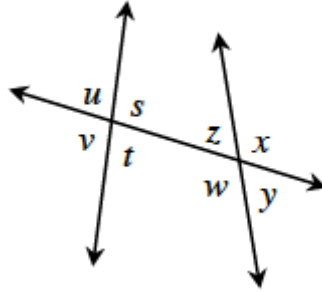


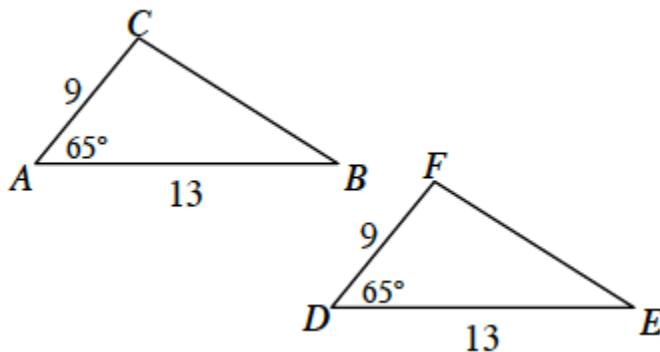
# 6.1.1

6-4. Use the diagram below to answer the following questions.



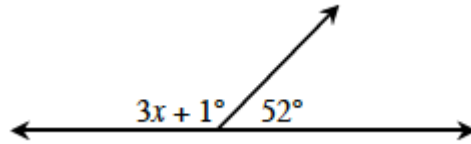
- What type of angle pair is  $\angle z$  and  $\angle t$ ? That is, what is their geometric relationship?
- What type of angle pair do  $\angle s$  and  $\angle v$  form?
- Name all pairs of corresponding angles in the diagram. Hint: There are four different pairs.

6-5. Examine the triangles below.



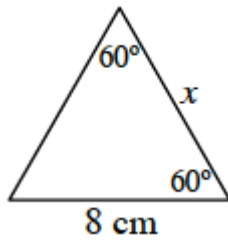
- Are these triangles similar? If so, use a flowchart to show how you know. If they are not similar, explain how you know.
- Are the triangles congruent? Explain your reasoning.

**6-6.** Using the diagram below, write an equation and find  $x$ . Check your answer!

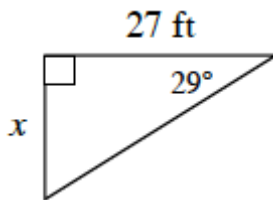


**6-7.** For each of the triangles below, find  $x$ .

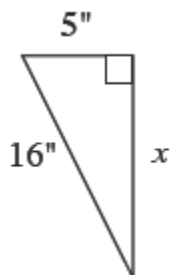
a.



b.



c.

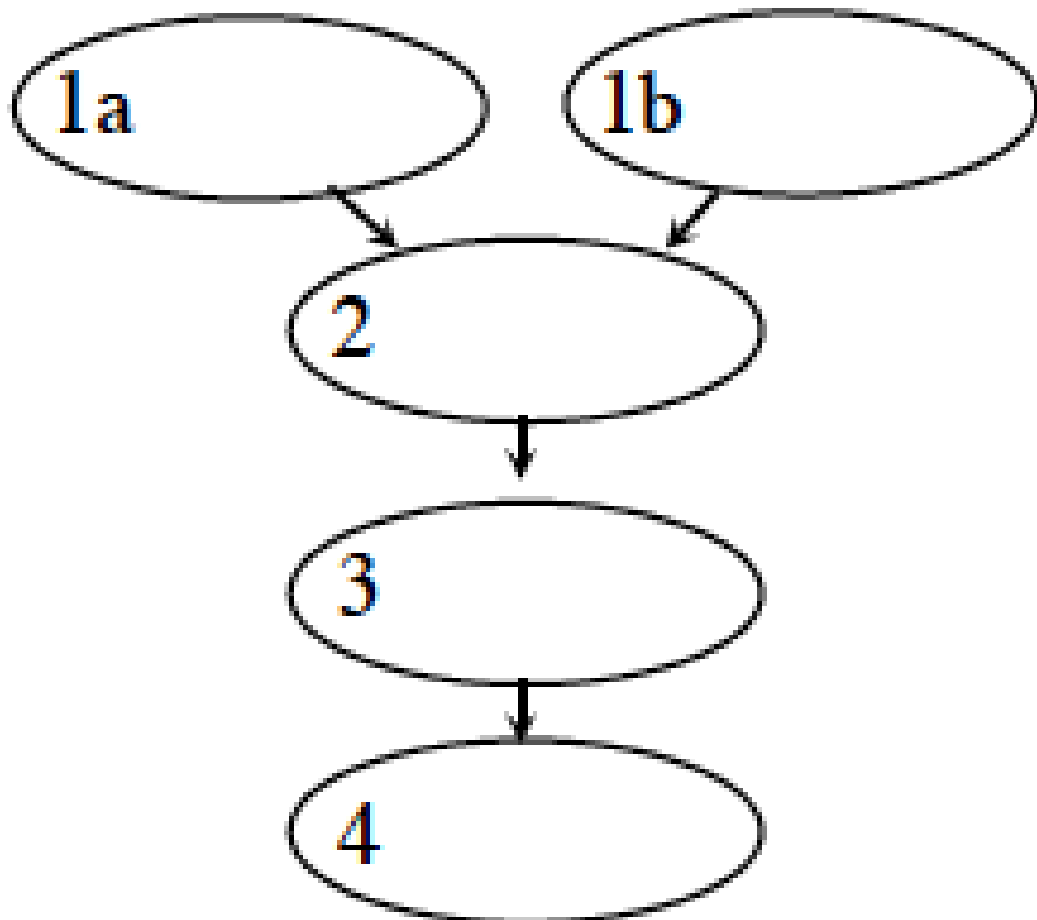


**6-8.** Joey is in charge of selling cupcakes at the basketball games. The game is today at 5:00 p.m. At 3:00 p.m., Joey put some cupcakes into the oven and started working on his homework. He fell asleep and did not wake up until 3:55 p.m. What do you think happened?

Joey knows that the following four statements are facts:

- i. If the cupcakes are burned, then the fans that attend the varsity basketball games will not buy them.
- ii. If cupcakes are in the oven for more than 50 minutes, they will burn.
- iii. If the fans do not buy the cupcakes, then the team will not have enough money for new uniforms next year.
- iv. The cupcakes are in the oven from 3:00 p.m. to 3:55 p.m.

