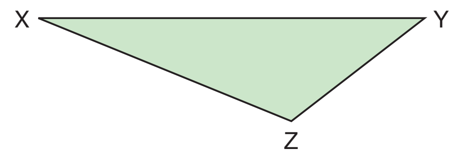
LESSON 2

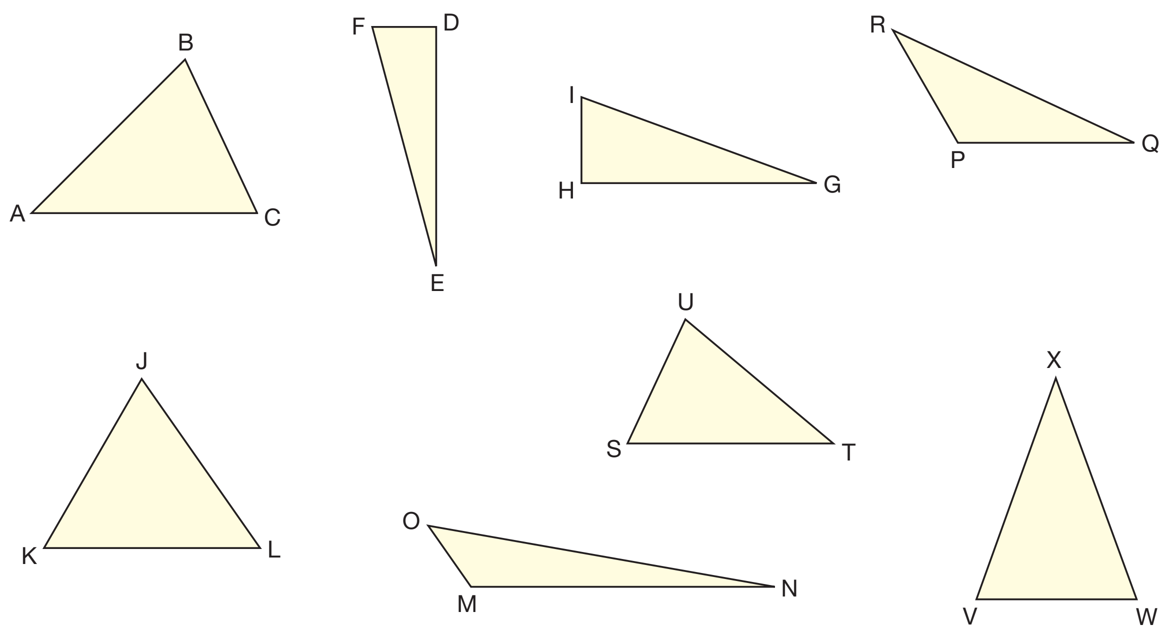
Naming and Sorting Triangles by Angles

Name each angle in $\triangle XYZ$ as acute, right, or obtuse.
What strategy did you use to find out?
What is the sum of the angles in the triangle?



Explore

You will need a protractor and scissors.
Your teacher will give you a large copy of these triangles.



- ➤ Measure the angles in each triangle.
  Record the angle measures.
- ➤ Cut out the triangles. Choose a sorting rule, then sort the triangles.
  How are the triangles in each group the same? How are they different?

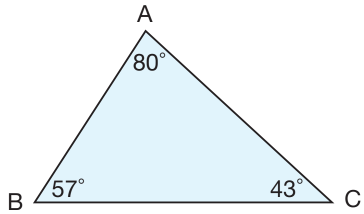
Show *and* Share

Trade your sorted triangles with another group of students.
Identify the rule for your classmates' sorting.
Did you sort the triangles the same way? Explain.

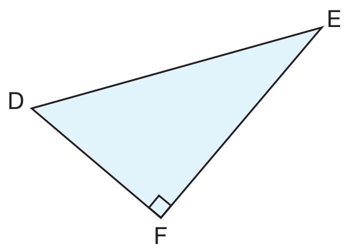
Lesson Focus | Name and sort triangles by types of angles.

Connect

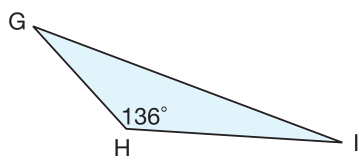
➤ We can name triangles by the types of interior angles.
An **acute triangle** has all angles less than 90°.



