Name:_____

Factors, Multiples, and Prime Numbers

For each of the following, use the set of clues to determine the secret number.

Puzzle A:

Clue 1 The number has two digits.
Clue 2 The number has 13 as a factor.
Clue 3 The sum of the digits of the number is 11.

Puzzle B:

Clue 1 The number is prime.
Clue 2 The number is less than 19.
Clue 3 The sum of the digits of the number is greater than 7.

List all the factors of each number.

24:

31:

35:

Which of the numbers (24, 31, 35) are *prime* numbers? Explain why.

Which of the numbers (24, 31, 35) are *composite* numbers? Explain why.

Given the following sets of numbers, write as many different multiplication and division statements as you can. For example, if the numbers are 5, 7, 35, you can write:

$5 \times 7 = 35$ $7 \times 5 = 35$ $35 \div 5 = 7$ $35 \div 7 = 5$

a. 6, 4, 24

b. 96, 12, 8, 3, 32

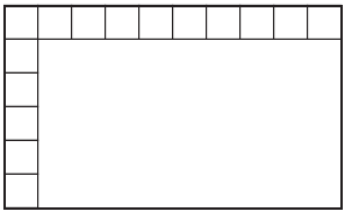
c. 6, 27, 108, 12, 4, 18, 9

Alicia has made a rectangle using 24 square tiles. If she adds the length and width of her rectangle together, she gets 11.What is the length and width of Alicia's rectangle? Explain your reasoning.

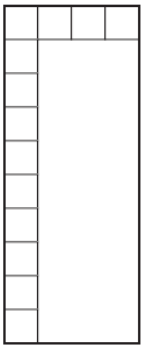
Jennifer has made a rectangle using 48 square tiles. If she adds the length and width of her rectangle together she gets a prime number. What is the length and width of Jennifer's rectangle? Explain your reasoning.

In each of the rectangles shown below, only the tiles along the length and width are shown. For each rectangle, explain how many square tiles it would take to make each rectangle.

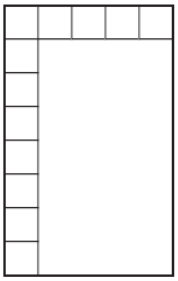
a.



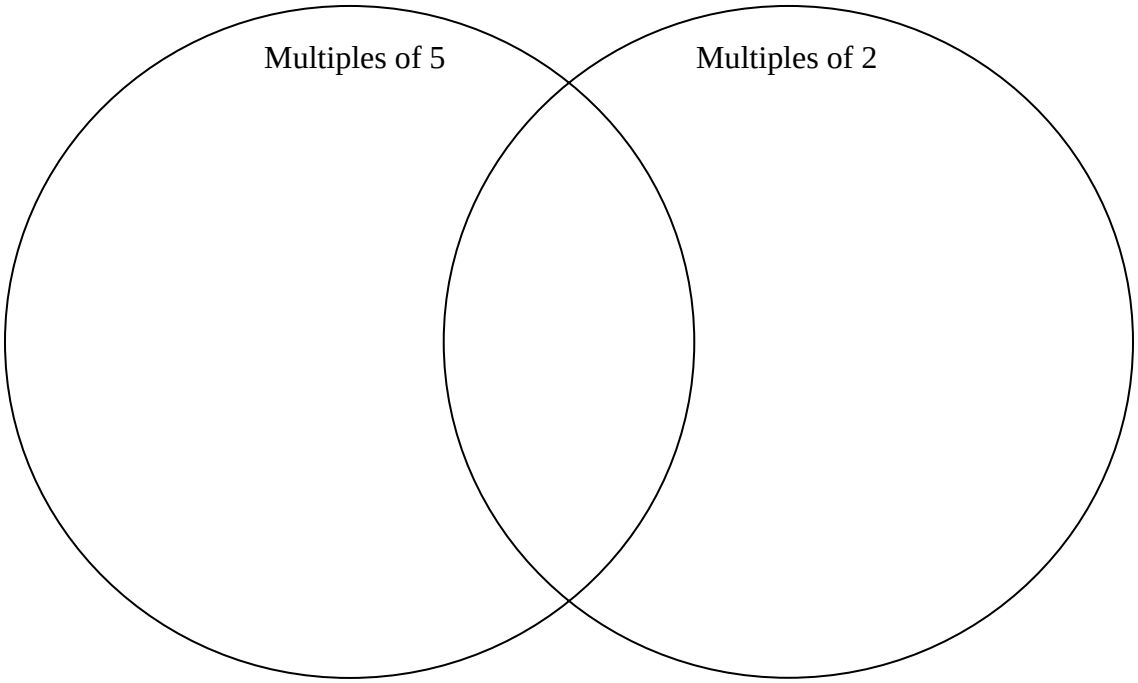
b.



