for the Democrat? \( \frac{233}{540} \approx 43\% \)

2. Hakeem shot the basketball 28 times and made 17 baskets. What percent of his shots were baskets?

3. Max is reading Gone With the Wind. He has read 250 pages out of the 960 pages in the book. What percent of the pages has he read?

4. Rolex Smudge was figuring out his federal income tax. His income was $32,900, but he was able to subtract $6,400 in deductions. He paid 18% of the remaining income in tax. How much did he pay?

5. The Saturn 5 rocket is 110.6 m tall. A model of the Saturn 5 rocket is 3.4 m tall. The model height is what percent of the actual height?

6. The regular price of a Space Invader game is $52, but it is on sale. The discount is $13. What percent discount is this?

7. Janis borrowed $1500 from her credit union for one year. The annual interest rate was 9%. What was the total amount she owed the credit union at the end of the year (principal plus interest)?

8. The Numeraiders won 7 games, lost 9 games, and tied 2 games. What percent of the games did they win?

9. The length of a classroom is 32 feet. The width is 75% of the length. Find the area of the classroom in square feet.

10. Forty people each bought $2 lottery tickets. Three of these people won $5, two of them won $10, and one of them won $20. The total amount of money won is what percent of the total amount spent on the tickets?
Simple Interest: \[ I = prt \]

Find the simple interest to the nearest cent.

1. $250 at 20% for 1 year
   \[
   I = 250 \times 0.2 \times 1 = 50
   \]
3. $75 at 6.5% for 9 months
4. $625 at 18.5% for 1 year

5. $3,284 at 15.5% for 2 years
6. $6,850 at 16% for 30 months

7. $170.32 at 3% for 4 years
8. $2,341 at 16.2% for 6 months

Find the total amount in each account.

9. $300 at 6% for 3 years
   \[
   I = 300 \times 0.06 \times 3 = 54
   \]
   \[ T = 54 + 300 = 354 \]
11. $1,000 at 5.5% for 9 months
12. $16.28 at 3% for 6 years

13. $298.97 at 4.5% for 3 months
14. $7,184 at 5.25% for 10 months

Find the annual rate of simple interest.

15. principal: $5,000 interest: $650 time: 3 years
   \[
   r = \frac{650}{5000 \times 3} = 0.04333 \quad r = 4.333\% 
   \]
16. principal: $4,840 interest: $199.95 time: 9 months
17. principal: $21.50 interest: $1.72 time: 2 years
18. principal: $725 interest: $130.50 time: 18 months
Discount

Find the discount to the nearest cent.

1. $42 jumper set, 25% off
   \[ 42 \times 0.25 = \boxed{10.50} \]

2. $189 pendant, 30% off

3. $99.99 watch, 20% off

4. $1.99 notebook, 50% off

5. $59.99 running shoes, 15% off

6. $64.99 hi-top shoes, 10% off

Find the sale price of each item.

7. $55 sport bag, 20% off
   \[ 55 \times 0.2 = 11 \]
   \[ 55 - 11 = \boxed{44} \]

8. $8.99 bag of tube socks, 30% off

9. $89.99 portable radio, 10% off

10. $54.99 toaster oven, 27% off

Find the percent of discount.

11. regular price: $79.99
    discount: $10
    \[ \frac{10}{79.99} = 0.125 \]
    \[ 12.5\% \]

12. regular price: $220
    sale price: $190

13. regular price: $200
    discount: $30

14. regular price: $49
    sale price: $39

Find the amount of discount and the sale price of each item.

15. $240 grill, 25% off
    \[ 240 \times 0.25 = \boxed{60} \]
    \[ 240 - 60 = \boxed{180} \]

16. $580 refrigerator, 12% off

17. $160 microwave, 20% off

18. $150 chair, 13% off
Addition and Subtraction of Integers I

Addition of Integers

1) \((-8) + (-5) = -13\)

2) \(9 + (-4) + 3 =\)

3) \(-8 + 2 + (-12) =\)

4) \(-5 + (-8) + 5 =\)

5) \((-6) + 9 = 3\)

6) \((-2) + (-3) + 4 =\)

7) \(4 + (-15) + (-4) =\)

8) \(-7 + (-4) + 3 =\)

Subtraction of Integers

9) \(5 - 12 =\)

10) \(-1 - (-5) =\)

11) \((-6) - (-4) =\)

12) \(-6 - 6 =\)

13) \(2 - (9) =\)

14) \(-8 - 9 =\)

15) \(3 - 2 - 1 =\)

16) \(9 - (-2) - 8 =\)

17) \((-2) - 8 =\)

18) \(8 - (-3) =\)

19) \((-8) - 3 =\)

20) \((-3) - (-3) =\)

21) \(5 - (-4) =\)

22) \(-6 - (-4) =\)