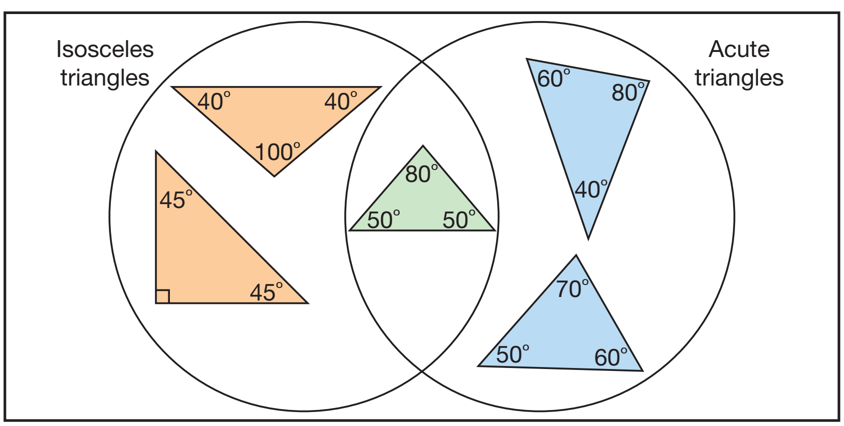
A **right triangle** has one 90° angle.



An **obtuse triangle** has one angle greater than 90°.



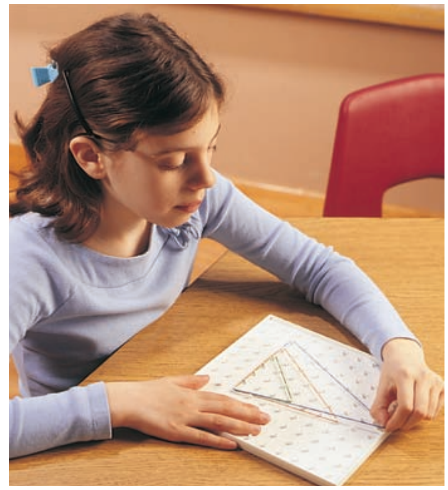
➤ We can sort triangles in a Venn diagram.
For example, choose the sorting rule "Isosceles triangles" and "Acute triangles."



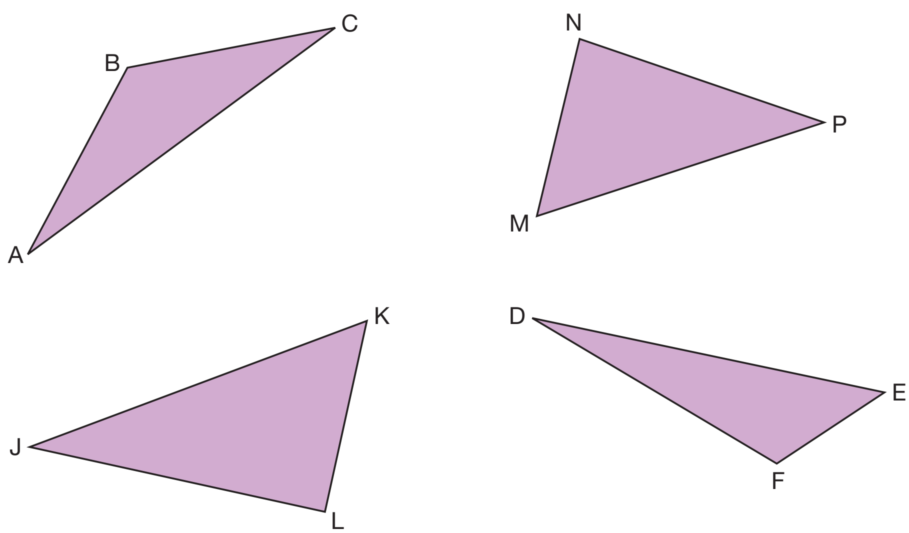
The triangles in the left loop have 2 equal angles.
The triangles in the right loop have all angles less than 90°.
The triangle in the overlap has 2 equal angles and all angles less than 90°.

