

## Section 2.3

# Angle Properties in Triangles

### Learning targets:

1. Demonstrate understanding of new terminology (exterior angle for a triangle, non-adjacent angles).
2. Apply angle properties of triangles to solve problems.

# Key Terms:

## (1) Exterior angle (of a triangle, or other polygon):

- the angle that is formed by a side of a triangle, or other polygon, and the extension of an adjacent side



**(2) Non-adjacent interior angles (in a triangle):**

- the two angles of a triangle that do not have the same vertex as an exterior angle

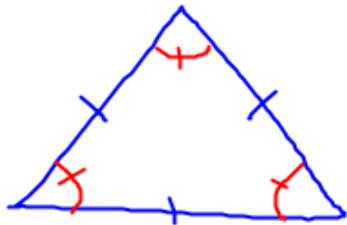


$\angle a$  and  $\angle b$  are non-adjacent interior angles for  $\angle c$ , which is an exterior  $\angle$ .

# Triangle property #1: (SMAT 180°)

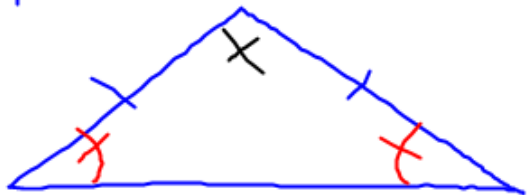
The sum of the measures of the interior angles of any triangle is  $180^\circ$

Special case #1: equilateral  $\triangle$



each interior angle is

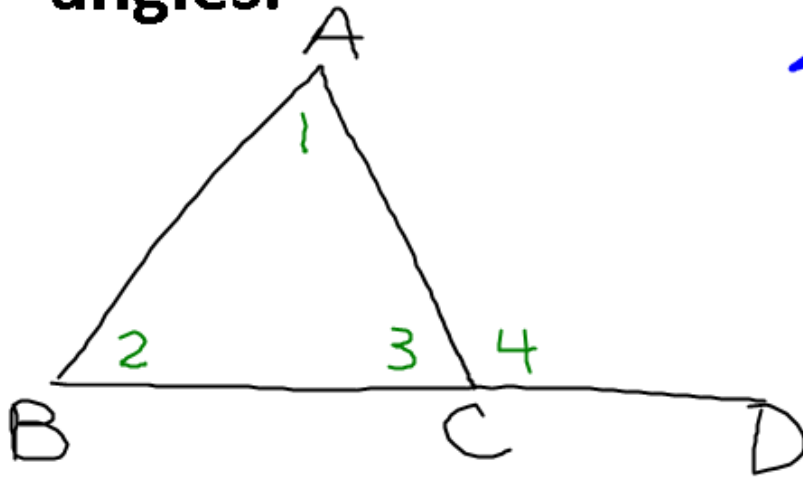
Special case #2: isosceles  $\triangle$



= each base angle

## Triangle property #2:

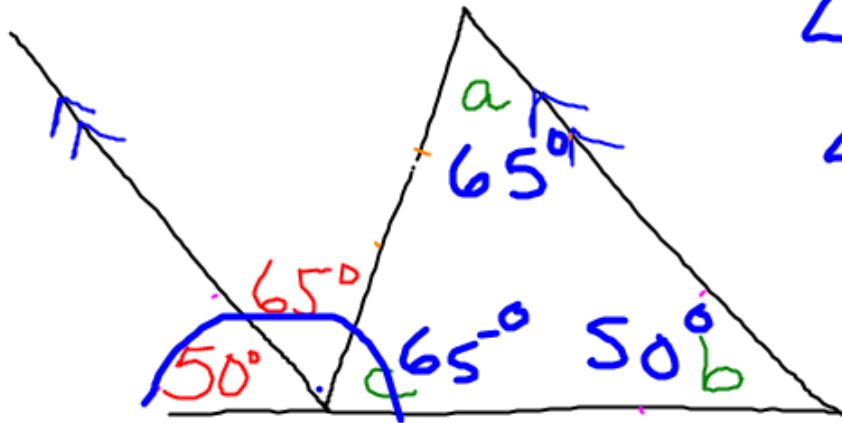
The measure of any exterior angle of a triangle is proven to be equal to the sum of the measures of the two non-adjacent interior angles.