c.



Venn Diagram:



a. Place the numbers from 1 to 40 in the appropriate regions of the diagram.

b. What do you notice about the numbers in the intersection? Why does this happen?

c. Where would you place 75 in the diagram? Where would you place 90? Explain your reasoning.

Karl added four numbers together and got an even sum. Three of the numbers are 42, 35, and 77. What can you say about the fourth number? Explain your reasoning.

On Saturdays, the #14 bus makes roundtrips between Susan's school and the mall, and the #11 bus makes roundtrips between the mall and the museum. Next Saturday, Susan wants to take the bus from her school to the museum. A #14 bus leaves Susan's school every 15 minutes, beginning at 7 A.M. It takes the bus 30 minutes to travel between the school and the mall. A #11 bus leaves the mall every 12 minutes, beginning at 7 A.M.

a. If Susan gets on the #14 at 9:30 A.M., how long will she have to wait at the mall for a #11 bus? Explain your reasoning.

b. If Susan gets on the #11 bus at the museum and arrives at the mall at 11:48 A.M., how long will she have to wait for the #14 bus? Explain your reasoning.

c. At what times between 9 A.M. and noon are the #14 and #11 buses at the mall at the same time? Explain your reasoning.

Jack plays on a basketball team after school (or on the weekend) every third day of the month. He baby-sits his younger brother after school every seventh day of the month. How many times during a 30-day month, if any, will Jack have a conflict between basketball and babysitting? Explain your reasoning.

Suppose you have two different numbers which are both prime.
a. What is the least common multiple of the numbers? Explain your reasoning.

b. What is the greatest common factor? Explain your reasoning.

Find the ***least common multiple*** and the ***greatest common factor*** for each pair of numbers:

a. 8 and 12

b. 7 and 15

c. 11 and 17

d. 36 and 108

e. For which pairs in parts (a)–(d) is the least common multiple the product of the two numbers? Why is this so? What is special about the numbers in these pairs?

Find the greatest common factor of each pair of numbers:

a. 4 and 12

b. 5 and 15

c. 10 and 40

d. 25 and 75

e. When is the greatest common factor of two numbers one of the two numbers? Explain your reasoning.

Find the prime factorization for each of the numbers below.

a. 630

b. 144

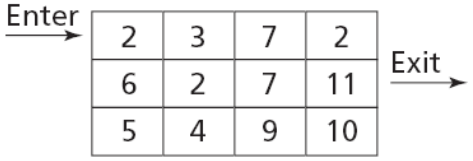
c. 1,011

d. 133

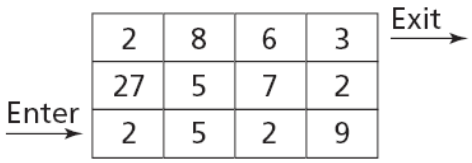
e. 23

Solve each of the multiplication mazes given below. Record your solution for each maze by tracing out the path through the maze and recording your multiplication work below each maze.