Practice

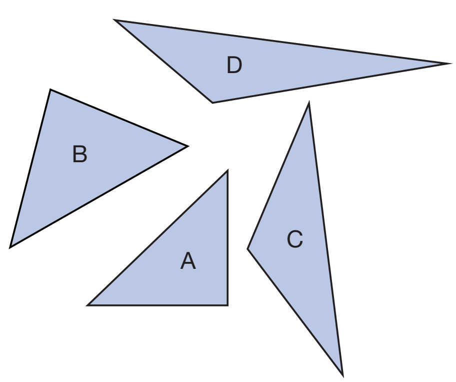
1. Use a geoboard, geobands, and square dot paper.
   a) Make 3 different acute triangles.
   Draw each triangle on dot paper.
   How do you know each triangle is acute?
   b) Make 3 different obtuse triangles.
   Draw each triangle on dot paper.
   How do you know each triangle is obtuse?
   c) Make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



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.

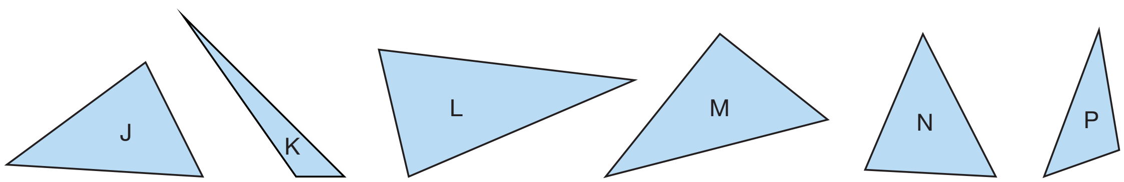


3. Akna drew these triangles. He noticed there were at least two acute angles in each triangle he drew.
   Akna made this conclusion: "All triangles must have at least two acute angles."
   Do you agree?
   Why or why not?



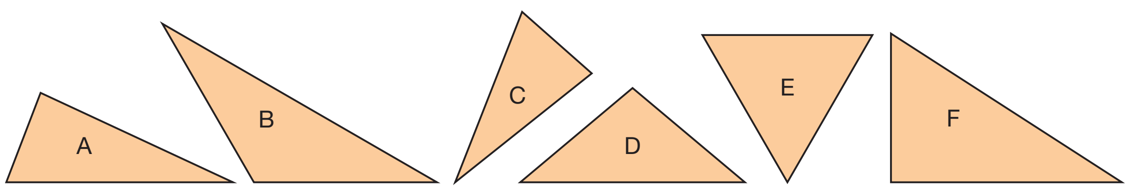
4. Is each statement true or false?
Use pictures, words, or numbers to explain your thinking.
   a) A triangle can have more than one obtuse angle.
   b) A triangle can have only one 90° angle.
   c) A triangle can have 3 acute angles.

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.

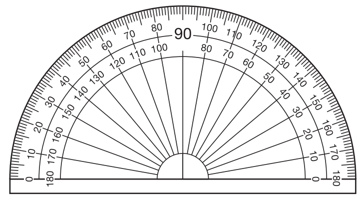
Reflect

How many different ways can you describe a triangle?
Draw a triangle and describe it as many ways as you can.

LESSON 3

Drawing Triangles

We can use a protractor to draw an angle.
What steps would you take to draw a 45° angle?



Explore

You will need rulers and protractors.

➤ Each group member chooses 2 triangles from the list:
- acute
- obtuse
- right
- scalene
- isosceles
- equilateral

➤ Draw each triangle you chose.

➤ Trade triangles with another group member.
Identify each triangle.

LESSON FOCUS | Construct a specified triangle.

Show *and* Share

Compare your strategies for drawing with those of the others in your group.
How did you create each triangle?
How did you identify your group members' triangles?

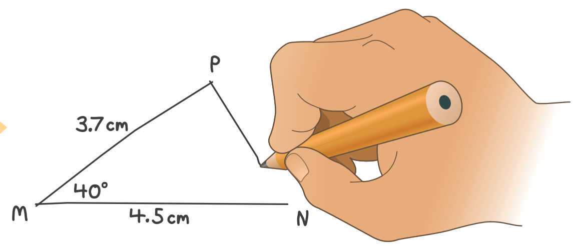
Connect

We can use a ruler and a protractor to construct a triangle.