$$\angle 4 = \angle 1 + \angle 2$$

## Example #1:

Determine the values of  $a$ ,  $b$  and  $c$  in the following diagram:



$$\angle a = 65^\circ \text{ alt int } \angle \text{'s}$$

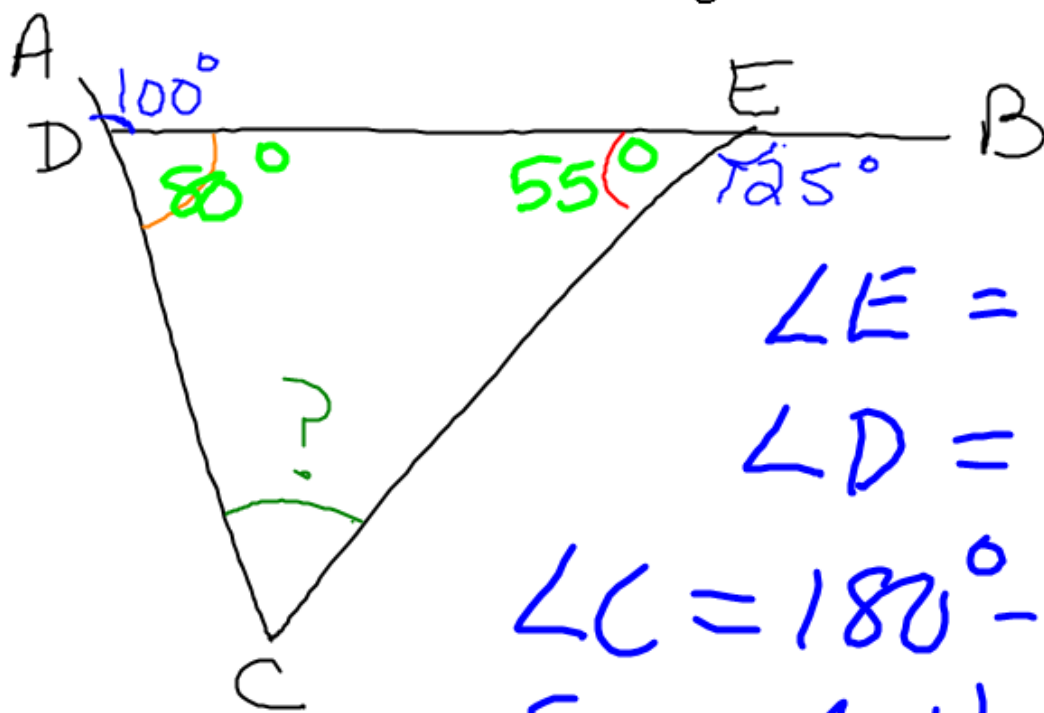
$$\angle b = 50^\circ \text{ corresponding } \angle \text{'s}$$

$$\angle c = 180^\circ - 65^\circ - 50^\circ$$

$$= 65^\circ \angle \text{'s of } \triangle \\ = 180^\circ$$

## Example #2:

Determine the measure of angle  $\angle DCE$  in the following diagram:



$$\angle E = 55^\circ \text{ supp } \angle \text{'s}$$

$$\angle D = 80^\circ \text{ supp } \angle \text{'s}$$

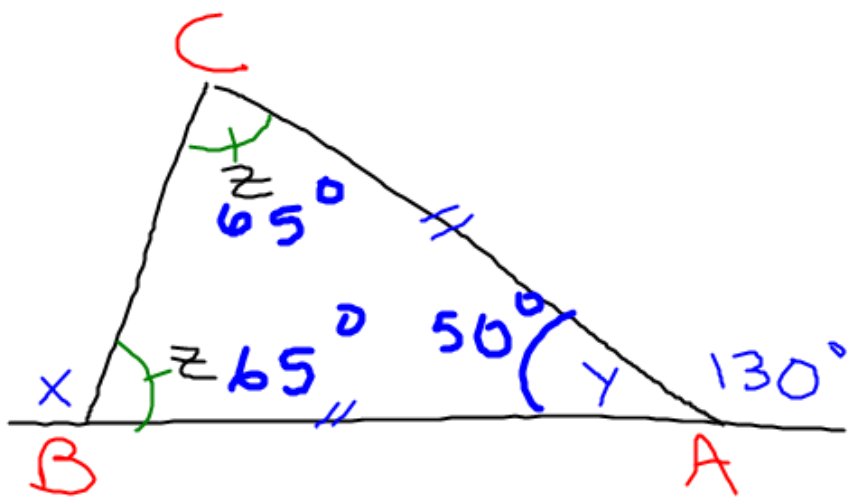
$$\angle C = 180^\circ - 80^\circ - 55^\circ = 45^\circ$$

$$\text{Sum of } \angle \text{'s in } \triangle = 180^\circ$$

## Example #3:

Triangle ABC is isosceles, with  $AB=AC$ .

