Chapter 6
Geometry & Measurement

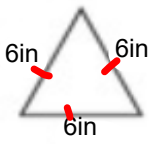
Lesson 2

Not drawn to scale

Classify each triangle. Write *isosceles*, *scalene*, or *equilateral*.

3 side equal

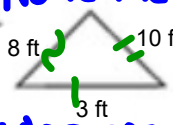
1.



Equilateral

None the same

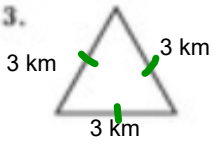
2.



sides are all different

Scalene

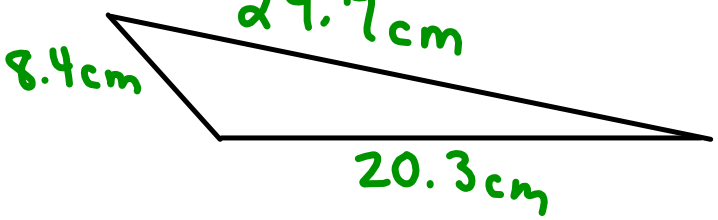
3.



Equilateral

2) Sketch a scalene triangle and put on measurements as examples of side lengths

3 sides and 3 angles differ



Homework solutions Page 201 - 203 #1, 2, 7

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Sample Solutions

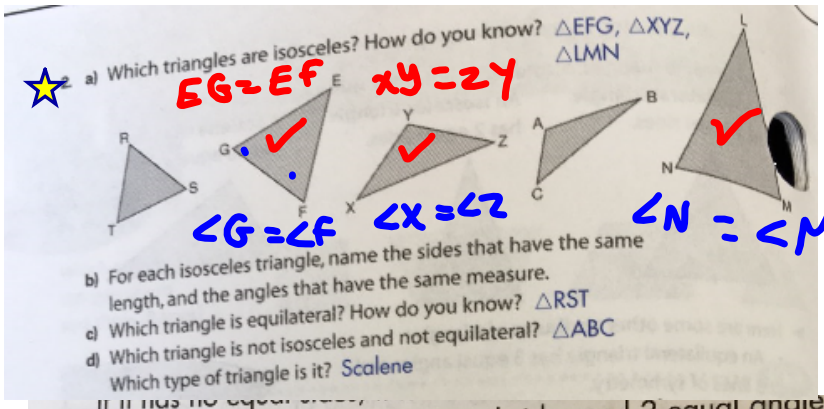
1. If the triangle has 3 equal sides, it is equilateral.
   If it has 2 equal sides, it is isosceles.
   If it has no equal sides, it is scalene.

1a) Isosceles

1b) Scalene

1c) Equilateral

1d) Isosceles



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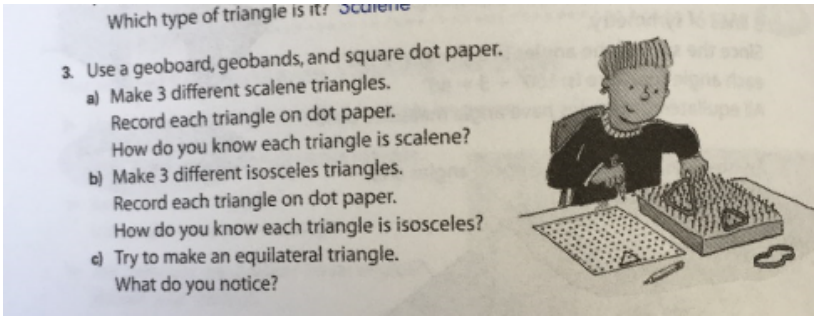
2. a) They each have exactly 2 equal sides and 2 equal angles.
   b) In △EFG, EF = EG and ∠F = ∠G; in △XYZ, YX = YZ and ∠X = ∠Z; and in △LMN, LM = LN and ∠N = ∠M
   c) All sides are equal and all angles are equal.



Which type of triangle is it? Scalene

3. Use a geoboard, geobands, and square dot paper.
   a) Make 3 different scalene triangles.
      Record each triangle on dot paper.
      How do you know each triangle is scalene?
   b) Make 3 different isosceles triangles.
      Record each triangle on dot paper.
      How do you know each triangle is isosceles?
   c) Try to make an equilateral triangle.
      What do you notice?