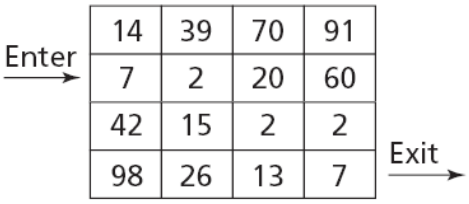
a. **Maze 924**



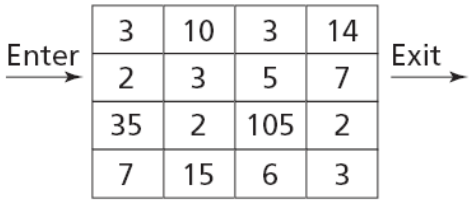
b. **Maze 1080**



c. **Maze 38220**



d. **Maze 210**



A *number sequence* is an ordered series of numbers that follow a pattern or rule. Jason has developed a secret rule for generating his own number sequence. Here are the first five terms in the sequence: 3, 15, 45, 225, 675, ...and so on. Use Jason's sequence to answer the following questions.

a. What is Jason's rule for finding the numbers in his number sequence? Explain how you found your answer.

b. What are the next two terms in Jason's number sequence?

c. What is the greatest common factor of all the terms in Jason's sequence, no matter how many new numbers he adds to the sequence? Explain your reasoning.

For each of the sets of clues below, find the secret number.

a. **Clue 1** The number is less than 130.
Clue 2 The number ends in a 5.
Clue 3 The number is a multiple of a prime that is greater than 20, but less than 30.

b. **Clue 1** The number ends in a 0.
Clue 2 The number is a multiple of 21.
Clue 3 The number is less than 400.

Find the prime factorization of each of the following numbers.

a. 190

b. 319

c. 255

d. 406

Fractions

a. For each of the fraction strips below, write a fraction that expresses how much of the strip is shaded.

i. 

ii. 

iii. 

iv. 

v. 

vi. 

b. For each of the six fraction strips above, write a fraction that expresses how much of the strip is not shaded.

c. What is the relationship between the fraction you wrote for the shaded part and the fraction you wrote for the un-shaded part for each of the six fraction strips? Explain your reasoning.

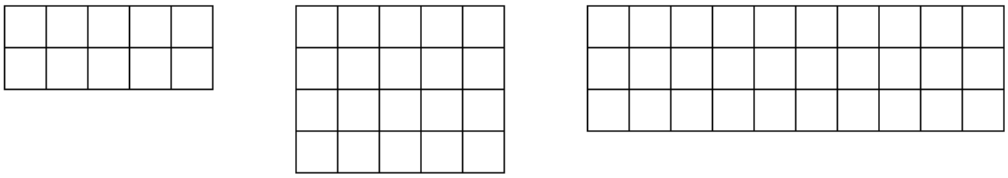
A bag contains 24 marbles (**Note:**You may want to use 24 cubes, chips, marbles, or other objects to help you solve this problem.)

a. If 16 of the marbles are removed from the bag to play a game, what fraction of the marbles are left in the bag?

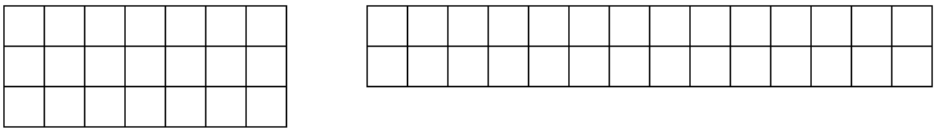
b. Of the 16 marbles taken from the bag, one-fourth are put back in the bag. Now how many marbles are in the bag? Explain your reasoning.

Shade each grid to represent the given fraction.

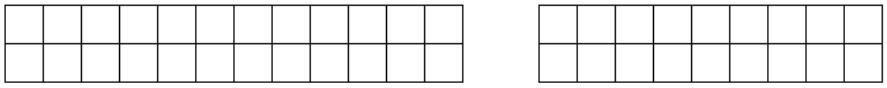
a. Represent the fraction 5/6 on each grid.



b. Represent the fraction 3/7 on each grid.



c. Represent the fraction 2/3 on each grid.