Decide how to organize the facts into the ovals (below). You will need to fill in one of the ovals with your own logical conclusion. Be sure that your ovals are in the correct order and that the arrows really show connections between the ovals. What conclusion should your flowchart make?



**6-9.** Assume that 25% of the student body at your school is male and that 40% of the students walk to school. If a student from this school is selected at random, find the following probabilities.

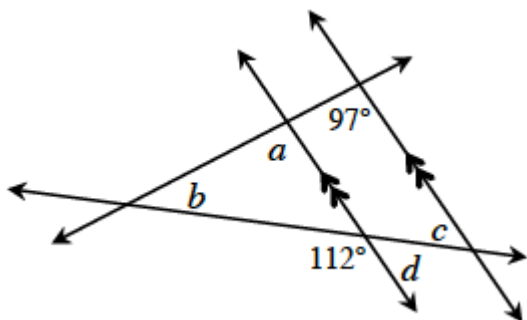
- $P(\text{student is female})$
- $P(\text{student is male and does not walk to school})$
- $P(\text{student walks to school or does not walk to school})$
- Identify the sample space in parts (b) and (c) above as a “union” or a “intersection.”

**6-10. Multiple Choice:**  $\triangle ABC$  is defined by points  $A(3, 2)$ ,  $B(4, 9)$ , and  $C(6, 7)$ . Which triangle below is the image of  $\triangle ABC$  when it is rotated  $90^\circ$  counter-clockwise (  $\curvearrowright$  ) about the origin?

- $A'(-2, 3)$ ,  $B'(-9, 4)$ ,  $C'(-7, 6)$
- $A'(-3, 2)$ ,  $B'(-4, 9)$ ,  $C'(-6, 7)$
- $A'(-2, 3)$ ,  $B'(-7, 6)$ ,  $C'(-9, 4)$
- $A'(2, -3)$ ,  $B'(9, -4)$ ,  $C'(7, -6)$
- None of these

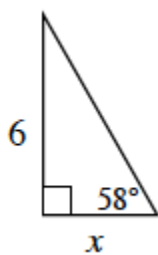
## 6.1.2

**6-14.** Examine the relationships that exist in the diagram below. Find the measures of angles  $a$ ,  $b$ ,  $c$ , and  $d$ . Remember that you can find the angles in any order, depending on the angle relationships you use.

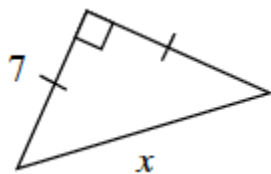


**6-15.** Examine the triangles below. For each one, solve for  $x$  and name which tool you used. Show all work.

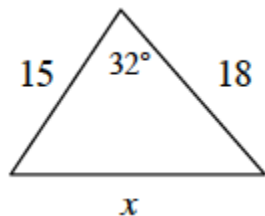
a.



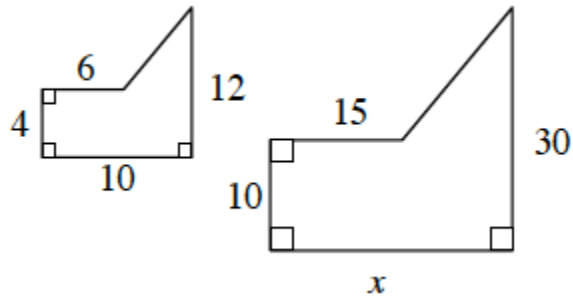
b.



c.



**6-16.** The two shapes below are similar.



a. Find the value of  $x$ . Show all work.

b. Find the area of each shape.

**6-17.** On graph paper, graph  $\triangle ABC$  if  $A(-2, 7)$ ,  $B(-5, 8)$ , and  $C(-3, 1)$ .

a. Reflect  $\triangle ABC$  across the  $x$ -axis to form  $\triangle A'B'C'$ . Name the coordinates of each new vertex.

b. Now rotate  $\triangle A'B'C'$  from part (a)  $180^\circ$  about the origin  $(0, 0)$  to form  $\triangle A''B''C''$ . Name the coordinates of each new vertex.

c. Describe a single transformation that would change  $\triangle ABC$  to  $\triangle A''B''C''$ .

**6-18.** Earl hates to take out the garbage and to wash the dishes, so he decided to make a deal with his parents: He will flip a coin once for each chore and will perform the chore if the coin lands on heads. What he doesn't know is that his parents are going to use a weighted coin that lands on heads 80% of the time!

- What is the probability that Earl will have to do both chores?
- What is the probability that Earl will have to take out the garbage, but will not need to wash the dishes?

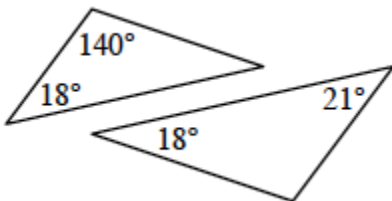
**6-19. Multiple Choice:** Which list of side lengths below could form a triangle?

- 2, 6, 7
- 3, 8, 13
- 9, 4, 2
- 10, 20, 30

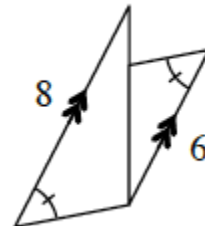
## 6.1.3

**6-23.** For each pair of triangles below, decide if the pair is similar, congruent or neither. Justify your conclusion with a flowchart or the reasons why the triangles cannot be similar or congruent. Assume that the diagrams are not drawn to scale.

a.



b.

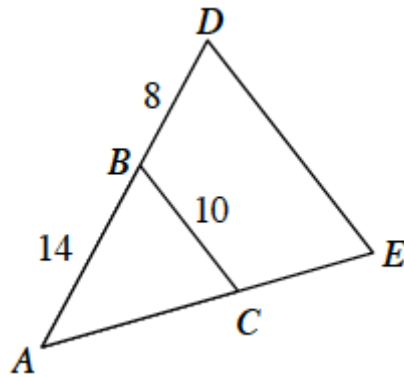


**6-24.** Use what you know about the slopes of parallel and perpendicular lines to find the equation of each line described below.

a. Find the equation of the line that goes through the point  $(2, -3)$  and is perpendicular to the line  $y = -\frac{2}{5}x + 6$ .

b. Find the equation of the line that is parallel to the line  $-3x + 2y = 10$  and goes through the point  $(4, 7)$ .

