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Lesson 2.04 Isosceles Triangles

Students will be able to:

- ▪ <u>Content Objective:</u> Define isosceles triangles as having at least two congruent sides and two congruent base angles.

- ▪ <u>Language Objective</u>: Discuss whether a triangle is isosceles using the construction of perpendicular bisector.

Warm Up

Reflect $\triangle ABC$ over $\overline{BC}$ to get $\triangle A'B'C'$ and answer the following questions.

a.   Did points B and C change location? These are called <u>fixed points.</u>

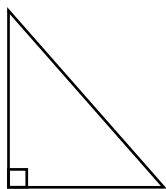b.   What is true about $\overline{AC}$ and $\overline{A'C'}$?
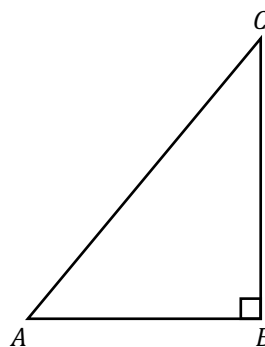
$\overline{BC}$ is called the <u>altitude</u> of triangle ACA' because it forms a right angle with the base of the triangle.
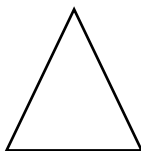
Vocabulary Review

Identify the types of triangles shown below. Use the word bank to guide you.

a.

b.

_____

_____
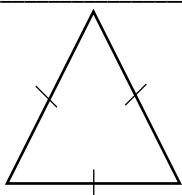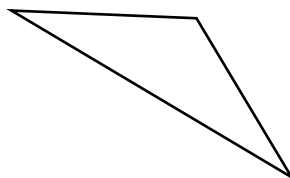
<u>Word Bank</u>

Equilateral Triangle

Acute Triangle

Obtuse Triangle

Right Triangle

c.

d.

_____

_____

Graphic Organizer
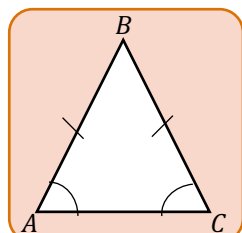
Isosceles Triangle

- • A triangle that has at least two congruent sides and two congruent base angles.
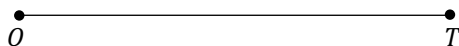
Base: $\overline{AC}$

Vertex Angle: $\angle B$

Base Angles: $\angle A$ & $\angle C$

$\overline{AB} \cong \overline{CB}$ & $\angle A \cong \angle C$

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🔍 **Investigate**

Line segment OT is shown below. Construct the perpendicular bisector and label the point of intersection M.

●————————————————————————————●
O T

a. What does point M represent?

b. Label point P on the perpendicular bisector and construct $\overline{PO}$ and $\overline{PT}$.

c. Using measurement, what is true about $\overline{PO}$ and $\overline{PT}$?

d. Using measurement, what is true about $\angle OPM$ and $\angle TPM$? What does this say about PM?

e. What can we say about $\triangle OPM$ and $\triangle TPM$?

f. What type of triangle is $\triangle OPT$?

Isosceles Triangle

1. The angle bisector of the vertex angle ($\angle OPT$ above) will always be the _____ of the base.

2. A point will lie on a perpendicular bisector of a segment if and only if it is _____ from the endpoints of the segment.

👨‍🏫 **Skill 1: Congruent Parts of Isosceles Triangles**

In isosceles $\triangle XYZ$ shown below, $\overline{XZ} \cong \overline{YZ}$.

a. Based on this information, what two angles must be equal?

b. If $m < Z = 30°$ (not drawn to scale), find the measure of $\angle X$ and $\angle Y$. What fact must we use?

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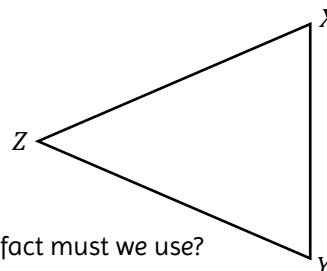
Exercise 1: Congruent Parts of Isosceles Triangles

Shown below is isosceles triangle ABC, where $\overline{AB} \cong \overline{AC}$.

a.   Using this information, identify the legs and base.

Leg: _____   Leg: _____   Base: _____

b.   If $AB = 2x + 1$ and $AC = 3x - 4$, solve for x.
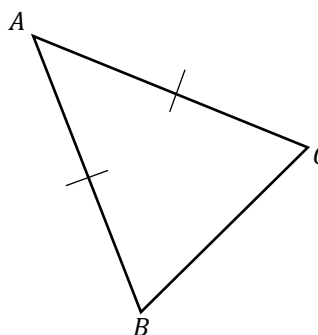
c.   If $m\angle B = 42°$, find the measure of $\angle A$.

Skill 2: Constructing Isosceles Triangles

Given the lengths below, construct an isosceles triangle using only a compass and straightedge. Leave all construction marks.

•————————————• Base

•————————————————• Legs

Talk it Out

Shown below is segment $\overline{EF}$ and point G not on $\overline{EF}$. If you connected the points to form ΔEFG, would it be an isosceles triangle? Use the construction of the perpendicular bisector to justify your answer.

G •

E •————————————————————————• F

Check Point

Fill in the blank.
Any point on the perpendicular bisector will be _____ from the endpoints of the segment being bisected.

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2.04- Problem Set

Name: _____

1. **True or False.** Identify whether each of the following statements are true or false.

    a. _____ An isosceles triangle has three congruent sides and three equal angles.

    b. _____ Any point on a perpendicular bisector of segment will be equidistant from the endpoints of the segment.

    c. _____ The angle bisector of the vertex angle of an isosceles triangle is a perpendicular bisector.

    d. _____ The base angles of an isosceles triangle are not congruent.

    e. _____ The base angles and legs of an isosceles triangle are congruent.

2. In the diagram of $\triangle HGT$ below, $\overline{HG} \cong \overline{HT}$. The measure of $\angle T$ is 30°. What is the measure of $\angle H$?

    1) 30°

    2) 100°

    3) 60°

    4) 120°

3. The vertex angle of an isosceles triangle measures 12 degrees more than the measure of one of the base angles. Find the measure of one of the base angles in the triangle? Draw a picture to support your work.

4. In $\triangle ABC$, $\overline{AB} \cong \overline{AC}$. An altitude is drawn from A to $\overline{BC}$ and intersects $\overline{BC}$ at point M. Which conclusion is *not* always true?

    1) $\angle ABC \cong \angle ACB$

    2) $\angle AMB \cong \angle AMC$

    3) $\overline{AM} \cong \overline{BM}$

    4) $\overline{BM} \cong \overline{CM}$

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