Lesson 5.1 and 5.2 Angles in Triangles & Congruent Triangles

Sunday, November 30, 2025 10:05 PM

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Lesson 5.1 and 5.2 Angles Of Triangles and Congruent Tria...

Lesson 5.1 Angles of Triangles &
Lesson 5.2 Congruent Triangles

Workbook pages starts at page 273

Content Objectives:

* Students will prove and apply the Triangle Angle-Sum Theorem, Exterior Angle Theorem, and Triangle Angle-Sum Theorem Corollaries.

- Students explain congruence between triangles based on their corresponding parts using *same, equal, corresponding*, and *congruent*.

Florida's B.E.S.T. Standards for Mathematics

MA.912.GR.1.3 Prove relationships and theorems about triangles. Solve mathematical and real-world problems involving postulates, relationships and theorems of triangles.

MA.912.GR.1.6 Solve mathematical and real-world problems involving congruence or similarity in two-dimensional figures.

MA.912.GR.2.6 Apply rigid transformations to map one figure onto another to justify that the two figures are congruent.

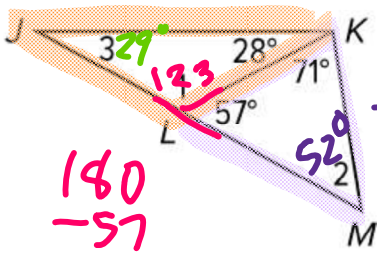
Apply Example 1

Use the Triangle Angle-Sum Theorem

Theorem 5.1: Triangle Angle-Sum Theorem

The sum of the measures of the interior angles of a triangle is 180°.

Find the measure of each numbered angle.



180
−151
29

123+28=
151

180
−57
123

71
+57
128

180−128
52

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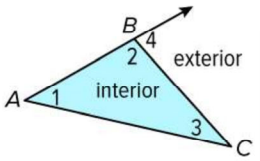
Learn

Exterior Angles of Triangles

exterior angles	An **exterior angle of a triangle** is an angle formed by one side of the triangle and the extension of an adjacent side. A triangle has three exterior angles. $\angle 4$ is an exterior angle of $\triangle ABC$.
remote interior angles	Each exterior angle of a triangle has two **remote interior angles** that are not adjacent to the exterior angle. $\angle 1$ and $\angle 3$ are the remote interior angles for $\angle 4$.



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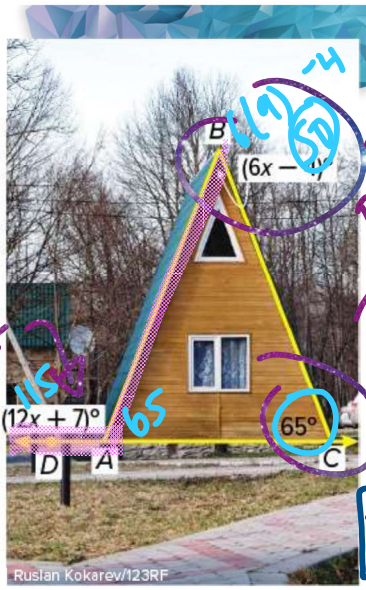
Example 2
Use the Exterior Angle Theorem

ARCHITECTURE Find the measure of ∠DAB in the front face of the building.



$6x - 4 + 65 = 12x + 7$

$6x + 61 = 12x + 7$

$-6x \quad -6x$

$61 = 6x + 7$

$-7 \quad -7$

$\frac{54}{6} = \frac{6x}{6}$

$x = 9$

Remote Interior ∠

$12(9) + 7 = 115$

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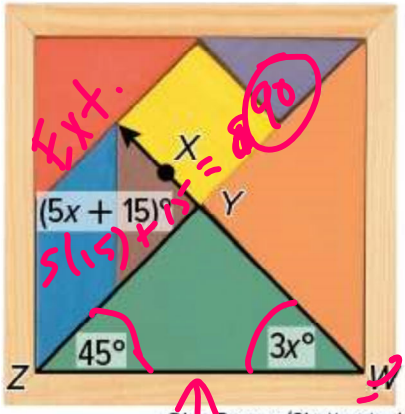
Example 2
Use the Exterior Angle Theorem

Check

PUZZLES Find the measure of ∠*XYZ*.



Olga Popova/Shutterstock

$45 + 3x = 5x + 15$

$-3x \quad -3x$

$45 = 2x + 15$

$30 = 2x$ $x = 15$

Ext. ∠ = sum of Remote Interior

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$1.25y - 45 + 90 + 1y = 180$

$2.25y + 45 = 180$

$-45 \quad -45$

$\frac{2.25y}{2.25} = \frac{135}{2.25}$

$y = 60$

Example 3

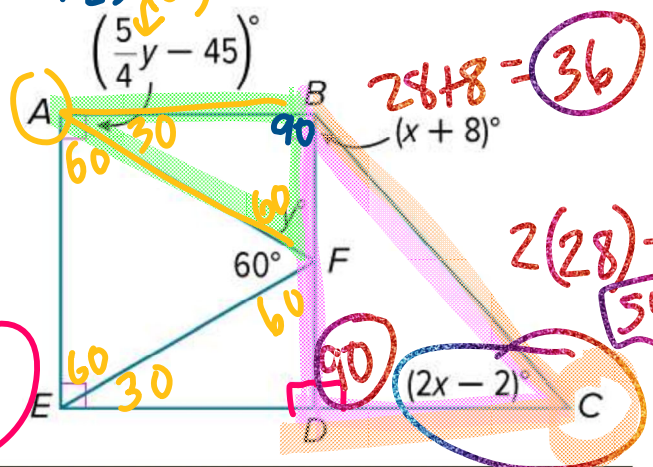
Find Angle Measures in Right Triangles

Find each measure.

a. $m\angle BCD$ **b.** $m\angle BAF$

Find all angle measures!