**6-25.** In the diagram below,  $\triangle ABC \sim \triangle ADE$ .

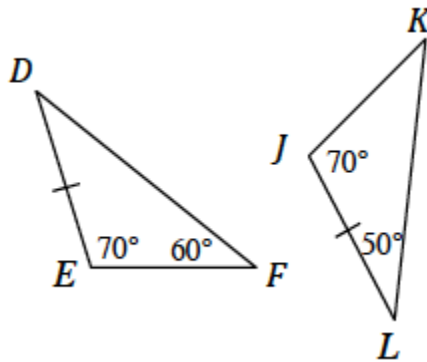


a. Draw each triangle separately on your paper. Be sure to include all measurements in your diagrams.

b. Find the length of  $\overline{DE}$ .



**6-26.** Examine the two triangles below.



- Are the triangles congruent? Justify your conclusion. If they are congruent, complete the congruence statement  $\triangle DEF$  \_\_\_\_.
- What series of transformation(s) are needed to change  $\triangle DEF$  to  $\triangle LJK$ ?
- If  $DE = 4$  units, find  $KL$ .

**6-27.** If  $b + 2a = c$  and  $2a + b = 10$ , then what is  $c$ ? Explain how you know.

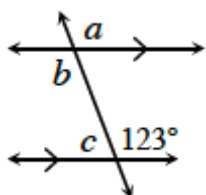
**6-28.** There are 212 students enrolled in geometry at West Valley High School. 64 are freshman, and 112 are sophomores.

- If a random geometry student is chosen, what is the chance (in percent) the student is a freshman or sophomore? Show how you can use the Addition Rule to answer this question. What was unusual about using the Addition Rule to answer this question?
- 114 of the geometry students perform in band and 56 perform in chorus. There is a 75% chance that a geometry student performs in either band or chorus. What is the probability a geometry student performs both in band and in chorus?

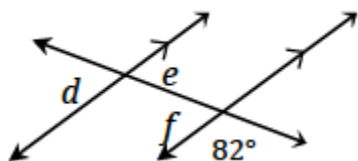
## 6.1.4

**6-34.** Use your theorems about parallel lines and the angles formed with a third line to find the measures of the labeled angles below. Show each step you use and be sure to justify each one with an angle theorem from your Angle Relationships Toolkit. Be sure to write down your reasoning in the order that you find the angles.

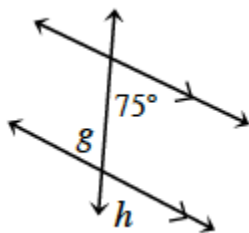
a.



b.

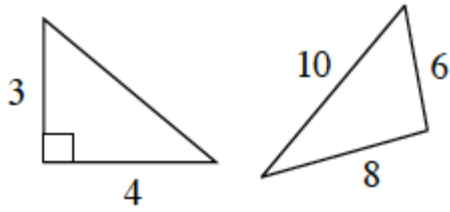


c.

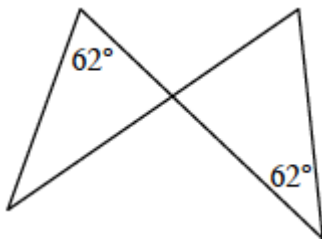


**6-35.** For each pair of triangles below, decide if the pair is similar, congruent or neither. Justify your conclusion using a flowchart. Assume that the diagrams are not drawn to scale.

a.



b.

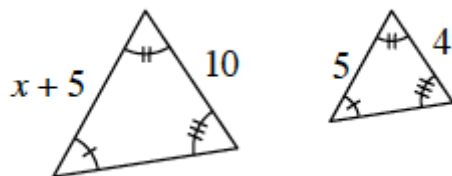


**6-36.** Solve the systems of equations below using any method, if possible. Show all work and check your solution. If there is no solution, explain why not.

a.  $y = 2x + 8$   
 $3x + 2y = -12$

b.  $2x - 5y = 4$   
 $5y - 2x = 10$

**6-37.** Examine the triangles below. Solve for  $x$ .



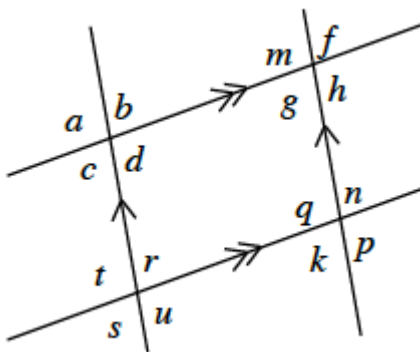
**6-38.** Solve the problem below using any method. Show all work.

Angle  $A$  of  $\triangle ABC$  measures  $5^\circ$  more than 3 times the measure of angle  $B$ . Angle  $C$  measures  $20^\circ$  less than angle  $B$ . Find the measure of angles  $A$ ,  $B$ , and  $C$ .

**6-39.** Kendra has programmed her cell phone to randomly show one of six photos when she turns it on. Two of the photos are of her parents, one is of her niece, and three are of her boyfriend, Bruce. Today she will need to turn her phone on twice: once before school and again after school.

- Choose a model (such as a tree diagram or generic area model) to represent this situation.
- What is the probability that both photos will be of her boyfriend?
- What is the probability that neither photo will be of her niece?

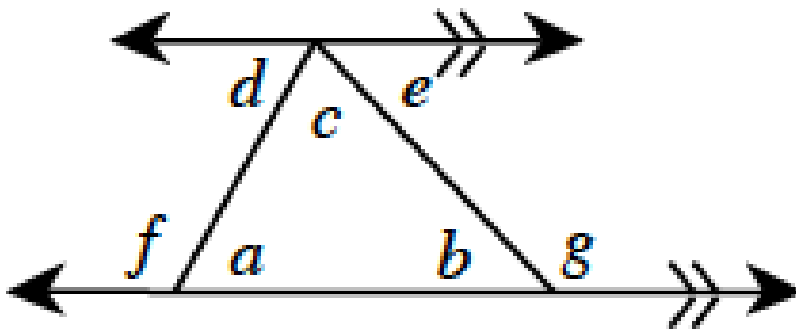
**6-40. Multiple Choice:** Given the diagram below, which of the statements below is not necessarily true?



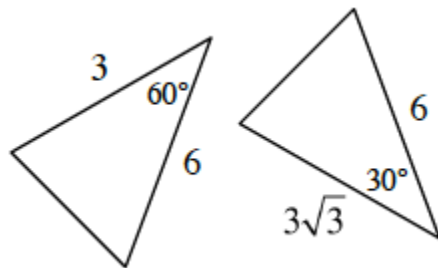
- a.  $a = d$
- b.  $d + r = 180^\circ$
- c.  $u = n$
- d.  $t = m$
- e. These all must be true.