23) \(-4 - 5 - 6 =\)

24) \(0 - (-5) =\)

Addition and Subtraction of Integers

25) \(-3 + (-7) =\)

26) \(5 - 15 =\)

27) \(-8 + 4 =\)

28) \(-13 - 7 =\)

29) \(-13 + 7 =\)

30) \(4 + (-16) =\)

31) \(-2 - (-3) =\)

32) \(-5 - 5 - 5 =\)

33) \(6 + (-7) - 8 =\)

34) \(0 - (-12) =\)

35) \(-3 - (-7) =\)

36) \(6 + (-2) =\)

37) \(7 - 13 =\)

38) \(-13 - (-7) =\)

39) \(-1 - 1 =\)

40) \(-9 + (-3) =\)

41) \(5 - 8 + (-3) =\)

42) \(4 - (-8) =\)

43) \(-7 - (-8) =\)

44) \(1 - 0 - (-1) =\)
Solve each equation.

1. \(a = 3 \div (-7) + 12\)
   \(a = 8\)

2. \((-6) + 17 + 3 = d\)
   \(|2 = d|\)

3. \(x = (-8) + 5 + 19\)

4. \(z = (-3) + (-8) + (-9)\)

Solve each equation. Check by solving another way.

5. \(w = 35 + (-8) + 54\)

6. \(51 + (-7) + (-17) = k\)

7. \(27 + (-35) + 23 + (-15) = g\)

8. \(m = (-32) + 16 + 18 + 43\)

9. \(e = 41 + 26 + (-35) + 18\)

10. \(n = -14 + (-18) + 19 + 16\)

11. \(t = -63 + 18 + (-37) + 21\)

12. \(42 + (-43) + 45 + (-46) = d\)

13. \(75 + (-100) + 75 + (-50) = y\)

14. \(m = -38 + 12 + (-10) + 15\)

15. \(w = -9 + (-7) + (-10) + (-6)\)

16. \(45 + 52 + (-32) + 55 = p\)

17. \(b = -41 - (-86)\)

18. \(h = 273 - 421\)

19. \(n = (-361) - 684\)

\(b = 45\)

20. \(c = -847 - 98\)

21. \(j = 647 - (-77)\)

22. \(427 - 847 = p\)

Evaluate each expression if \(y = -6\), \(p = 8\), and \(x = -10\).

23. \(86 - x\)

24. \(y - (-19)\)

25. \(46 - p\)

\(86 - 10 = 76\)

26. \(y + p - x\)

27. \(p + x - y\)

28. \(100 - (y + p + x)\)
Adding and Subtracting Unlike Fractions

Complete.

1. \( \frac{3}{4} + \frac{7}{7} = \frac{3}{7} \)
2. \( \frac{5}{2} - \frac{3}{2} = \frac{7}{3} \)
3. \( \frac{3}{4} - \frac{1}{2} = \frac{1}{4} \)

Solve each equation. Write each solution in simplest form.

4. \( a = \frac{2}{3} + \frac{7}{12} \)
5. \( r = -\frac{5}{12} + \frac{3}{8} \)
6. \( -\frac{3}{10} + \left( -\frac{2}{5} \right) = x \)

7. \( 2\frac{2}{3} + (-4\frac{1}{4}) = q \)
   
   \[
   = -\frac{9}{4} + \frac{3}{12} = \frac{15}{12} - \frac{9}{12} = \frac{6}{12} = \frac{1}{2}
   \]
   
   \(-1\frac{7}{12} = q \)

8. \( 4\frac{3}{4} - (-2\frac{8}{9}) = g \)

9. \( t = \frac{11}{12} - 1\frac{3}{9} \)

10. \( 8\frac{3}{4} - 5\frac{1}{8} \)

11. \( 7\frac{5}{6} - 2\frac{1}{3} \)

12. \( 9\frac{5}{12} - 5\frac{3}{4} \)

13. \( 12\frac{7}{10} - 5\frac{3}{4} \)

14. \( 6\frac{5}{6} + 7\frac{3}{8} \)

15. \( 9\frac{5}{8} - 1\frac{2}{3} \)

16. \( 10\frac{7}{5} + 4\frac{1}{4} \)

17. \( 8\frac{4}{5} - 6\frac{3}{10} \)

18. \( 2\frac{1}{4} + 3\frac{1}{2} + 5\frac{5}{8} \)
Multiplying Integers

State whether each product will be positive, negative, or zero.

1. (-3)(-6)  
   positive

4. (-2)(8)(-4)   

5. (4)(0)(9)     

6. (-3)(-4)(-5)  

Solve each equation.