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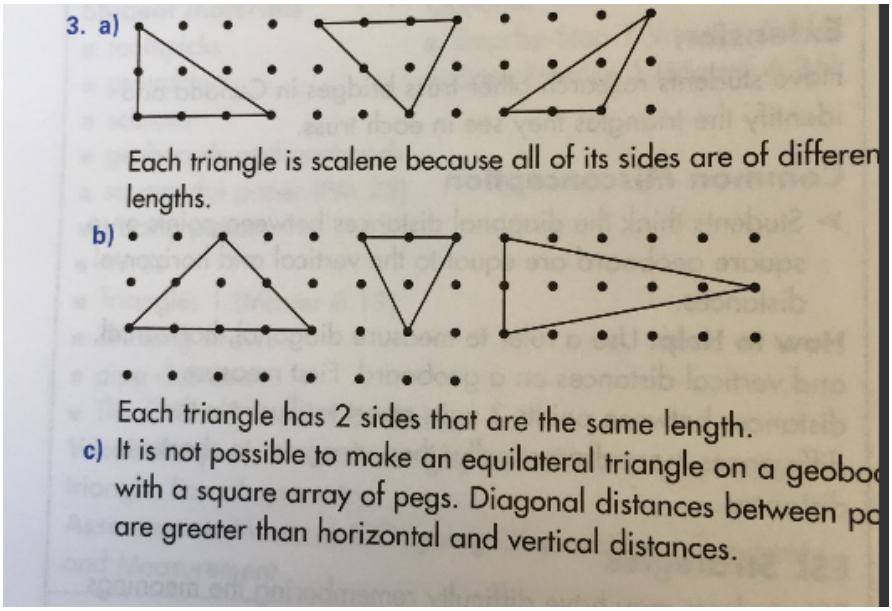

3. a)

Each triangle is scalene because all of its sides are of differen lengths.

b)

Each triangle has 2 sides that are the same length.

c) It is not possible to make an equilateral triangle on a geobo with a square array of pegs. Diagonal distances between po are greater than horizontal and vertical distances.

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What do you notice?

4. Work with a partner.
   a) Look around you. Find 2 examples of:
   • a scalene triangle • an isosceles triangle • an equilateral triangle
   Sketch each triangle. Describe where you found it.
   b) Which type of triangle was easiest to find? Why might this be?

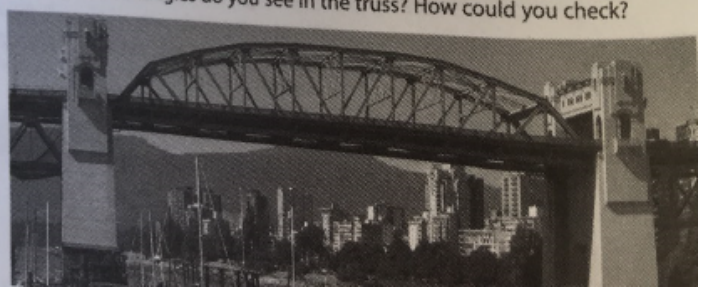
4. a) Scalene: the face on a doorstop, triangle on a quilt
   Isosceles: drawing of an evergreen tree, a tripod
   Equilateral: outline of a crayon point, traffic "Yield" sign
   b) For example, the isosceles triangle was easiest to find. This type of triangle provides balance.

triangle provides balance.

5. I see scalene triangles and equilateral triangles. I could use a ruler or a protractor to check.

was easiest to find? Why might this be?

5. Here is the truss of the Burrard Street Bridge in Vancouver, BC.
   Which types of triangles do you see in the truss? How could you check?



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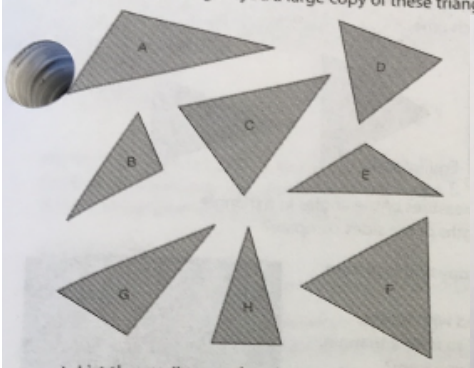
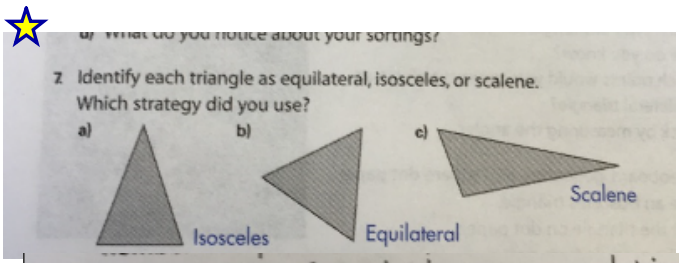
6. Your teacher will give you a large copy of these triangles.



a) List the attributes of each triangle.
b) Sort the triangles by the number of equal sides.
c) Sort the triangles by the number of equal angles.
d) What do you notice about your sortings?

protractor to check.