## 6.1.5

**6-46.** Copy the diagram below onto your paper. If  $a = 53^\circ$  and  $g = 125^\circ$ , find the measures of each labeled angle. Explain how you find each angle, citing definitions and theorems from your toolkit that support your steps. Remember that you can find the angles in any order, depending on the angle relationships you use.



**6-47.** As Samone looked at the triangles below, she said, “*I think these triangles are congruent.*” Her teammate, Darla, said, “*But they don’t look the same. How can you tell?*” Samone smiled and said, “*Never trust the picture! Look at the angles and the sides. The measures are all the same.*” [6-47 HW eTool](#) (CPM).



a. Solve for the missing side of each triangle. How do they compare?

b. Are you convinced that Samone is correct? Explain.

**6-48.** Write a converse for each conditional statement below. Then, assuming the original statement is true, decide if the converse must be true or not.

a. If it rains, then the ground is wet.

b. If a polygon is a square, then it is a rectangle.

c. If a polygon is a rectangle, then it has four  $90^\circ$  angles.

d. If the shape has three angles, it is a triangle.

e. If two lines intersect, then vertical angles are congruent.

**6-49.** On graph paper, graph the line  $y = -\frac{3}{2}x + 6$ . Name the  $x$ - and  $y$ -intercepts.

**6-50.** This problem is a checkpoint for solving proportional equations and similar figures. It will be referred to as Checkpoint 6.

a.  $\frac{7-y}{5} = \frac{3}{4}$

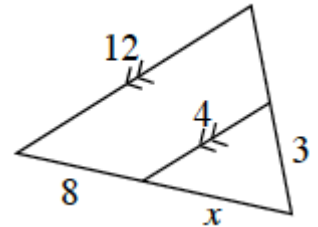
b.  $\frac{3}{y} = \frac{6}{y-2}$

c. Sam grew  $1\frac{3}{4}$  inches in  $4\frac{1}{2}$  months. If he continued at the same rate, how much would he grow in one year?

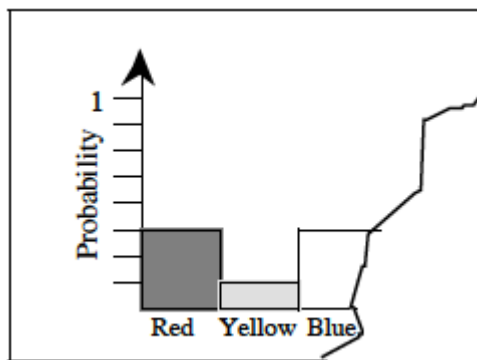
d. Use the figure at right to solve for  $x$ .

Check your answers by referring to the Checkpoint 6 materials located at the back of your book.

If you needed help solving these problems correctly, then you need more practice. Review the Checkpoint 6 materials and try the practice problems. Also, consider getting help outside of class time. From this point on, you will be expected to do problems like these quickly and easily.



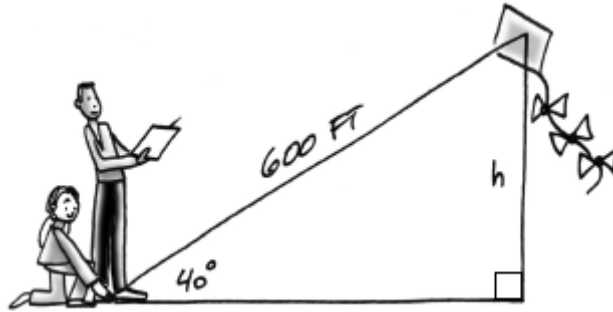
**6-51.** Donnell has a bar graph which shows the probability of a colored section coming up on a spinner, but part of the graph has been ripped off.



- What is the probability of spinning red?
- What is the probability of spinning yellow?
- What is the probability of spinning blue?
- If there is only one color missing from the graph, namely green, what is the probability of spinning green? Why?



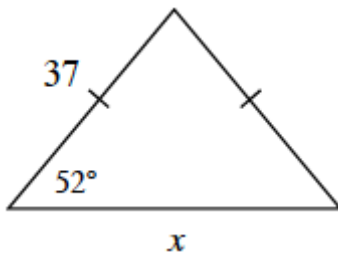
**6-52.** One measurement used in judging kite-flying competitions is the size of the angle formed by the kite string and the ground. This angle can be used to find the height of the kite. Suppose the length of the string is 600 feet and the angle at which the kite is flying measures  $40^\circ$ . Calculate the height,  $h$ , of the kite.



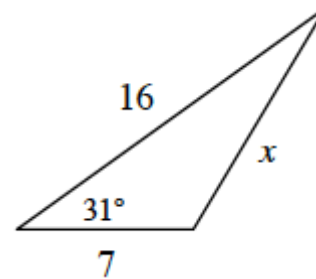
## 6.2.1

**6-55.** Use your triangle tools to solve for  $x$  in the triangles below.

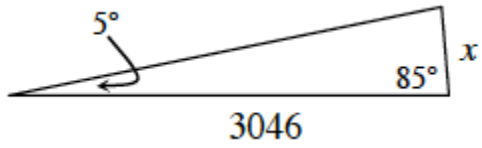
a.



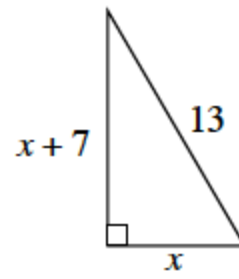
b.



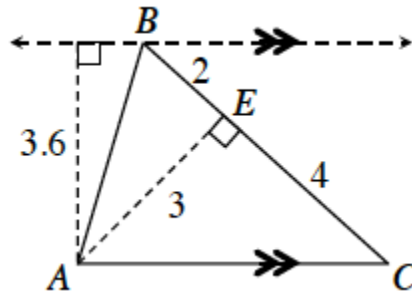
c.



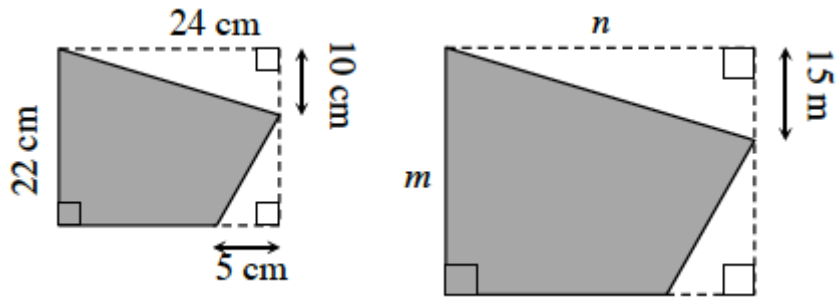
d.