Construct scalene $\triangle$MNP.
The length of MN is 4.5 cm.
The measure of $\angle$M is 40°.
The length of MP is 3.7 cm.

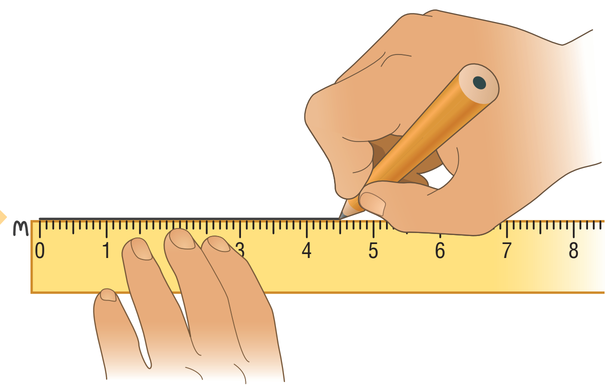
Step 1

Sketch the triangle first.
Label each side and angle.
This sketch is *not* accurate.



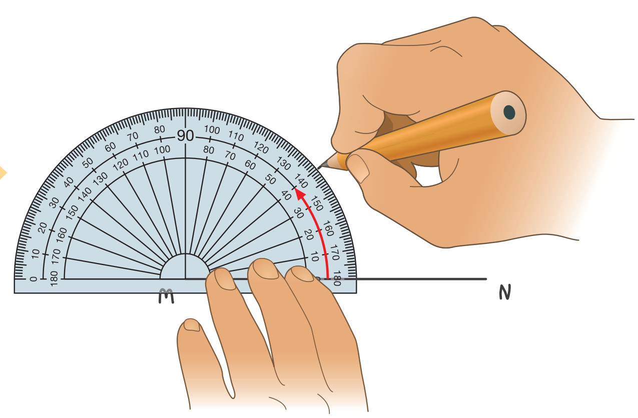
Step 2

Use a ruler to draw side MN
4.5 cm long.

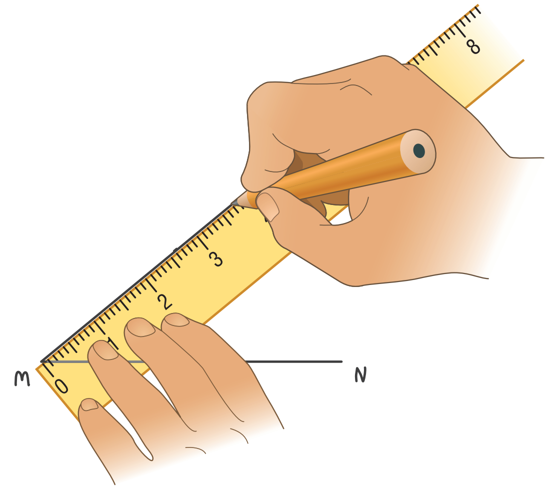


Step 3

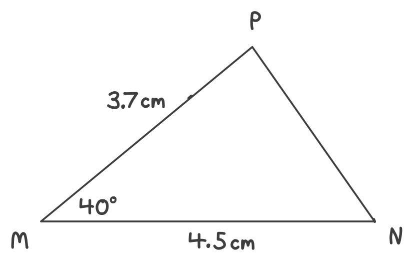
Place the baseline of the protractor
on MN, with its centre at M.
From 0° on the inner circle,
measure an angle of 40° at M.



Step 4
Remove the protractor.
Join M to the mark at 40°.
Measure 3.7 cm from M.
Mark the point P.



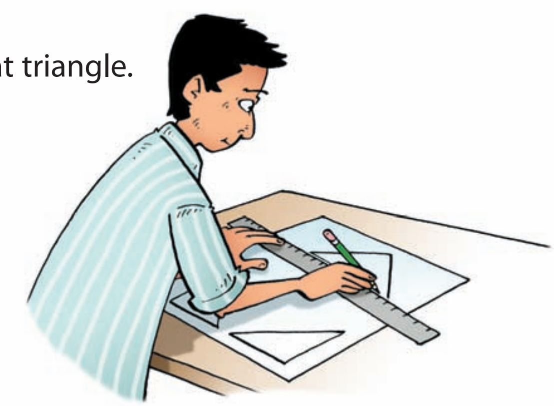
Step 5
Use a ruler to join P to N
to form side NP.
Label the triangle with its measures.