6. a) A, B, and G: 0 equal sides, 0 equal angles, 0 lines of symmetry; C, E, and H: 2 equal sides, 2 equal angles, 1 line of symmetry; D and F: 3 equal sides, 3 equal angles, 3 lines of symmetry
b) Triangles A, B, and G have no equal sides. Triangles C, E, and H each have exactly two equal sides. Triangles D and F each have 3 equal sides.
c) Triangles A, B, and G have no equal angles. Triangles C, E, and H each have exactly two equal angles. Triangles D and F each have 3 equal angles.
d) The results are the same whether the triangles are sorted by the number of equal sides or by the number of equal angles.



d) What do you notice about your sortings?

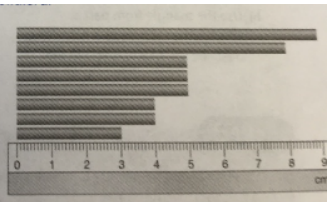
7. Identify each triangle as equilateral, isosceles, or scalene. Which strategy did you use?

a) Isosceles
b) Equilateral
c) Scalene

7. I used the number of equal sides to name each triangle.

Ruler

8. You will need drinking straws, a ruler, scissors, and pipe cleaners. Cut the straws into 8 pieces as shown. Use pieces of pipe cleaner as joiners.



a) Make each triangle. Trace and label your results.
- an equilateral triangle
- an isosceles triangle with the least perimeter
- a scalene triangle with the greatest perimeter

b) Which straws could not be used together to make a triangle? Explain.
8, 3, 4; 8, 3, 5; 8, 4, 4; 9, 3, 4; 9, 3, 5; 9, 4, 4; 9, 5, 4

Perimeter is the distance around a shape.

(Sample Solutions continued)

8. a) There are only 3 straws with equal length. The equilateral triangle has sides 5 cm long. To make the isosceles triangle with the least perimeter, I chose the shortest pair of straws with the same length and the shortest straw. The side lengths are 4 cm, 4 cm, and 3 cm. To make the scalene triangle with the greatest perimeter, I chose the 3 longest straws with different lengths. The side lengths are 5 cm, 8 cm, and 9 cm.
b) Any combination of straws in which the longest straw is longer than or equal to the combined length of the other two straws will not make a triangle.

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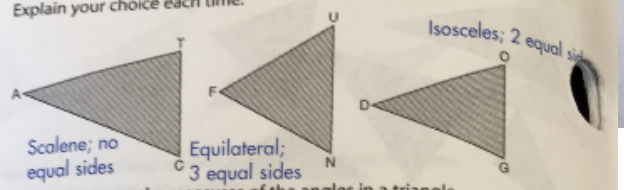
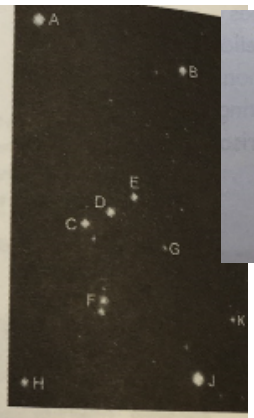
8. a) Name each triangle as scalene, isosceles, or equilateral. Explain your choice each time.



b) How can you use the measures of the angles in a triangle to predict how the lengths of the sides compare?

9. b) If all angles are different, then all side lengths are different. If two angles are equal, then the corresponding two sides are equal. If all angles are equal, then all sides are equal.

10. Your teacher will give you a copy of this picture of the Orion constellation.
The brightest stars are labelled with letters.
a) Connect points C, D, and F to form a triangle.
Which type of triangle did you form?
How do you know?
b) Connect points F, H, and J to form a triangle.
Which type of triangle did you form?
How do you know?
c) Which points would you connect to form an equilateral triangle?
Check by measuring the angles.



11. Use a geoboard, geobands, and square dot paper.
a) Make an isosceles triangle.
Draw the triangle on dot paper.
b) Use the triangle from part a.
Change the triangle so it is scalene.
Describe the changes you made.