7. \(a = 9(-5)\)  

8. \(h = 7(-15)\)  

9. \(n = (-7)(-12)\)

10. \(e = (-16)(-4)\)  

   \(e = 64\)  

11. \((-12)(3) = j\)  

12. \(r = -14(-8)\)

13. \(g = 14(36)\)  

14. \(k = -11(-11)\)  

15. \(s = -16(-21)\)

16. \(315 \div 9 = p\)  

17. \(-312 \div (-12) = q\)  

18. \(285 \div (-15) = r\)

19. \(d = -312 \div (-6)\)  

20. \(e = 232 \div (-8)\)  

21. \(f = -144 \div (-9)\)

22. \(h = \frac{516}{12}\)  

23. \(j = \frac{480}{-10}\)  

24. \(g = \frac{-344}{-8}\)

25. \(q = \frac{-630}{42}\)  

26. \(-360 \div 8 = r\)  

27. \(\frac{-4.096}{-64} = s\)

Evaluate each expression if \(c = -3\), \(r = 9\), and \(t = -10\).

28. \(\frac{200}{t}\)  

   \(\frac{200 \circ}{-10} = -20\)

29. \(\frac{162}{r}\)  

30. \(\frac{63}{c}\)

31. \(cr \div 3\)  

32. \(tr \div c\)  

33. \((crt)^2 \div 6\)
Properties

The table shows the properties for addition and multiplication of fractions.

<table>
<thead>
<tr>
<th>Property</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commutative</strong></td>
<td></td>
</tr>
<tr>
<td>The sum or product of two fractions is the same regardless of the order in which they are added or multiplied.</td>
<td>$\frac{1}{2} + \frac{1}{4} = \frac{1}{4} + \frac{1}{2}$</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\frac{2}{3} \times \frac{1}{5} = \frac{1}{5} \times \frac{2}{3}$</td>
</tr>
<tr>
<td><strong>Associative</strong></td>
<td></td>
</tr>
<tr>
<td>The sum or product of three or more fractions is the same regardless of the way in which they are grouped.</td>
<td>$(\frac{1}{2} + \frac{5}{8}) + \frac{7}{8} = \frac{1}{2} + (\frac{5}{8} + \frac{7}{8})$</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\frac{1}{3} \times (\frac{3}{4} \times \frac{5}{7}) = (\frac{1}{3} \times \frac{3}{4}) \times \frac{5}{7}$</td>
</tr>
<tr>
<td><strong>Identity</strong></td>
<td></td>
</tr>
<tr>
<td>The sum of any fraction and 0 is the fraction. The product of any fraction and 1 is the fraction.</td>
<td>$\frac{7}{8} + 0 = \frac{7}{8}$</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\frac{5}{8} \times 1 = \frac{5}{8}$</td>
</tr>
<tr>
<td><strong>Inverse (Reciprocal)</strong></td>
<td></td>
</tr>
<tr>
<td>The product of a fraction and its reciprocal is 1.</td>
<td>$\frac{7}{8} \times \frac{8}{7} = 1$</td>
</tr>
<tr>
<td><strong>Distributive</strong></td>
<td></td>
</tr>
<tr>
<td>The sum of two fractions multiplied by a number is equal to the sum of the products of each fraction and the number.</td>
<td>$\frac{2}{3} (\frac{1}{2} + \frac{3}{7}) =$</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$(\frac{2}{3} \times \frac{1}{2}) + (\frac{2}{3} \times \frac{3}{7})$</td>
</tr>
</tbody>
</table>

**Name the multiplicative inverse of each number.**

1. $\frac{6}{11}$  
2. $\frac{19}{3}$  
3. $\frac{1}{8}$  
4. $9$

**Name the property shown by each statement.**

5. $\frac{11}{12} \times 1 = \frac{11}{12}$  
6. $(\frac{1}{6} + \frac{3}{8}) + \frac{5}{9} = \frac{1}{6} + (\frac{3}{8} + \frac{5}{9})$

7. $\frac{3}{4} \times \frac{5}{8} = \frac{5}{8} \times \frac{3}{4}$  
8. $\frac{3}{8} \times (\frac{1}{3} + \frac{5}{7}) = (\frac{3}{8} \times \frac{1}{3}) + (\frac{3}{8} \times \frac{5}{7})$

9. $\frac{5}{4} \times \frac{4}{5} = 1$  
10. $\frac{4}{6} + \frac{3}{4} = \frac{3}{4} + \frac{4}{5}$

11. $0 + \frac{17}{18} = \frac{17}{18}$  
12. $\frac{2}{5} \times (\frac{1}{4} \times \frac{9}{10}) = (\frac{2}{5} \times \frac{1}{4}) \times \frac{9}{10}$

22
Multiplying Fractions and Mixed Numbers

Multiply. Write each product in simplest form.