Practice

1. Use either or both of these tools: ruler and protractor
   - Construct each triangle listed below.
   - Explain how you know you have drawn that triangle.

   a) an acute triangle
   b) an equilateral triangle
   c) an isosceles triangle
   d) an obtuse triangle
   e) a right triangle
   f) a scalene triangle

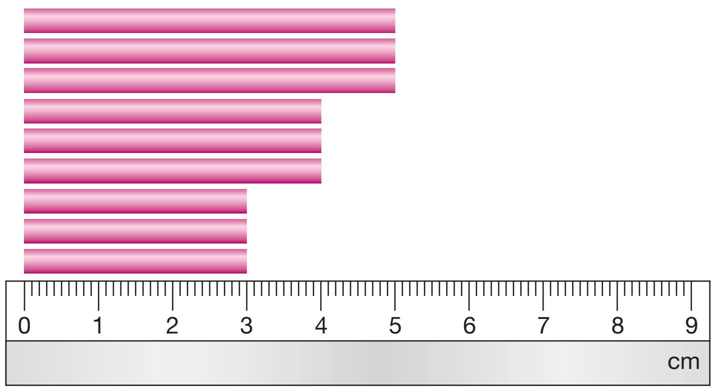


2. Use a ruler and a protractor.
   Construct a triangle with angles 40°, 60°, and 80°.
   Compare your triangle with that of a classmate.
   Do your triangles match?
   How could you find out?

3. Use a ruler and a protractor.
Construct each triangle.
Sketch the triangle first.
   a) Isosceles triangle VWX
      The length of side VW is 7 cm.
      The measure of ∠V is 80°.
      The measure of ∠W is 50°.
   b) Obtuse triangle RST
      The length of side TS is 5.2 cm.
      The measure of ∠T is 30°.
      The length of side RT is 3.4 cm.

Label each triangle with the measures of all the sides and angles.

4. You will need drinking straws, a ruler, scissors, and pipe cleaners.
Cut the straws into 9 pieces as shown.



Use pieces of pipe cleaner as joiners.
Use combinations of 3 or more straws to make each triangle.
Trace each triangle.
Label each triangle with the measures of all the sides and angles.
   a) an isosceles triangle that is also an acute triangle
   b) an isosceles triangle that is also an obtuse triangle
   c) two different equilateral triangles
   d) two different right triangles

5. Use a geoboard and geobands.
Construct a triangle with two 45° angles.
Record your work on square dot paper.
Do this 3 times to construct 3 different triangles.
   a) How are the triangles the same?
      How are the triangles different?
   b) What kind of triangle did you make?
      Give a different name to describe the triangle.

6. Construct a triangle that has one angle that measures 55° and one angle that measures 35°.
What kind of triangle did you make?
Give a different name to describe the triangle.

7. Construct a triangle that has one angle that measures 60° and one angle that measures 45°.
   a) What is the measure of the third angle?
   b) What kind of triangle did you make?
   How do you know?
   c) How else can you name the triangle?

8. A student said he had drawn △ABC with these measures:
   - AB = 4.2 cm
   - ∠A = 90°
   - ∠B = 95°

   Was the student correct?
   How do you know?

9. Construct isosceles △GHK.
The measure of ∠H is 120°.
Choose side lengths for HG and HK so that △GHK is isosceles.
   a) What are the measures of ∠G and ∠K?
   How long is side GK?
   b) Suppose side HG is longer.
   The length of side HK does not change.
   What happens to the measure of ∠K?
   What happens to the length of side GK?

   Show your work.

Reflect

Name the 6 types of triangles you know.
Which of them do you find easiest to draw?
Explain why.

At Home

Look for triangles in your home.
They could be pictures of triangles or objects with triangular faces.
Name each triangle 2 ways.
Choose 1 triangle. Draw it.