For each pair of fractions, insert a less-than symbol (<), greater-than symbol (>), or an equals symbol (=) between the fractions to make the true statement.

a. $\frac{1}{2}$ $\frac{5}{10}$ **b.** $\frac{1}{3}$ $\frac{2}{5}$ **c.** $\frac{5}{12}$ $\frac{1}{3}$

d. $\frac{4}{5}$ $\frac{2}{3}$ **e.** $\frac{3}{4}$ $\frac{8}{10}$ **f.** $\frac{5}{8}$ $\frac{3}{7}$

a. For each pair of fractions, insert a less-than symbol (<), greater-than symbol (>), or an equals symbol (=) between the fractions to make the true statement.

i. $\frac{2}{3}$ $\frac{2}{5}$ **ii.** $\frac{4}{6}$ $\frac{4}{5}$ **iii.** $\frac{3}{4}$ $\frac{3}{8}$

b. Describe a way to compare two fractions when the numerators are the same.

a. For each pair of fractions, insert a less-than symbol (<), greater-than symbol (>), or an equals symbol (=) between the fractions to make the true statement.

i. $\frac{2}{5} \quad \frac{4}{5}$ ii. $\frac{4}{9} \quad \frac{7}{9}$ iii. $\frac{5}{11} \quad \frac{3}{11}$

b. Describe a way to compare two fractions when the denominators are the same.

For each group of fractions, rewrite the fractions in order from least to greatest.

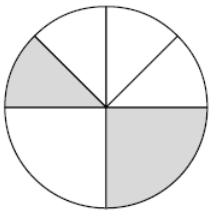
a. $\frac{2}{3}, \frac{1}{2}, \frac{3}{4}, \frac{2}{6}$

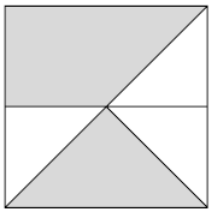
b. $\frac{24}{4}, \frac{1}{4}, \frac{11}{16}, \frac{1}{7}$

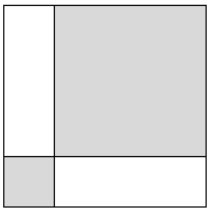
c. $\frac{1}{2}, \frac{1}{5}, \frac{1}{3}, \frac{1}{9}, \frac{1}{6}$

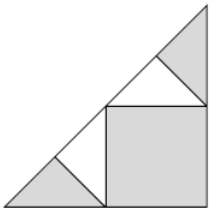
d. $\frac{11}{16}, \frac{3}{4}, \frac{3}{8}, \frac{1}{2}, \frac{3}{16}$

For each shape below, write a fraction to express the portion of the entire shape that is shaded.

a. 

b. 

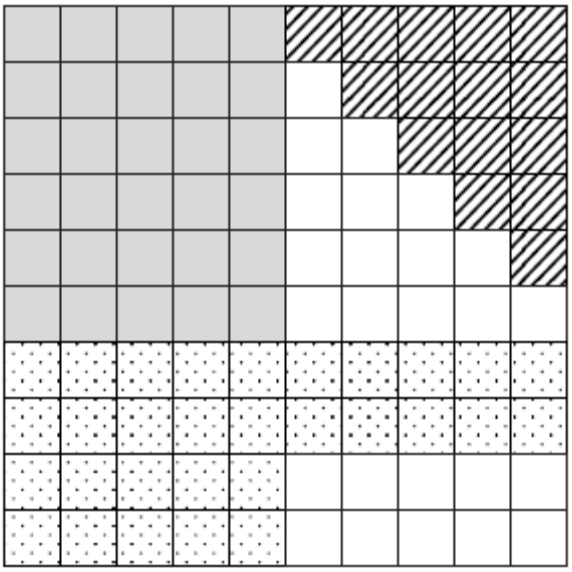
c. 

d. 

Copy and complete the following table:

Fraction	$\frac{7}{4}$		$\frac{35}{3}$	$\frac{19}{4}$		
Mixed Number		$3\frac{2}{3}$			$2\frac{5}{6}$	$7\frac{1}{2}$

In the diagram, the hundredths grid is the whole. Use the grid to answer each of the following questions and write each answer in both decimal and fraction form.



a. What portion of the grid is shaded gray?

b. What portion of the grid is striped?

c. What portion of the grid is checkered?

d. What portion of the grid is blank?