10. a) △CDF is scalene. All sides are of different lengths.
b) △FHJ appears isosceles, but when measured, side FH is shorter than side FJ so △FHJ is scalene.
c) △CFG looks equilateral. All the angles should measure 60°. When measured, each angle is either slightly greater than or slightly less than 60°. So, the triangle is not quite equilateral.

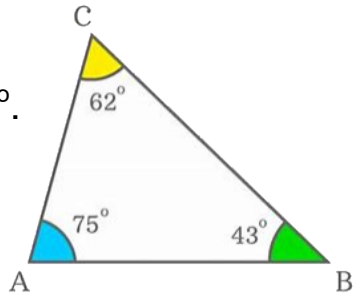
Lesson 2 Name & Sort Triangles by angles only

STUDY

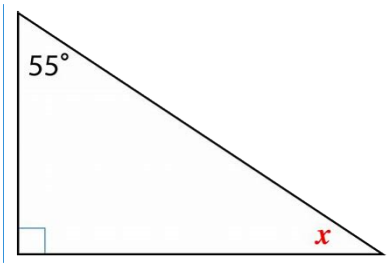
Study

We can name triangles by the type of interior angles.

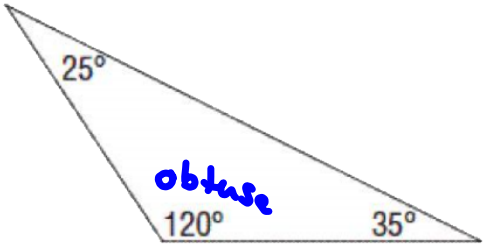
An acute triangle has ALL angles LESS than 90º.



A right triangle has one angle that is 90º.



An obtuse triangle has one angle that is GREATER than 90º.

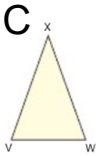


Acute	Right	Obtuse
C D G H	B E	A F

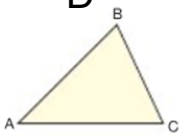
A

B

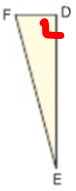
C



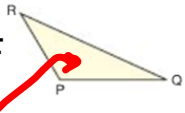
D



E



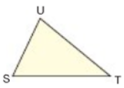
F



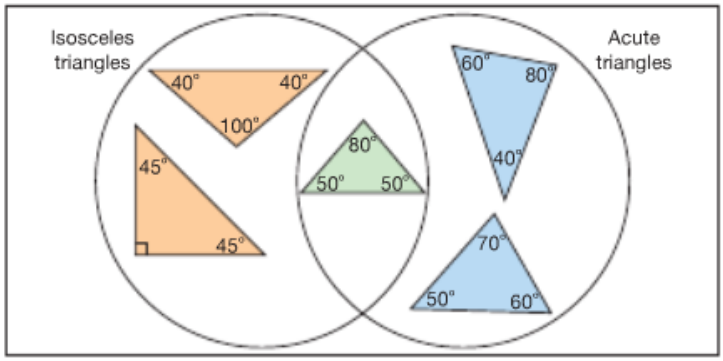
obtuse

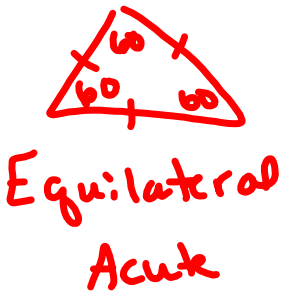
G

H



➤ We can sort triangles in a Venn diagram.
For example, choose the sorting rule "Isosceles triangles" and "Acute triangles."





The triangles in the left loop have 2 equal angles.
The triangles in the right loop have all angles less than 90°.
The triangle in the overlap has 2 equal angles and all angles less than 90°.

page 207 #2a b (Trace the triangles by placing paper over the pictures)

→ use protractor → measure angle
and
ruler → measure sides

page 207 #3

Page 208 #4

Page 208 #5, #6 (Trace, Don't cut, just measure and sort)