1. \( \frac{16}{3} \times \frac{1}{2} = \frac{1}{3} \)  
2. \( \frac{3}{4} \times \frac{1}{9} \)  
3. \( 3 \times \frac{4}{9} \)

4. \( \frac{1}{5} \times \frac{1}{4} \)  
5. \( \frac{1}{4} \times \frac{4}{6} \)  
6. \( \frac{4}{9} \times \frac{3}{4} \)

7. \( \frac{13}{21} \times \frac{7}{13} \)  
8. \( \frac{7}{8} \times \frac{4}{9} \)  
9. \( \frac{5}{7} \times \frac{7}{10} \)

10. \( \frac{4}{5} \times \frac{5}{14} \)  
11. \( \frac{1}{4} \times \frac{5}{8} \)  
12. \( \frac{2}{3} \times \frac{5}{9} \)

13. \( \frac{4}{5} \times \frac{7}{1} = \frac{28}{5} = \frac{5 \frac{3}{5}}{5} \)

14. \( 2\frac{2}{5} \times 1\frac{3}{5} \)

15. \( 6 \times \frac{2}{3} \)

16. \( 3\frac{3}{4} \times 12 \)  
17. \( 1\frac{5}{6} \times 2\frac{4}{7} \)  
18. \( 4\frac{1}{3} \times \frac{1}{2} \)

19. In Mr. Cranium's math class, \( \frac{2}{3} \) of the students attempted the bonus problem. Of those, \( \frac{3}{5} \) got it correct. What fraction of the whole class got the problem correct?

20. Ms. Rugg measured a room for carpet. She found it was \( 4\frac{1}{2} \) yd wide and \( 5\frac{2}{3} \) yd long. How many square yards of carpet will be needed?
Dividing Fractions

State a multiplication expression for each division expression. Then compute.

1. \( \frac{3}{4} \div \frac{9}{10} \)
   \[
   \frac{\frac{3}{4}}{\frac{9}{10}} = \frac{5}{6}
   \]

2. \(-\frac{2}{3} \div \frac{6}{11}\)

3. \(\frac{10}{13} \div 15\)

4. \(-6 \div (-2\frac{1}{3})\)

5. \(3\frac{1}{2} \div 2\frac{1}{3}\)

6. \(5\frac{1}{3} \div (-6)\)

7. What is the value of \(\frac{16}{44}\)?

Solve each equation. Write each solution in simplest form.

8. \(a = \frac{2}{3} \div \frac{3}{4}\)

9. \(f = 18 \div (-3)\)

10. \(c = \frac{4}{5} \div \frac{3}{10}\)

11. \(2\frac{1}{2} + 3\frac{3}{8} = k\)

12. \(\frac{4}{5} \div (-6) = b\)

13. \(m = 5\frac{3}{4} \div \frac{7}{8}\)

14. \(0.12 + 16 = g\)

15. \(h = -6.5 \div 8\)

16. \(-3.5 \div (-2.75) = d\)

Evaluate each expression.

17. \(c + d\) if \(c = \frac{1}{3}\) and \(d = 2\frac{1}{2}\)

18. \(a + b^2\) if \(a = -\frac{3}{4}\) and \(b = \frac{4}{5}\)

19. \(x^2 + y\) if \(x = \frac{2}{3}\) and \(y = -\frac{3}{2}\)

20. \(m^2 + y^2\) if \(m = 2\frac{1}{2}\) and \(y = 5\)
Why Didn’t Anybody Win the Race from Russia to Sweden?

Evaluate each formula for the given values of the variables. Circle the letter of the correct value. Write this letter in the box containing the number of the exercise.

<table>
<thead>
<tr>
<th>Formula</th>
<th>Find if values</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>( d = rt )</td>
<td>( r = 8 ) and ( t = 3 )</td>
<td>( K. \ 32 )</td>
</tr>
<tr>
<td></td>
<td>( r = 60 ) and ( t = 7.5 )</td>
<td>( U. \ 390 )</td>
</tr>
<tr>
<td>( V = lwh )</td>
<td>( l = 3, w = 2, h = 9 )</td>
<td>( E. \ 54 )</td>
</tr>
<tr>
<td></td>
<td>( l = 7, w = 4, h = 3.2 )</td>
<td>( H. \ 94.6 )</td>
</tr>
<tr>
<td>( A = \frac{bh}{2} )</td>
<td>( b = 12, h = 5 )</td>
<td>( G. \ 42 )</td>
</tr>
<tr>
<td></td>
<td>( b = 2.4, h = 38 )</td>
<td>( C. \ 39.6 )</td>
</tr>
<tr>
<td>( y = mx + b )</td>
<td>( m = 2, x = 7, b = 4 )</td>
<td>( O. \ 18 )</td>
</tr>
<tr>
<td></td>
<td>( m = 1.6, x = 9, b = 3 )</td>
<td>( Y. \ 17.4 )</td>
</tr>
<tr>
<td>( d = \frac{n(n-3)}{2} )</td>
<td>( n = 6 )</td>
<td>( L. \ 11 )</td>
</tr>
<tr>
<td></td>
<td>( n = 11 )</td>
<td>( S. \ 44 )</td>
</tr>
<tr>
<td>( A = \frac{h(a+b)}{2} )</td>
<td>( h = 3, a = 8, b = 2 )</td>
<td>( E. \ 15 )</td>
</tr>
<tr>
<td></td>
<td>( h = 4.5, a = 10, b = 6 )</td>
<td>( D. \ 36 )</td>
</tr>
<tr>
<td>( s = 16t^2 )</td>
<td>( t = 3 )</td>
<td>( N. \ 180 )</td>
</tr>
<tr>
<td></td>
<td>( t = 10 )</td>
<td>( S. \ 960 )</td>
</tr>
<tr>
<td>( V = \frac{w^2h}{3} )</td>
<td>( w = 5, h = 6 )</td>
<td>( V. \ 50 )</td>
</tr>
<tr>
<td></td>
<td>( w = 8, h = 2.7 )</td>
<td>( T. \ 57.6 )</td>
</tr>
</tbody>
</table>
**Algebra: Solving Equations**