For each pair of numbers, insert a less-than symbol (<), a greater-than symbol (>), or an equals symbol (=) between the numbers to make a true statement.

a. 0.305 0.35 **b.** 0.123 0.1002 **c.** 0.25 0.25000

d. 0.25 0.025 **e.** 3.45 3.045 **f.** 12.03 12.30

For each pair of numbers, insert a less-than symbol (<), greater-than symbol (>), or an equals symbol (=) between the numbers to make a true statement.

a. 2.5 $2\frac{2}{5}$ **b.** 0.65 $\frac{2}{3}$ **c.** 0.8 $\frac{4}{7}$

d. $\frac{5}{8}$ 0.625 **e.** 0.3 $\frac{3}{7}$ **f.** 2.1 $1\frac{9}{10}$

g. $\frac{11}{12}$ $\frac{11}{11}$ **h.** $\frac{3}{6}$ 0.5 **i.** 9 $8\frac{8}{10}$

Name three fractions that are equivalent to each decimal below. Explain your reasoning. Draw a picture if it helps you explain your thinking.

a. 0.60 **b.** 1.7 **c.** 0.05

d. 2.3 **e.** 0.15 **f.** 0.625

Name a decimal that is equivalent to each fraction below. Explain your reasoning. Draw a picture if it helps you explain your thinking.

a. $\frac{1}{2}$ **b.** $\frac{3}{15}$ **c.** $\frac{7}{4}$ **d.** $\frac{3}{8}$ **e.** $\frac{111}{20}$ **f.** $\frac{18}{24}$

Sarah can jog at a steady pace of 4.75 miles per hour, and Tony can jog at a steady pace of 4.25 miles per hour.

a. How many miles can Sarah jog in 30 minutes? Explain your reasoning.

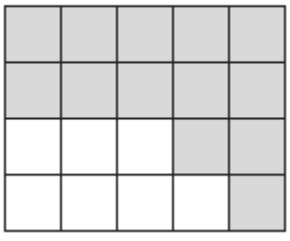
b. How many miles can Tony jog in 30 minutes?

c. If Sarah and Tony jog for 45 minutes, how much farther will Sarah go than Tony? Explain your reasoning.

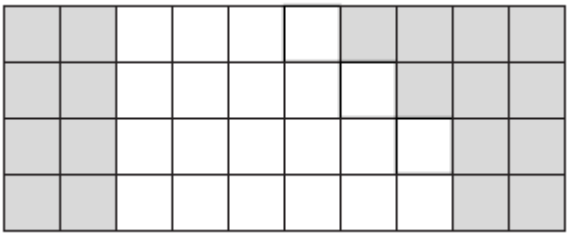
Each small square on the grid represents 1/5 .

a. What whole number is represented by the whole grid?

b. What decimal is represented by the shaded region of the grid?



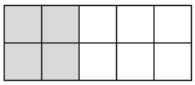
9. Each small square on the grid represents 0.25.

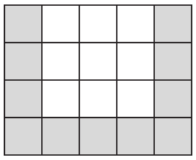


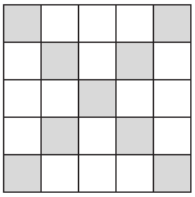
a. What whole number is represented by the whole grid?

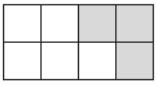
b. What fraction is represented by the shaded region of the grid?

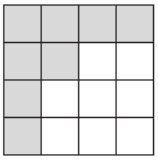
For each of the grids given below, express the shaded region of the grid as a fraction, a decimal, and a percent.

a. 

b. 

c. 

d. 

e. 

f. 

Angie and Jim conducted a survey of their sixth-grade classmates in their mathematics class. They found out the following information:

- 70% of the students in the class do homework three or more nights each week.
- Of the students who do homework three or more nights each week, half do homework five nights each week.

a. What percentage of the students in the class do homework two nights or less each week? Explain your reasoning.

b. What fraction of the students in the class do homework five nights each week? Explain your reasoning.

c. What percentage of students in the class do homework three or four nights a week? Explain your reasoning.

d. From the information provided, can you tell how many students are in the class? Explain why or why not.

In a class of 24 sixth-graders, 25% walk to school, ride bicycles to school, take the bus to school, and the remainder of the class are driven to school by their parents or guardians.

a. How many students in the class walk to school? Explain your reasoning.

b. How many students in the class ride bicycles to school? Explain your reasoning.