**6-56.** Penelope measured several sides and heights of  $\triangle ABC$ , as shown in the diagram below. Find the area of  $\triangle ABC$  *twice*, using two different methods.



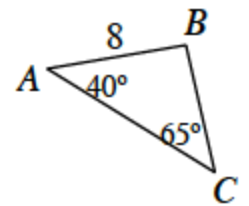
6-57. The shaded figures below are similar.



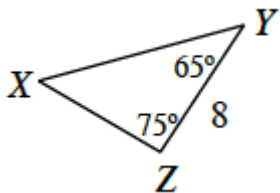
a. Solve for  $m$  and  $n$ .

b. Find the area and perimeter of each figure.

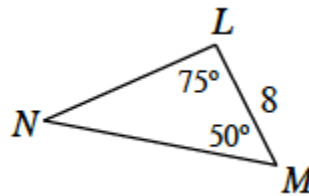
6-58. Decide if each triangle below is congruent to  $\triangle ABC$  at right, similar but not congruent to  $\triangle ABC$ , or neither. Justify each answer. If you decide that they are congruent, organize your reasoning into a flowchart.



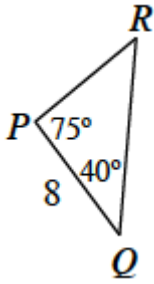
a.



b.



b.



**6-59.** On graph paper, graph the line  $y = 3x + 1$ . [6-59 HW eTool](#) (Desmos).

a. What is this line's slope angle? That is, what is the acute angle the line makes with the  $x$ -axis?

b. Find the equation of a new line that has a slope angle of  $45^\circ$  and passes through the point  $(0, 3)$ . Assume that the slope is positive.

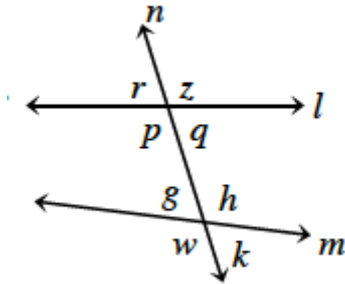
c. Find the intersection of these two lines using any method. Write your solution as a point in the form  $(x, y)$ .

**6-60. Multiple Choice:** Listed below are the measures of several different angles. Which angle is obtuse?

- a.  $0^\circ$
- b.  $52^\circ$
- c.  $210^\circ$
- d.  $91^\circ$

## 6.2.2

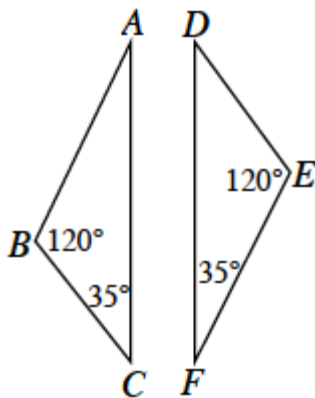
**6-62.** Examine the diagram below. Based on the information below, what statement can you make about the relationships between the lines? Be sure to justify each conclusion. Remember: each part below is a separate problem.



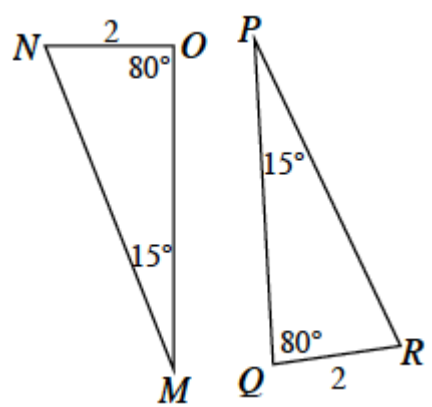
- $p = h$
- $w = k$
- $r = q$
- $z + k = 160^\circ$

**6-63.** Determine if each pair of triangles below are congruent, similar but not congruent, or if they are neither. If they are congruent, organize your reasoning into a flowchart. Remember that the triangles below not be drawn to scale.

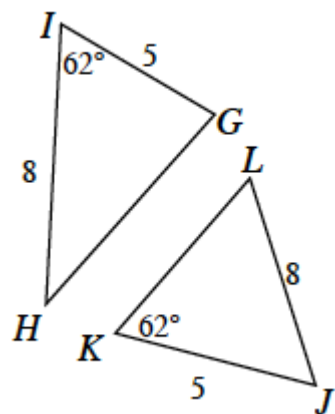
a.



b.



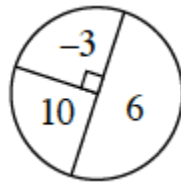
c.



**6-64.** Write a converse for each conditional statement below. Then, assuming the original statement is true, decide if the converse must be true or not.

- If the cat knocks over the lamp, then it will run away frightened.
- If a 6-sided die is rolled, then the chances of getting a 3 are  $\frac{1}{6}$ .
- If a triangle has a  $90^\circ$  angle, then it is a right triangle.

**6-65.** For the spinner below, find the expected value of one spin. Test your ideas by creating the spinner below with the [Single Spinner Label eTool](#) and experimentally playing the game.



**6-66. Multiple Choice:** Which equation below correctly represents the relationship of the sides given in the diagram below?



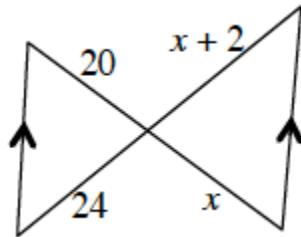
- $3x - 2 + 2x + 17 = 360^\circ$
- $3x - 2 + 2x + 17 = 180^\circ$
- $3x - 2 + 2x + 17 = 90^\circ$
- $3x - 2 = 2x + 17$





## 6.2.3

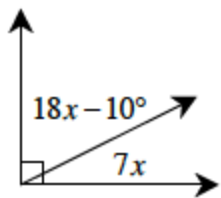
6-73. Examine the triangles in the diagram below.



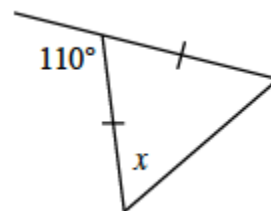
- a. Are the triangles similar? If you decide that they are, then justify your conclusion using a flowchart.
- b. Solve for  $x$ . Show all work.