Practice

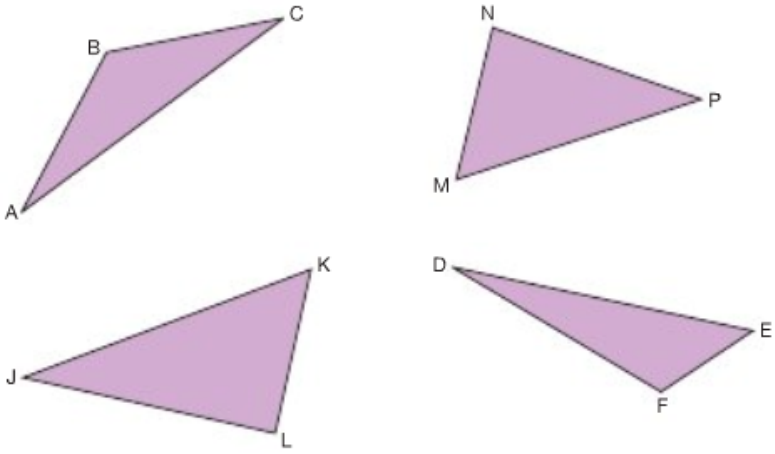
1. Use a geoboard, geobands, and square dot paper.
   a) Make 3 different acute triangles.
   Draw each triangle on dot paper.
   How do you know each triangle is acute?
   b) Make 3 different obtuse triangles.
   Draw each triangle on dot paper.
   How do you know each triangle is obtuse?
   c) Make 3 different right triangles.
   Draw each triangle on dot paper.
   How do you know each triangle is right?

TIP

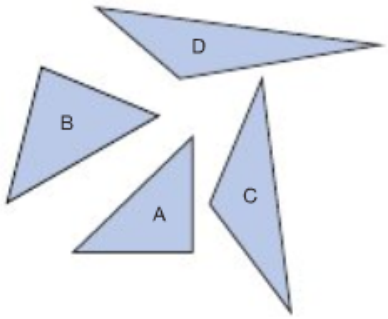
2. a) Predict whether each triangle is an acute, an obtuse, or a right triangle. How did you make your prediction?

   b) Use a protractor. Measure the angles in each triangle. Name each triangle as an acute, an obtuse, or a right triangle.

   c) Were your predictions correct? Explain.

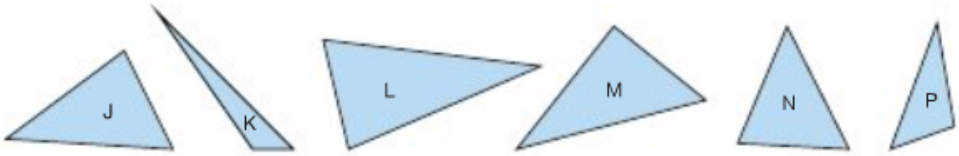


3. Akna drew these triangles. He noticed there were at least two acute angles in each triangle he drew.
Akna made this conclusion: "All triangles must have at least two acute angles."
Do you agree?
Why or why not?



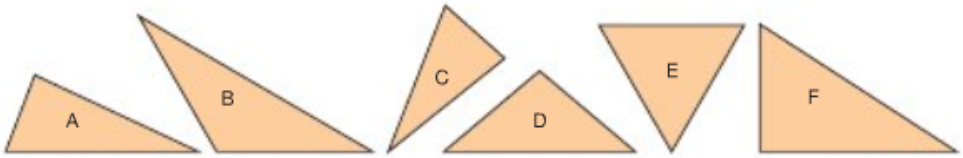
4. Is each statement true or false?
Use pictures, words, or numbers to explain your thinking.
   a) A triangle can have more than one obtuse angle.
   b) A triangle can have only one 90° angle.
   c) A triangle can have 3 acute angles.

5. You will need scissors and a large copy of these triangles.



Cut out the triangles.
Sort the triangles as acute, obtuse, or right triangles.
How did you decide where to place each triangle?

6. You will need scissors and a large copy of these triangles.
Cut out the triangles.



a) Sort the triangles in a Venn diagram with 2 loops.
Label each loop. Explain your sorting rule.
Are there any triangles in the overlap?
If there are, what attributes do these triangles have?

b) Repeat part a. This time, choose a different sorting rule.
How many different ways can you sort the triangles? Show your work.

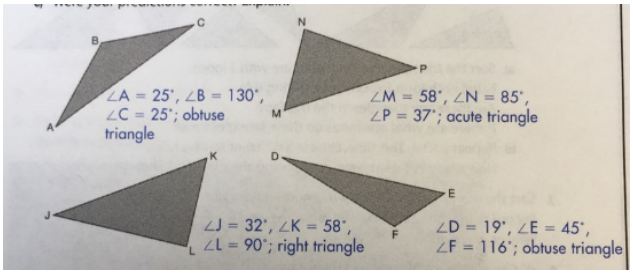
7. Sort the triangles in question 6 using a Venn diagram with 3 loops.
Record your work. Do any of the loops overlap?
Why or why not?