Solve each equation. Check your solution.

1. \( x - 16 = -38 \)
   \[ x = -22 \]

2. \( 2w = -64 \)

3. \( -9s = -63 \)

4. \( y - (-12) = 16 \)

5. \( -15 + a = -32 \)

6. \( q + (-63) = -100 \)

7. \( \frac{h}{5} = 18 \)

8. \( \frac{m}{6} = -9 \)

9. \( x - 240 = 78 \)

10. \( -17 = \frac{n}{4} - 18 \)
    \[ n = 16 \]

11. \( 25 = \frac{n}{6} + (-19) \)

12. \( -6y = -960 \)

13. \( 18w = -234 \)

14. \( 2,294 = -74t \)

15. \( 49 = -9y - 68 \)

16. \( 375 = 14x + (-17) \)
    \[ x = 28 \]

17. \( -12y - 14 = 142 \)

18. \( 15x + 36 = -249 \)
Solving Inequalities

Solve each inequality. Show the solution on a number line.

1. \(x + 2 > 6\)
   \[\frac{-2}{x > 4}\]

2. \(y + 3 < 9\)

3. \(3 \cdot e > 12\)

4. \(\frac{f}{4} > 2\)

5. \(a + 12 < 18\)

6. \(b - 2 < 6\)

7. \(4c < 8\)

8. \(\frac{d}{3} > 3\)

9. \(2x + 3 > 9\)

10. \(4y - 6 < 18\)

11. \(\frac{f}{2} + 6 < 8\)
**Statistics Connection: Using Statistics to Predict**

**Sports** Of the TV households surveyed by the Nielsen Media Research Company, the top sports shows of 1990-1991 are listed in the table at the right.

<table>
<thead>
<tr>
<th>Top Sports Shows, 1990-91</th>
<th>% of TV households</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Super Bowl XXV</td>
<td>41.9</td>
</tr>
<tr>
<td>2. NFC Championship</td>
<td>28.5</td>
</tr>
<tr>
<td>3. AFC Playoff Bengals vs. Raiders</td>
<td>24.7</td>
</tr>
<tr>
<td>4. NFC Playoff Saints vs. Bears</td>
<td>24.2</td>
</tr>
</tbody>
</table>

1. How many households in a town with 40,000 households might you expect to have watched Super Bowl XXV?  
   \[ 0, \text{419} \times 40,000 = 16,760 \]  
   \(1)\) 16,760

2. How many households in a town with 80,000 households might you expect to have watched the fourth top show?  
   \(2)\)

3. How many households in a town with 100,000 households might you expect to have watched a program other than the NFC Championship game?  
   \(3)\)

**School** Mrs. Romano surveyed her 7th grade class about their favorite foods. The results are shown in the table at the right.

<table>
<thead>
<tr>
<th>Mrs. Romano’s Class</th>
<th>Favorite Food</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>spaghetti</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>pizza</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>hamburgers</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>tacos</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>fried chicken</td>
<td>3</td>
</tr>
</tbody>
</table>

4. What was the sample size? \(4)\)  

5. What percent of students liked pizza best? \(5)\)

6. Mr. Peters’ class has 24 students in it but otherwise is about the same as Mrs. Romano’s class. How many students would you expect to like spaghetti the best? \(6)\)

7. How many students in Mr. Peters’ class would you expect to not like tacos the best? \(7)\)

8. For the entire 7th grade class of 250 students, how many would you expect to like fried chicken the best? \(8)\)
How Do We Know That Clocks Are Hungry?

Cross out the letters above each correct answer. When you finish, write the remaining letters in the spaces at the bottom of the page.