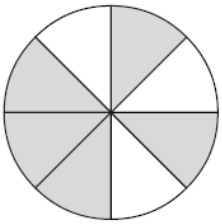
c. How many students in the class take the bus to school?

d. What fraction of the class are driven to school by their parent or guardian? Explain your reasoning.

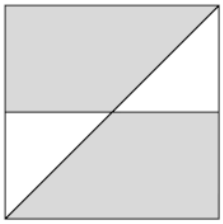
e. What percentage of the students in the class walk, ride bicycles or the bus, or are driven to at school by a parent or guardian? Explain your reasoning.

Express the shaded region of each drawing as a fraction, a decimal, and as a percent.

a.



b.



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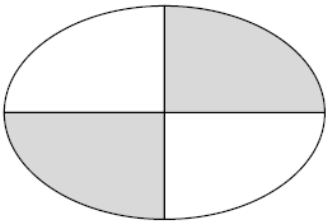
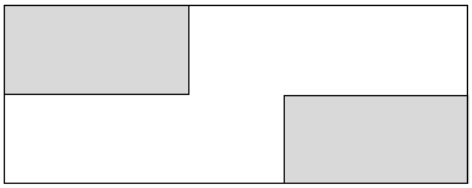


d.

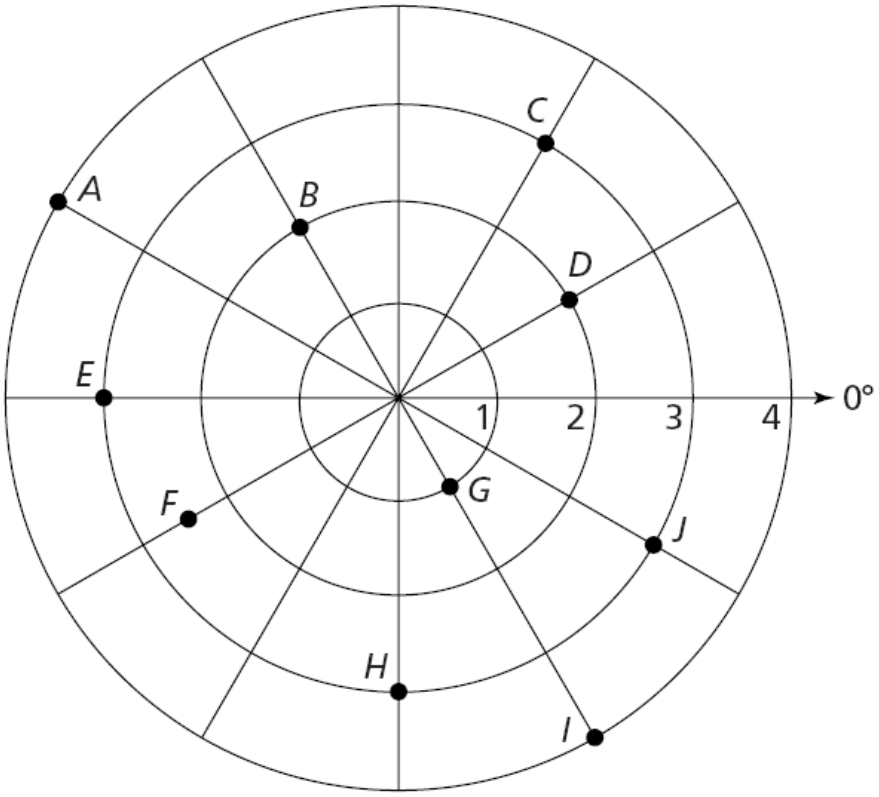


Fill in the missing parts of the table.

Fraction	Decimal	Percent
$\frac{3}{8}$		
	0.88	
		35%
$1\frac{1}{4}$		
	0.625	
		275%

Geometry

Use the circular grid below to answer the following questions.



a. Find the (distance, angle measure) coordinates for points *A* through *J*.

*A*_____ *B*_____ *C*_____ *D*_____ *E*_____

*F*_____ *G*_____ *H*_____ *I*_____ *J*_____

b. What is the distance from point *A* to point *J*? Explain how you found your answer.