6-74. For each diagram below, use geometric relationships to solve for the given variable(s). Check your answer.

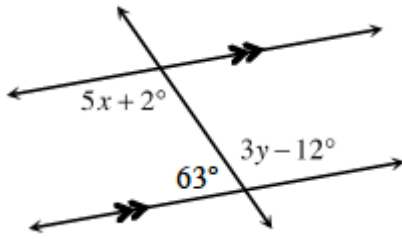
a.



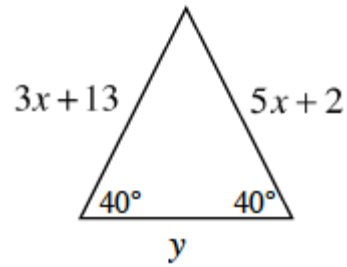
b.



c.

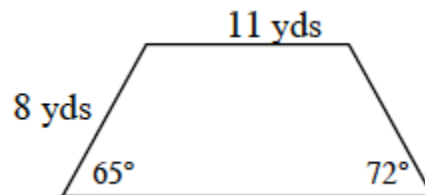


d.

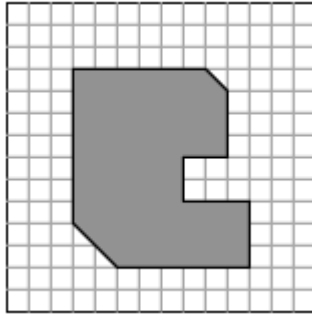


**6-75.** Refrigerators that are produced on an assembly line sometimes contain defects. The probability a refrigerator has a paint blemish is 4%. The probability that it has a dent is  $\frac{1}{2}\%$ . The probability it has both a paint blemish and a dent is also  $\frac{1}{2}\%$ . What is the probability a refrigerator has a paint blemish or a dent? What can you conclude about defects on these refrigerators?

**6-76.** Find the area and perimeter of the trapezoid below.



**6-77.** A map of an island is shown below. Each unit of length on the grid represents 32 feet.



a. Find the actual dimensions of the island (the overall width and length).

b. Find the area of the shape at right and the actual area of the island

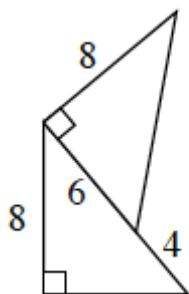
**6-78. Multiple Choice:** The length of a rectangle is three units shorter than twice its width. Which expression below could represent the area of the rectangle?

- a.  $2x^2 - 3$
- b.  $2x^2 - 6x$
- c.  $2x^2 - 3x$
- d.  $(2x - 3)^2$

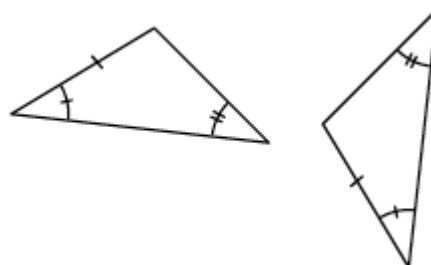
## 6.2.4

**6-83.** Determine whether or not the triangles in each pair below are congruent. Justify your conclusion with a triangle congruency condition. Then choose one pair of congruent triangles and show your reasoning with a flowchart.

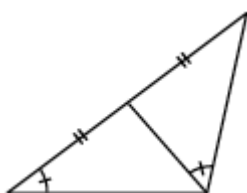
a.



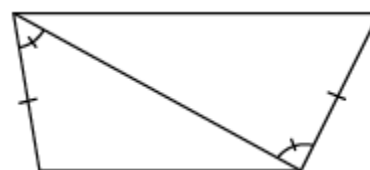
b.



c.

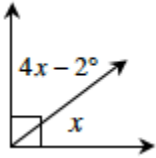


d.

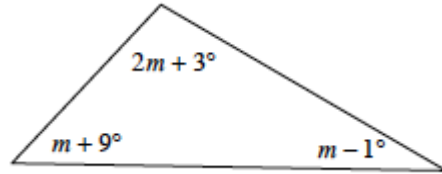


**6-84.** Examine the geometric relationships in each of the diagrams below. For each one, write and solve an equation to find the value of the variable. Name all geometric relationships or theorems that you use.

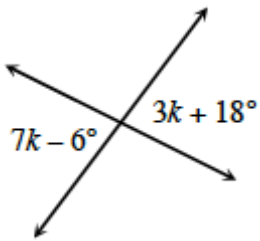
a.



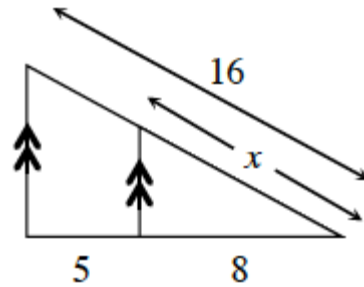
b.



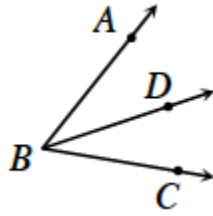
c.



d.



**6-85.** In the diagram below,  $\overrightarrow{BD}$  **bisects**  $\angle ABC$ . This means that  $\overrightarrow{BD}$  divides the angle into two equal parts. If  $m\angle ABD = 3x + 24^\circ$  and if  $m\angle CBD = 5x + 2^\circ$ , solve for  $x$ . Then find  $m\angle ABC$ .



**6-86.** Write a converse for each conditional statement below. Then, assuming the original statement is true, decide if the converse must be true or not.

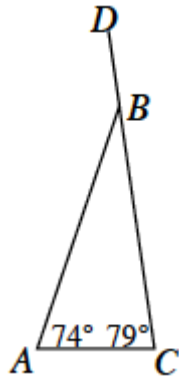
a. If the base angles of a triangle are congruent, then it is isosceles.

b. If a figure is a triangle, then the sum of the angles in the figure is  $180^\circ$ .

c. If I clean my room, then my mom will be happy.

**6-87.** A particular spinner only has two regions: green and purple. If the spinner is randomly spun twice, the probability of it landing on green twice is 16%. What is the probability of the spinner landing on purple twice?