1. A die in the shape of an octahedron has sides numbered from 1 to 8.
   a. Each time you roll the die, how many equally likely outcomes are there?
   b. If you roll the die once, what is the probability of getting a 3? \( \frac{1}{8} \)
   c. If you roll once, what is the probability of getting a number greater than 6?
   d. If you roll the die 800 times, about how many times would you expect to get a 7?
   e. If you roll the die 240 times, about how many times would you expect to get a 4?

2. Find each probability if you spin the spinner once.
   a. \( P(\text{black}) \)  
   b. \( P(\text{white}) \)  
   c. \( P(\text{striped}) \)
   d. \( P(\text{black or white}) \)
   e. \( P(\text{not white}) \)
   f. \( P(\text{black or white or striped}) \)
   g. \( P(\text{green}) \)

3. If you spin the spinner 100 times, about how many times would you expect it to land on:
   a. black?  
   b. white?  
   c. striped?

4. A dart is thrown at the target shown. If the dart hits the target randomly, what is the probability that it will:
   a. Hit the bullseye (one of the shaded squares in the middle)?
   b. Hit one of the shaded squares around the edge?
   c. Hit any shaded square?  
   d. Hit any unshaded square?

5. If a dart hits the target randomly 180 times, about how many bullseyes would you expect?

<table>
<thead>
<tr>
<th>BO</th>
<th>TH</th>
<th>IT</th>
<th>IS</th>
<th>WH</th>
<th>TR</th>
<th>E</th>
<th>AT</th>
<th>BO</th>
<th>N</th>
<th>YA</th>
<th>RD</th>
<th>OT</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>25</td>
<td>1/10</td>
<td>1/3</td>
<td>8</td>
<td>50</td>
<td>1/5</td>
<td>20</td>
<td>1/4</td>
<td>1</td>
<td>2/9</td>
<td>5/9</td>
<td>2/5</td>
</tr>
<tr>
<td>TI</td>
<td>CK</td>
<td>LW</td>
<td>AS</td>
<td>H</td>
<td>AN</td>
<td>D</td>
<td>AY</td>
<td>C</td>
<td>UP</td>
<td>S</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>100</td>
<td>1/12</td>
<td>1/9</td>
<td>1/2</td>
<td>9/10</td>
<td>2/3</td>
<td>1/6</td>
<td>30</td>
<td>40</td>
<td>40</td>
<td>70</td>
<td>1/8</td>
</tr>
</tbody>
</table>
**What Do You Call a Palace Window?**

Cross out the letters above each correct answer (some are rounded). When you finish, write the remaining letters in the spaces at the bottom of the page.

A. For each pair of similar figures, find the length of each side marked with a variable.

1. \( x = 9.6 \text{ m} \)

2. \( x = 16 \text{ cm} \)

3. \( x = 30 \text{ in.} \)

4. \( 15 \text{ cm} \)

5. \( 18 \text{ ft} \)

6. \( 32 \text{ m} \)

7. \( 3 \text{ in.} \)

8. \( 9.2 \text{ cm} \)

9. \( 50 \text{ ft} \)

B. Solve.

10. Jen-Min wants to enlarge a 4-in. by 6-in. photo so that the longer side will be 14 in. How long will the shorter side be?

11. A tree casts a shadow 30 ft long. If a man 6 ft tall casts a shadow 5 ft long at the same time of day, how tall is the tree?
**Similar Figures and Areas**

The areas of two similar figures are related in a special way. Suppose that rectangle A is 2 units by 3 units and rectangle B is 4 units by 6 units.

The area of rectangle A is $2 \times 3 = 6$ units$^2$.
The area of rectangle B is $4 \times 6 = 24$ units$^2$.

The lengths of the sides of rectangle B are twice those of rectangle A and the area of rectangle B is four times that of rectangle A.

*Sketch figure B similar to figure A and satisfying the given condition.*

1. Rectangle B has sixteen times the area of rectangle A.

2. Square B has an area that is 4 times that of square A.

3. Circle B has an area four times that of circle A.
**A Triangle Inequality**

A well known inequality in geometry relates the measures of the three sides of any triangle. Here are two different statements of this inequality.

**The Triangle Inequality**

The sum of the measures of any two sides of a triangle is greater than the measure of the third side.

In any \( \triangle ABC \), \( AB + BC > AC \).

---

**Solve each problem.**

1. Use three line segments with the measures 3, 4, and 8. Write a statement using the < symbol to show that these three segments do not satisfy the triangle inequality.

2. Try to draw a triangle using the three segments in Problem 1. Describe what happens.

---

**Can the three measures be used to make a triangle? Write yes or no.**

3. 6 m, 2 m, 7 m
4. 5 cm, 8 cm, 11 cm
5. 5 in., 14 in., 7 in.
6. 9 cm, 5 cm, 4 cm
7. 10 yd, 10 yd, 10 yd
8. 4 ft, 10 ft, 5 ft

---

**For each triangle, describe the possible measures of side AB.**

9.