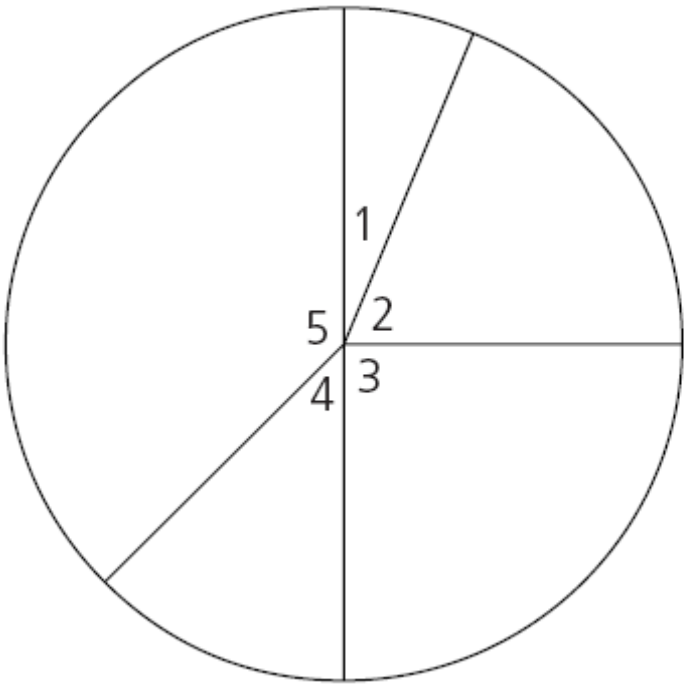
c. What is the distance from point *F* to point *D*?

d. What is the distance from point *B* to point *I*?

e. What is the measure of the angle with vertex at the origin and sides that pass through points *H* and *J*? Explain how you found your answer.

f. What is the measure of the angle with vertex at the origin and sides that pass through points *A* and *I*?

Use the diagram below and what you know about angle relationships to answer the following questions.



a. What is the measure of angle 3?

b. The measure of angle 1 is one-fourth of the measure of angle 3. What is the measure of angle 1?

c. What is the measure of angle 2?

d. The measure of angle 4 is twice the measure of angle 1.What is the measure of angle 4?

e. What is the measure of angle 5?

An isosceles triangle has two 50° angles. What is the measure of the third angle? Explain how you found your answer.

One angle of an isosceles triangle measures 100°.What are the measures of the other two angles? Explain your reasoning.

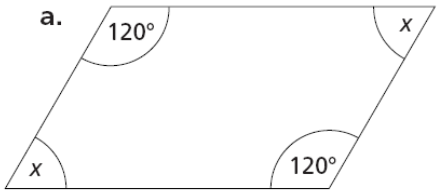
Two of the angles of a parallelogram each measure 75°.What are the measures of the other two angles? Explain your reasoning.

One angle of a parallelogram measures 40° and another angle measures 140°. What are the measures of the other two angles? Explain how you found your answer.

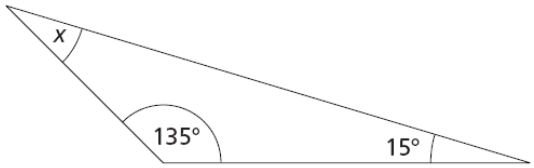
Can a parallelogram have two 45° angles and two 75° angles? Why or why not?

For each of the shapes below, find the unknown angle measure without using your protractor.

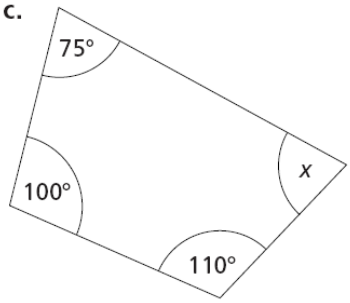
a.



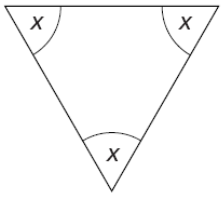
b.



c.



d.



A quadrilateral has two sides of length 6.The sum of the lengths of the other two sides is 15. Use this information to answer the following questions.

a. Suppose the two sides of length 6 are right next to each other. What might the lengths of the other two sides be? Explain your reasoning.