Determine the measures of angles  $x$  and  $y$ :



$$\angle y = 50^\circ$$

Suppl.  $\angle$ 's

$$z = \frac{130^\circ}{2}$$

$$z = 65^\circ$$

$$\text{Sum of } \angle \text{'s in } \Delta = 180^\circ$$

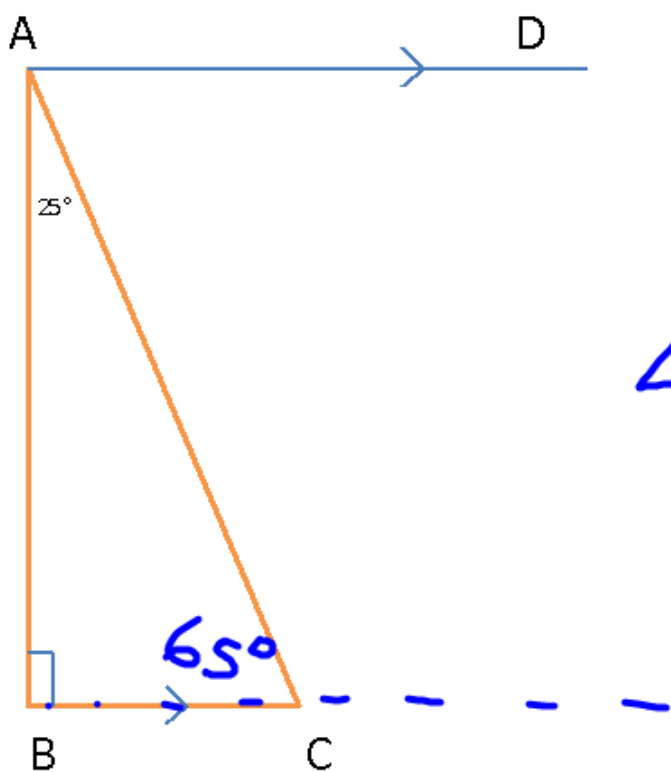
$$\angle x = 180^\circ - 65^\circ$$

$$\angle x = 115^\circ \text{ suppl. } \angle \text{'s.}$$



## You Try:

1. Determine the measure of  $\angle DAC$  in the diagram below:

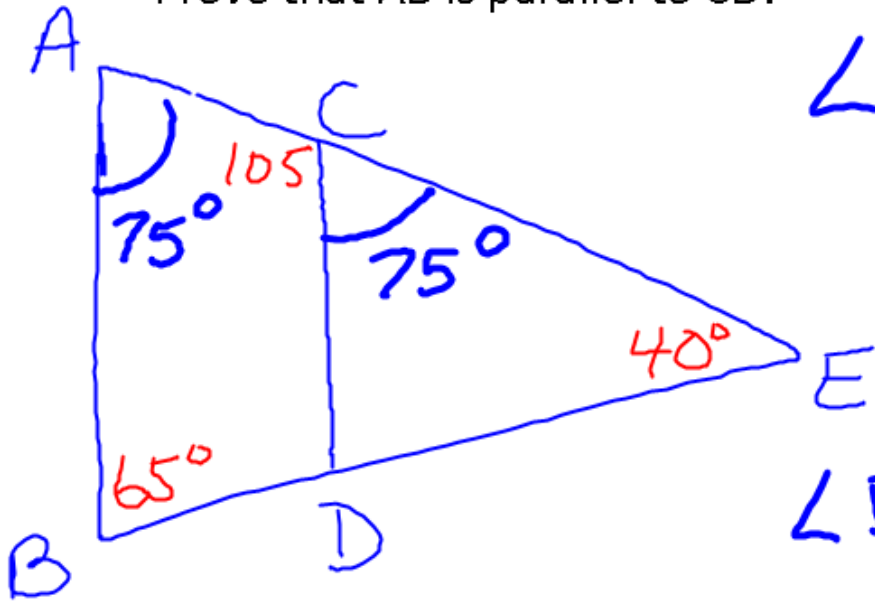


$$\begin{aligned}\angle C &= 65^\circ \\ \text{Sum of } \angle\text{'s in } \triangle &= 180^\circ \\ \angle DAC &= 65^\circ \text{ alt int}\end{aligned}$$

2. Is  $\angle DAC$  an exterior angle for  $\triangle ABC$ ?  
Not an exterior  $\angle$ .

## Example #4:

Prove that AB is parallel to CD:



$$\angle DCE = 75^\circ \text{ supp } \angle C$$

$$\angle A = 180 - 40 - 65 = 75^\circ$$

angles in  $\Delta$  sum  $180^\circ$

$$\angle DCE \cong \angle BAC$$

Corresponding  $\angle$ 's.

$$\therefore AB \parallel CD \text{ corresponding } \angle \text{'s} \\ \cong \rightarrow \parallel \text{ lines.}$$

# **ASSIGNMENT:**

**Text page 90 – 93:**

**#1, 2, 3, 4, 6, 7, 9, 11, 13, 14, 15, 16**