10.

11.

---
Cross Sections

In each diagram on this page, a plane cuts through a solid figure. The intersection of the plane with the solid figure is called a cross section.

Sketch the cross section formed in each diagram.

1. 

2. (pyramid with a square base)

3. 

4. 

5. (pyramid with a triangular base)

6. 

7. 

8. (pyramid with a triangular base)
**Area of Circles**

\[ \pi = 3.14 \]
\[ r = \text{radius} \]
\[ d = \text{diameter} = (2r) \]

**Example 1**

Area = \[ \pi r^2 \]
\[ A = \pi (7)^2 \]
\[ A = (3.14)(49) \]
\[ A = 153.86 \text{ cm}^2 \]

**Example 2**

\[ A = \pi r^2 \]
\[ d = 18 \text{ mm} \]
Radius is half of diameter.
To find the radius, divide by 2.
\[ r = \frac{18}{2} = 9 \]
\[ A = (3.14)(9)^2 \]
\[ A = 254.34 \text{ mm}^2 \]

Find the areas.

1. \[ \frac{9 \text{ yd}}{ } \]
2. \[ \frac{6 \text{ in.}}{ } \]
3. \[ \frac{8 \text{ km}}{ } \]
4. \[ \frac{5 \text{ m}}{ } \]
5. \[ \frac{6 \text{ cm}}{ } \]
6. \[ \frac{11 \text{ ft}}{ } \]
Page 1
1) 26 miles per gallon  2) $2.66 per box
3) $2.33 per movie  4) 3 shows per hour
5) $2.50 per blizzard  6) 4 hot dogs per student
7) 23 1/3 students per teacher

Page 3
1) CD: +7 Eq: y = 7x  2) CD: +2 Eq: y = 2x + 2
3) CD: +3 Eq: y = 3x + 2  4) CD: +10 Eq: y = 10x - 5

Page 4
1) 81 ounces  2) 12 rafters  3) 144 addresses
4) 20 cups  5) 1200 inches  6) 351 rivets
7) 225 mushrooms  8) 48 carpets
9) ≈ 23 clipboards  10) 5880 beets
11) 6 gallons gas  12) 5.5 pages

Page 5
1) 54 free throws  2) 300 km  3) 120 people
4) 144 balls  5) $374  6) 7.5 hours  7) 128 at bats
8) 0.375 or 3/8 L of milk  9) 41.25 revolutions
10) 36 teachers  11) 4.7 or 4 2/3 hours
12) 1428 mi

Page 6
1) $35 x 0.80 = $28. Since you get 20% off, you only pay 80% of the price.
2) $28 x 90% = $25.20. Since I get another 10% off, I took 90% of the sale price.
3) Video games: $28, $25.20
   CD$': $16, $14.40
   CD storage case: $10.40, $9.36
   Cassette tapes: $7.60, $6.84
   Video play station: $112, $100.80
4) 35 + 20 + 13 + 9.50 + 140 - (25.20 + 14.40 + 9.36 + 6.84 + 100.80) = savings of $60.90.

Page 7

\[
\begin{array}{c|c|c|c|c|c|c}
\hline
\text{Price} & \text{\#} & \text{Income} & \text{Exp} & \text{Profit} \\
\hline
\$5 & 100 & $500 & $300 & $200 \\
\hline
\$6 & 80 & $480 & $260 & $220 \\
\hline
\$7 & 60 & $420 & $220 & $200 \\
\hline
\end{array}
\]

Page 10
1) 70%  2) 24%  3) 32%  4) 60%  5) 380%
6) 37.5%  7) 81  8) 110.4  9) 125  10) 70.2
11) 320  12) 32  13) 116  14) 83  15) 18
16) 330  17) 737.3  18) 1.4

Page 11
1) 92.0%  2) 51.3%  3) 53.9%  4) 319.6%
5) 256.2%  6) 13.0%  7) 76.9%

Page 12
THEY HAVE GOOD ICE SIGHT

Page 13
1) $50  2) $52.50  3) $3.66  4) $115.63
5) $1018.04  6) $2740  7) $20.44  8) $189.62
9) $354  10) $300.21  11) $1041.25  12) $19.21
13) $302.33  14) $7498.30  15) 4 1/3%  16) 5.5%
17) 4%  18) 12%

Page 14
1) $10.50  2) $56.70  3) $20  4) $1  5) $9
6) $6.50  7) $44  8) $6.29  9) $80.99  10) $40.14
11) ≈ 13%  12) ≈ 14%  13) 15%  14) ≈ 20%
15) $60; $180  16) $69.60; $510.40
17) $32; $128  18) $19.50; $130.50