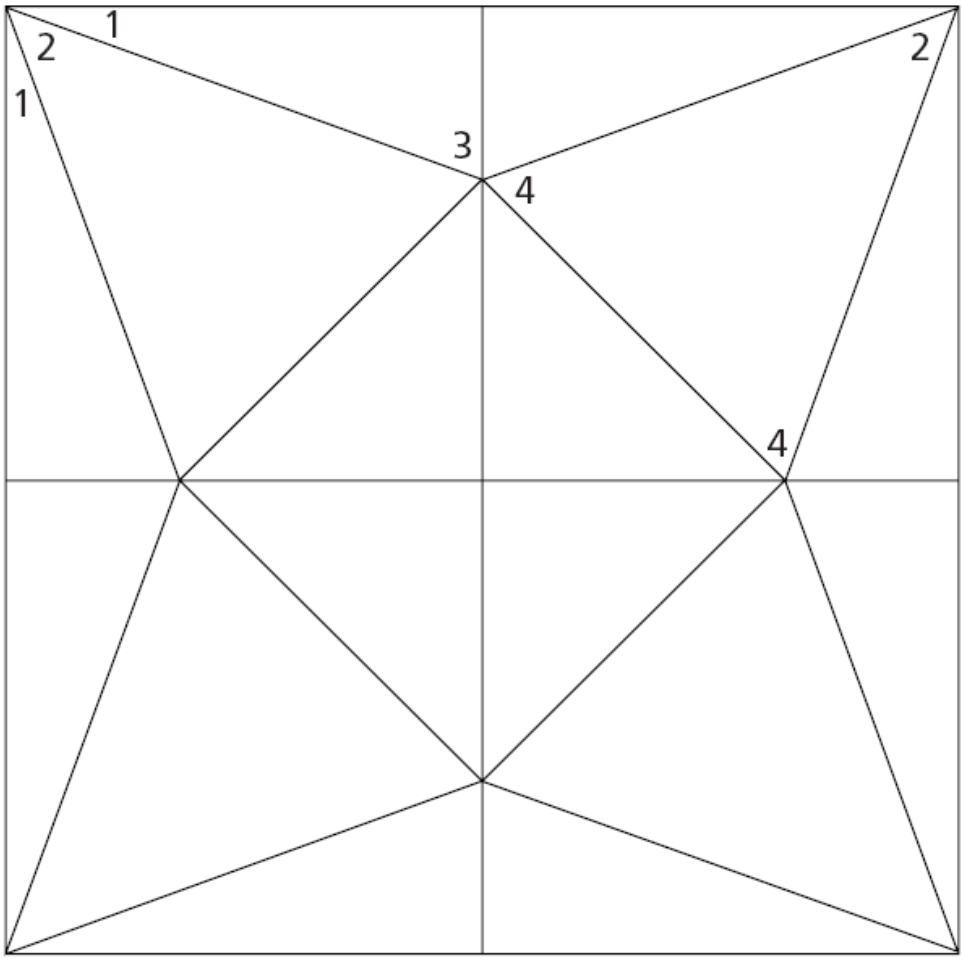
b. Suppose the quadrilateral is a rectangle and the two sides of length 6 are opposite each other. What would the lengths of the other two sides have to be? Explain how you found your answer.

c. Could the quadrilateral have two sides of length 6, one side of length 13.5, and one side of length 1.5? Explain why or why not.

Bob has sketched an equilateral triangle. The sum of the lengths of the sides is 12. What is the length of each side of Bob's triangle? Explain your reasoning.

Angela has sketched a rectangle. She says that the lengths of the sides of the rectangle add to 26, and the length of one side is 7.What are the length and width of Angela's rectangle? Explain how you found your answer.

The figure below is made up of squares and triangles. Use the design below and what you know about angle relationships to answer the following questions.



a. If the measure of angle 1 is 25°, what is the measure of angle 2? Explain your reasoning.

b. If the measure of angle 1 is 25°, what is the measure of angle 3? Explain your reasoning.

c. If the measure of angle 1 is 25°, what is the measure of angle 4? Explain your reasoning.