

**Section 6 – Topic 1**  
**Introduction to Triangles – Part 1**

We can classify triangles by their angles and their sides. Complete each section of the following table with the most appropriate answers.

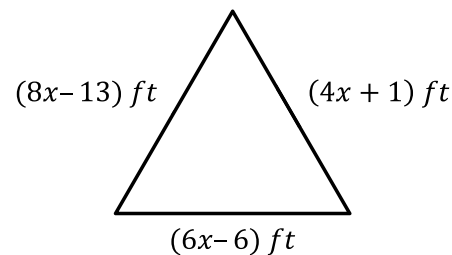
Description	Representation	Name
one right angle		
three acute angles		
one obtuse angle		
all 60° angles		
two congruent sides		
no congruent sides		
three congruent sides		

Can a triangle be both acute and isosceles? Justify your reasoning.

Can a triangle be both equiangular and obtuse? Justify your reasoning.

**Let's Practice!**

- Consider the diagram below of an equilateral triangle.

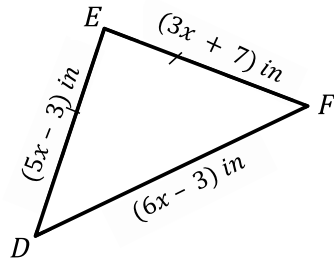


How long is each side of the triangle? Justify your answer.



**Try It!**

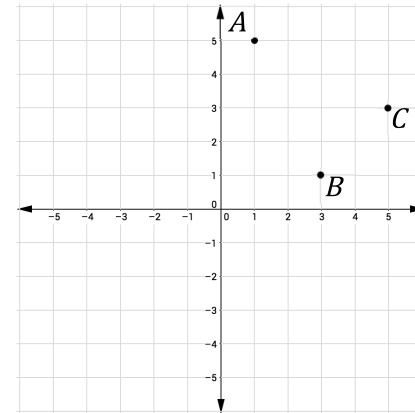
2. Consider the triangle below.



- If  $\triangle DEF$  is an isosceles triangle with base  $\overline{DF}$ , what is the value of  $x$ ? Justify your answer.
  - What is the length of each leg?
  - What is the length of the base?
3. How can you determine if a triangle on the coordinate plane is a right triangle?

**Let's Practice!**

4. Consider the figure below.

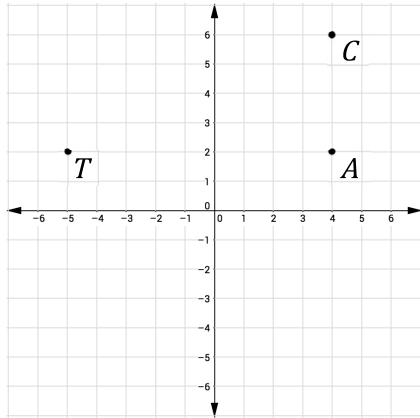


- Marcos claims that angle  $B$  is a right angle. Is Marcos correct? Explain your reasoning.
- How can you classify a triangle on the coordinate plane by sides?



**Try It!**

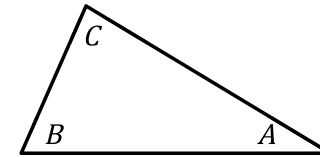
5. Consider the figure below.



Classify the above triangle. Use two different approaches to justify your answer.

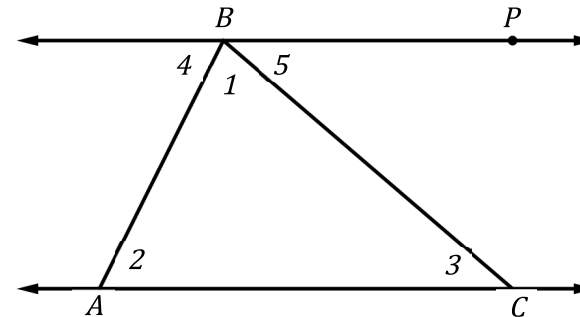
**Section 6 – Topic 2**  
**Introduction to Triangles – Part 2**

What is the sum of the measures of the interior angles of a triangle?



Formulate how you can prove the sum of measures, if possible.

Consider the following figure.



**Given:**  $\triangle ABC$  and  $\overline{BP}$  is parallel to  $\overline{AC}$ .

**Prove:**  $m\angle 1 + m\angle 2 + m\angle 3 = 180^\circ$



Complete the following two-column proof for the previous exercise.

Statements	Reasons
1. $ABC$ is a triangle.	1.
2. $\overline{BP} \parallel \overline{AC}$	2.
3. $m\angle 1 + m\angle 5 = m\angle PBA$	3.
4. $m\angle PBA + m\angle 4 = 180^\circ$	4.
5. $m\angle 1 + m\angle 5 + m\angle 4 = 180^\circ$	5.
6. $\angle 2 \cong \angle 4; \angle 3 \cong \angle 5$	6.
7. $m\angle 2 = m\angle 4; m\angle 3 = m\angle 5$	7.
8. $m\angle 1 + m\angle 2 + m\angle 3 = 180^\circ$	8.

**TAKE NOTE!**  
Postulates &  
Theorems

### Triangle Sum Theorem

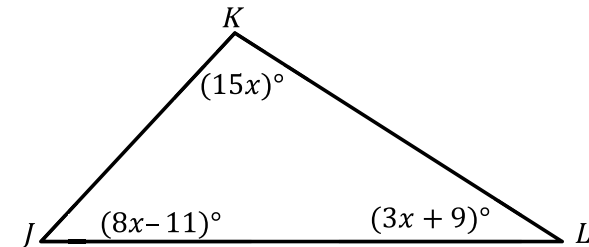
The sum of the interior angles in a triangle is  $180^\circ$ .

### Let's Practice!

- Joan knows the measures of two of the interior angles in a triangle. How could she find the third measure? Explain your reasoning.

### Try It!

- Consider the figure below.



Timothy was trying to find the measure of angle  $K$  in the triangle above. However, he got 7 as the answer. He is confused as he cannot understand why  $m\angle K = 7$ . Is Timothy's answer correct? Justify your answer.

**BEAT THE TEST!**

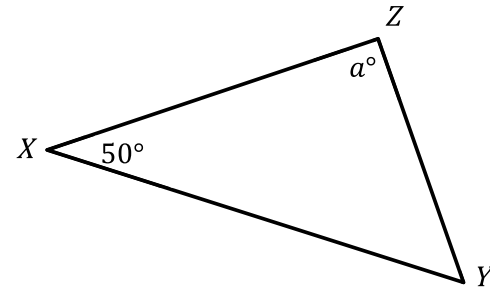
1. Triangle  $DOG$  has vertices at  $D(5, 8)$ ,  $O(-3, 10)$ , and  $G(-3, 6)$ .

*Part A:* Determine what type of triangle  $DOG$  is, and mark the most appropriate answer.

- Ⓐ Scalene
- Ⓑ Isosceles
- Ⓒ Equilateral
- Ⓓ Right

*Part B:* If you move vertex  $D$  four units to the left, will the classification of triangle  $DOG$  change? If so, what type of triangle will it be? Justify your answer.

2. Stephen is fencing in his triangular garden as shown by the diagram below.



*Part A:* Write an expression for the measure of angle  $Y$ .

*Part B:* Stephen measured angle  $Z$  as  $90^\circ$ . He measures angle  $Y$  as  $38^\circ$ . Did he measure correctly? Justify your answer.