Page 16
1) -13  2) 8  3) -18  4) -8  5) 3  6) -1  7) -15
8) -8  9) -7  10) 4  11) -2  12) -12  13) -7  14) -17
15) 0  16) 3  17) -10  18) 11  19) -11  20) 0  21) 9
22) 2 - 23) -15  24) 5  25) -10  26) -10  27) -4
28) -20  29) -6  30) -12  31) 1  32) -15  33) -9
34) 12  35) 4  36) 4  37) -6  38) -6  39) -2
40) -12  41) -6  42) 12  43) 1  44) 2

Page 17
1) 8  2) 14  3) 16  4) -20  5) 81  6) 27  7) 0  8) 45
9) 50  10) 3  11) -61  12) -2  13) 0  14) -21
15) -32  16) 120  17) 45  18) -148  19) -1045
20) -945  21) 724  22) -420  23) 96  24) 13
25) 38  26) 12  27) 4  28) 108
Page 18
1) 10 2) 5 3) 3 4) 1 5) -1/4 6) -1/24 7) -7/10
8) -1 7/12 9) 5 1/8 10) -3/4 11) 3 5/8 12) 5 1/2
13) 3 2/3 14) 6 19/20 15) 14 5/24 16) 7 17/24
17) 15 1/36 18) 1/2 3/18 19) 11 3/8

Page 20
1) positive 2) negative 3) positive 4) positive
5) zero 6) negative 7) -45 8) -105 9) 84 10) 64
11) -36 12) 112 13) 504 14) 121 15) 336
16) 35 17) 26 18) -19 19) 52 20) -29 21) 16
22) 43 23) -43 24) 43 25) -15 26) -45 27) 64
28) -20 29) 18 30) -21 31) -9 32) 30
33) 12.150

Page 22 (continued)
1) 11/6 2) 3/19 3) 8 4) 1/9 5) identity
6) associative 7) commutative 8) distributive
9) inverse 10) commutative 11) identity

Page 23
1) 1/3 2) 1/12 3) 1 1/3 4) 1/20 5) 1/5 6) 1/3
7) 1/3 8) 7/18 9) 1/2 10) 2/7 11) 5/32
12) 10/27 13) 5 3/5 14) 3 3/7 15) 4 16) 45
17) 4 18) 2 1/6 19) 2/5 20) 25 1/2 square yards

Page 24
1) 1/4 x 10/6; 5/6 2) -2/3 x 11/6; -1 2/9
3) 10/13 x 1/15; 2/39 4) -6/1 x -3/7; 2 4/7
5) 7/2 x 3/7; 1 1/2 6) 16/3 x 1/6; -8/9 7) 4 8) 8/9
9) -6 10) 2 2/3 11) 25/36 12) 2/27 13) 8 5/8
14) 0.0075 15) -0.8125 16) 1.27 17) 2/15
18) -1 11/64 19) -8/27 20) 1/4

Page 30
EVERYBODY STOPPED

Page 32
1) x = -22 2) w = -32 3) s = 7 4) y = 4
5) a = -17 6) q = -37 7) k = 90 8) m = 54
9) x = 318 10) n = -16 11) p = -264 12) y = 160
13) w = -13 14) x = -31 15) y = -13 16) x = 28
17) y = -13 18) x = -19

Page 35
1. x + 2 > 6
   x > 4
2. y + 3 < 9
   y < 6
3. 3 x > 12
   q > 4
4. f > 2
   f > 8
5. a > 12 or
   a < 6
6. b > 3 or
   b < 8
7. c < 2
8. e > 9
9. f > 3
   f > 9
10. g > 6 or
    g < 6
11. h < 4

Page 37
1) 16,760 2) 19,360 3) 71,500 4) 30 5) 30%
6) 8 7) about 21 8) 25

Page 39
THEY ALWAYS

Page 41
A ROYAL PAN

Page 42
1. Rectangle B has sixteen times the area of rectangle A.

2. Square B has an area that is 4 times that of square A.

3. Circle B has an area four times that of circle A.
Page 44
1) $3 + 4 < 8$  2) The two shorter lengths do not meet.  3) yes  4) yes  5) no  6) no  7) yes  8) no  9) $AB$ is between 2 and 12, or $2 < AB < 12$.  
10) $AB$ is between 2 and 8, or $2 < AB < 8$.
11) $AB$ is $< 50$.

Page 45
1)  
2)  
3)  
4)  
5)  
6)  
7)  
8)  

Page 47
1) $\approx 63.6 \text{ yd}^2$  2) $\approx 113.1 \text{ in}^2$  3) $\approx 50.3 \text{ km}^2$  
4) $\approx 78.5 \text{ m}^2$  5) $\approx 28.3 \text{ cm}^2$  6) $\approx 380.1 \text{ ft}^2$