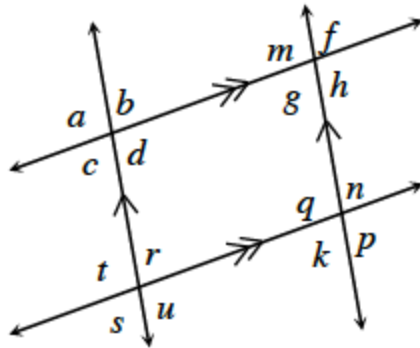
6-88. Multiple Choice: The measure of  $\angle ABD$  below is:



- a.  $27^\circ$
- b.  $161^\circ$
- c.  $118^\circ$
- d.  $153^\circ$
- e. None of these

## 6.2.5

6-94. Examine the angles formed by parallel lines below. [Homework Help](#)



- a. If  $r = 5x + 3^\circ$  and  $k = 4x + 9^\circ$ , solve for  $x$ . Justify your answer.
  
- b. If  $c = 114^\circ$ , what is  $q$ ? Justify your answer.
  
- c. If  $g = 88^\circ$ , then what is  $q$ ? Justify your answer.

**6-95.** Write the equation of each line described below in slope-intercept form ( $y = mx + b$ ).

a.  $m = \frac{6}{5}$  and  $b = -3$

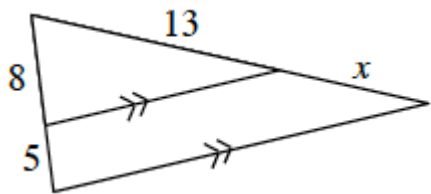
b.  $m = -\frac{1}{4}$  and  $b = 4.5$

c.  $m = \frac{1}{3}$  and the line passes through the origin  $(0, 0)$

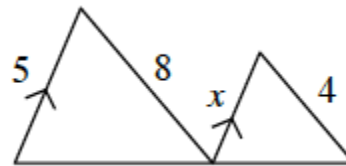
d.  $m = 0$  and  $b = 2$

**6-96.** For each part below, decide if the triangles are similar. If they are similar, use their similarity to solve for  $x$ . If they are not similar, explain why not.

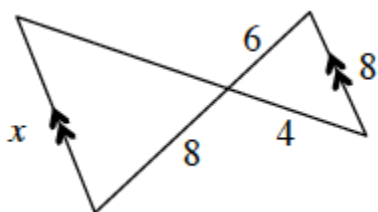
a.



b.



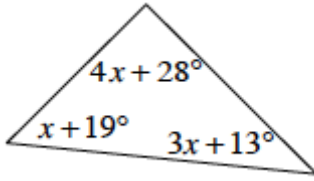
c.



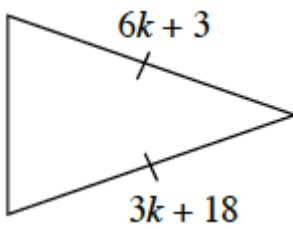


**6-97.** For each shape below, use the geometric relationships to solve for the given variable(s). Show all work. Name the geometric relationships you used.

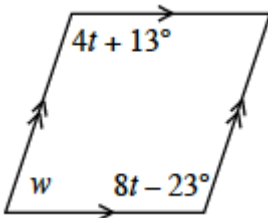
a.



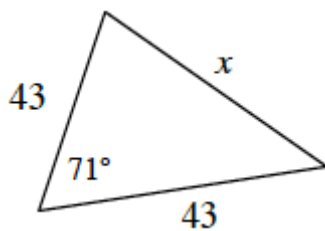
b.



c.



d.



**6-98.** Jinning is going to flip a coin. If the result is “heads,” he wins \$4. If the result is “tails,” he loses \$7.

- a. What is his expected value per flip?
  
  
  
  
  
  
  
  
  
  
- b. If he flips the coin 8 times, how much should he win or lose?

**6-99. Multiple Choice:** What is the distance between the points  $(-2, -5)$  and  $(6, 3)$ ?

- a. 8
- b.  $8\sqrt{2}$
- c. 16
- d. 64

## Ch. 6 Closure

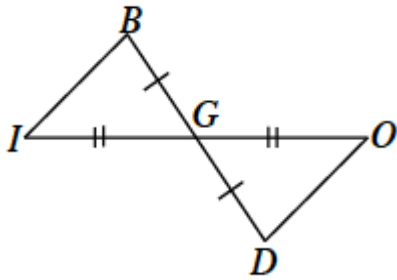
### 4. WHAT HAVE I LEARNED?

**CL 6-100.** Write the converse of each statement and then determine whether or not the converse is true.

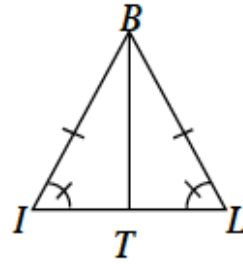
- a. If two lines are parallel, then corresponding angles are equal.
  
  
  
  
  
  
  
  
  
  
- b. In  $\triangle ABC$ , if the sum of  $m\angle A$  and  $m\angle B$  is  $110^\circ$ , then  $m\angle C = 70^\circ$ .
  
  
  
  
  
  
  
  
  
  
- c. If alternate interior angles  $k$  and  $s$  are not equal, then the two lines cut by the transversal are not parallel.
  
  
  
  
  
  
  
  
  
  
- d. If Johan throws coins in the fountain, then he loses his money.

**CL 6-101.** Determine whether or not the two triangles in each part below are congruent. If they are congruent, show your reasoning in a flowchart. If the triangles are not congruent or you cannot determine that they are, justify your conclusion.

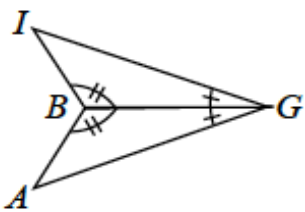
a.



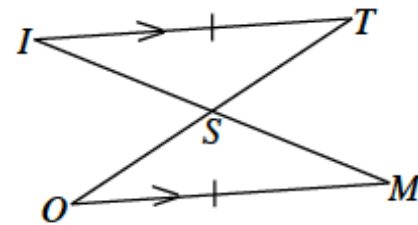
c.



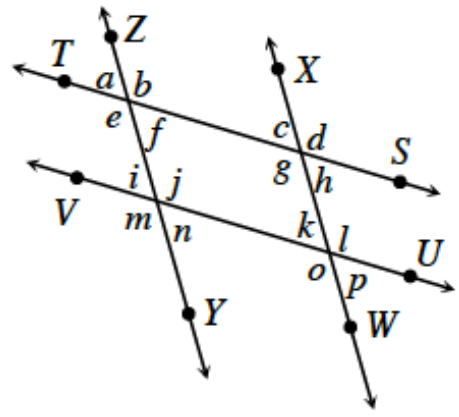
b.



d.