8. a) Can an obtuse triangle be an equilateral triangle? Explain.
b) Can a right triangle be an isosceles triangle? Explain.

Sample Solutions

1. a) Triangles will vary.
   All angles in each of the triangles are less than 90°.
   b) Triangles will vary.
   Each triangle has one angle greater than 90°.
   c) Triangles will vary.
   Each triangle has one 90° angle.

2. a) △ABC: Obtuse triangle; ∠B is greater than 90°.
   △MNP: Acute triangle; all angles are less than 90°.
   △JKL: Right triangle; ∠L is 90°.
   △DEF: Obtuse triangle; ∠F is greater than 90°.

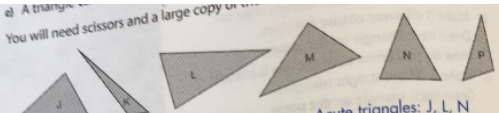


3. Yes, all triangles must have at least two acute angles. When one angle is obtuse or right, then the other angles must be acute or the angle sum would be greater than 180°. An acute triangle has 3 acute angles, which is "at least" 2.

4. a) The sum of 2 obtuse angles would be greater than 180°.
   b) The sum of 2 right angles would be 180° and there are no degrees left for the third angle.
   c) All acute triangles have 3 acute angles.

4. Is each statement true or false?
   Use pictures, words, or numbers to explain your thinking.
   a) A triangle can have more than one obtuse angle. False
   b) A triangle can have only one 90° angle. True
   c) A triangle can have 3 acute angles. True
   ...and a large copy of these triangles.

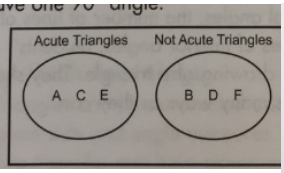
5. You will need scissors and a large copy of these triangles.
   Cut out the triangles.
   Sort the triangles as acute, obtuse, or right triangles.
   How did you decide where to place each triangle?



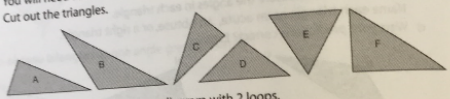
Acute triangles: J, L, N
Obtuse triangles: K and P
Right triangle: M

5. Acute triangles have all angles less than 90°. Obtuse triangles have one angle greater than 90°. Right triangles have one 90° angle.

6. a)



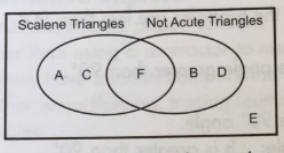
6. You will need scissors and a large copy of these triangles.
   Cut out the triangles.



   a) Sort the triangles in a Venn diagram with 2 loops.
   Label each loop. Explain your sorting rule.
   Are there any triangles in the overlap?
   If there are, what attributes do these triangles have?
   b) Repeat part a. This time, choose a different sorting rule.
   How many different ways can you sort the triangles? Show your work.

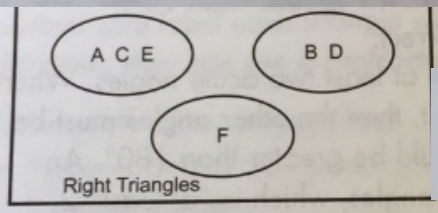
There is no overlap because a triangle cannot be both acute and not acute.

b)



There is a triangle in the overlap. Triangle F is a right triangle (not acute) with all sides of different lengths (scalene).

7. Sort the triangles in question 6 using a Venn diagram with 3 loops. Record your work. Do any of the loops overlap? Why or why not?



None of the loops overlap because a triangle is either acute or obtuse or right. It cannot be two types at once.

8. a) An equilateral triangle has three 60° angles. An obtuse triangle has one angle greater than 90°.
   b) A right triangle can have 2 sides of the same length.

REFLECT: I can describe a triangle by the number of equal sides, the number of equal angles, the number of lines of symmetry, and by the types of interior angles. Students' answers should include a drawing of a triangle. They should describe the triangle in as many ways as they can.

8. a) Can an obtuse triangle be an equilateral triangle? Explain. No
   b) Can a right triangle be an isosceles triangle? Explain. Yes