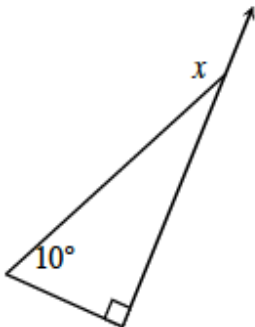
**CL 6-102.** For each part, determine which lines, if any, are parallel. Be sure to justify your decisions.



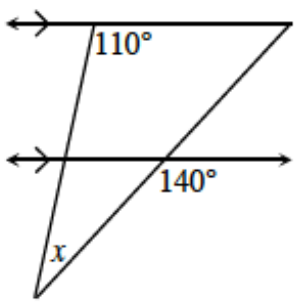
- a.  $\angle e \cong \angle m$
- b.  $\angle c \cong \angle o$
- c.  $\angle d \cong \angle o$
- d.  $\angle a \cong \angle m \cong \angle o$
- e.  $\angle a \cong \angle k$
- f.  $\angle k \cong \angle c \cong \angle f$

**CL 6-103.** For each diagram, solve for the variable. Be sure to include the names of any relationships you used to get your solution.

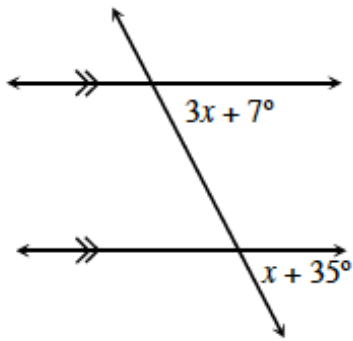
a.



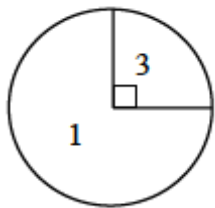
b.



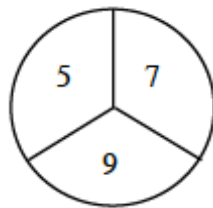
c.



**CL 6-104.** Cynthia is planning a party. For entertainment, she has designed a game that involves spinning two spinners. If the sum of the numbers on the spinners is 10 or greater, the guests can choose a prize from a basket of candy bars. If the sum is less than 10, then the guest will be thrown in the pool. She has two possible pairs of spinners, shown below. For each pair of spinners, determine the probability of getting tossed in the pool. Assume that Spinners B, C, and D are equally subdivided.

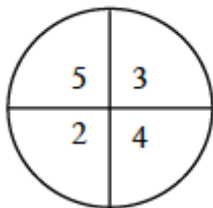


Spinner A

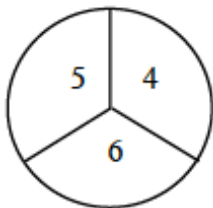


Spinner B

a.



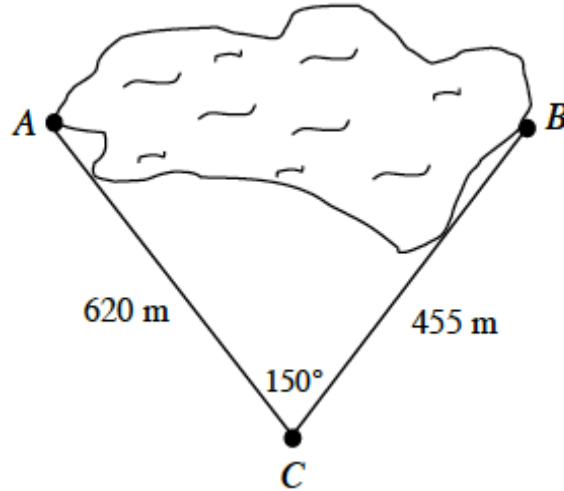
Spinner C



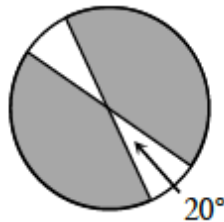
Spinner D

b.

**CL 6-105.** Yee Ping thought about swimming across Redleaf Lake. She knows that she can swim about 1000 meters. She decided that she would feel more confident if she knew how far she would have to swim. To determine the length of the lake, she put posts at both ends of the lake (points  $A$  and  $B$ ) and a third post on one side of the lake (point  $C$ ). The distances between the posts are shown in the diagram below. She measured the angle between the two posts and found that it was  $150^\circ$ . Use this information to determine the length of the lake. Do you think that Yee Ping will be able to swim between points  $A$  and  $B$ ?

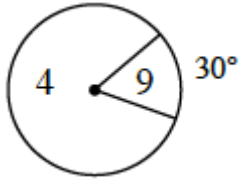


**CL 6-106.** Your teacher has constructed a spinner like the one below. He has informed you that the class gets one spin. If the spinner lands on the shaded region, you will have a quiz tomorrow. What is the probability that you will have a quiz tomorrow? Explain how you know.

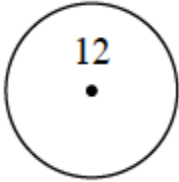


**CL 6-107.** For each spinner below, find the expected value of one spin.

a.



b.



**CL 6-108.** Margarite has 9 pieces of copper pipe with which she plans to make 3 triangular frames. She has organized them into groups of three based on their coloring. The lengths of the pipes in each group are listed below.

*i.* 23, 21, 4    *ii.* 2, 11, 10    *iii.* 31, 34, 3

- Which groups, if any, will she actually be able to use to make a triangular frame if she is unable to cut any of the pipes? How do you know?
- If possible, arrange the 9 pieces she has so that she can make 3 triangular frames. If so, how? If not, why not?

**CL 6-109.** At a story-telling class, Barbara took notes on the following story. However, all the parts of the story got mixed up. Help her make sense of the story by organizing the following details in a flowchart.

- a. Maggie was happy she could play on the same team as Julie and Cheryl.
- b. Julie was hoping to make the A team again this year as she grabbed her basketball and got on a bus in Bellingham.
- c. Cheryl, having been named most valuable player in Port Townsend, started the drive to the statewide basketball camp.
- d. Because of her skill in the first game, Maggie moved up to the A team.
- e. At camp, Julie and Cheryl were placed on the A team.
- f. Julie, Maggie and Cheryl met at a statewide basketball camp. Shortly after they met, they were placed on teams.
- g. This year was Maggie's first year at camp, and she was placed on the B team.
- h. On the train to camp, Maggie thought about how surprising it was that her basketball coach chose her to attend camp.