$1.25(60) - 45 = 30$



$28 + 8 = 36$

$2(28) - 2$

54

$90 + x + 8 + 2x - 2 = 180$

$3x + 96 = 180$

$-96 = -96$

$\frac{3x}{3} = \frac{84}{3} = 28$

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Interior Angles of Triangles

Key Concept: Congruent Triangles

Two triangles are congruent if and only if their corresponding parts are congruent.

For triangles, we say *Corresponding parts of congruent triangles are congruent*, or CPCTC.

In two **congruent polygons**, all the parts of one polygon are congruent to the **corresponding parts,** or matching parts, of the other polygon. These corresponding parts include *corresponding angles* and *corresponding sides*.

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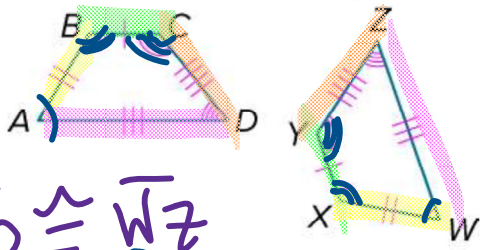
$\overline{BC} \cong \overline{XY}$

$\overline{AB} \cong \overline{WX}$

Example 1

Identify Corresponding Congruent Parts

Show that the polygons are congruent by identifying all the congruent corresponding parts. Then write a congruence statement.



$\angle A \cong \angle W \quad \angle B \cong \angle X \quad \angle C \cong \angle Y$

$\overline{AD} \cong \overline{WZ}$

$\overline{CD} \cong \overline{YZ}$

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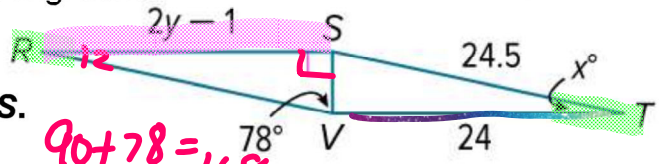
Example 2

Use Corresponding Parts of Congruent Triangles



In the diagram, $\triangle RSV \cong \triangle TVS$. Find the values of x and y.

90+78=168

180−168=12

12°

Part A Find the value of x

Part B Find the value of y.

$2y - 1 = 24$

$+1 \quad +1$

$2y = 25$

$y = 12.5$

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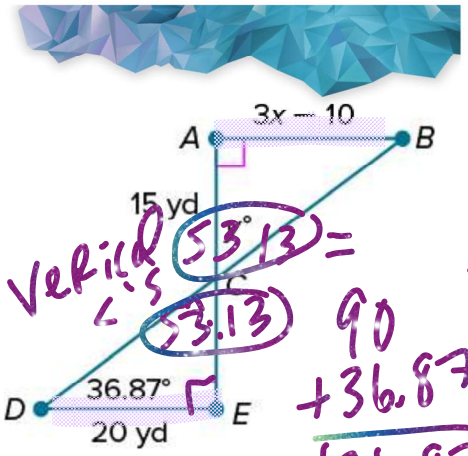
Example 2

Use Corresponding Parts of Congruent Triangles

Check

In the diagram, $\triangle ABC \cong \triangle EDC$. Find the values of x and y.



$3x - 10 = 20$

$+10 \quad +10$

$\frac{3x}{3} = \frac{30}{3}$ $x = 10$

Verified $\angle$'s: $53.13 = 53.13$

$90 + 36.87 = 126.87$

$180 - 126.87 = 53.13$

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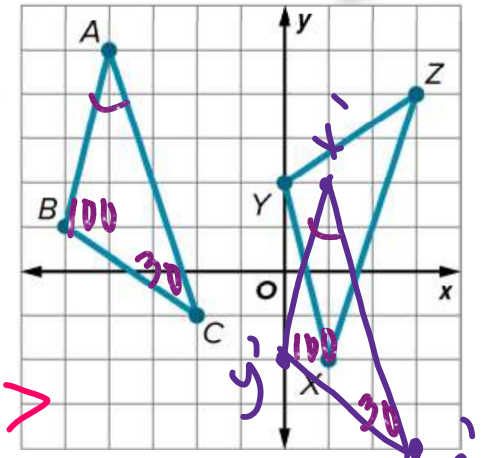
Rigid Motion · Reflection, Translation, Rotation

Example 3

Justify Congruence Using Rigid Transformations

Is $\triangle ABC \cong \triangle XYZ$? Justify your answer using rigid transformations.



Reflection over the x-axis

translation $(x-5, y+3)$ $\langle -5, 3 \rangle$

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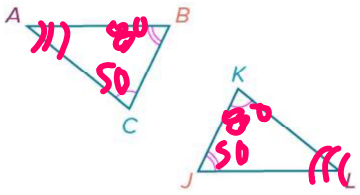
Learn

Third Angles Theorem and Triangle Congruence

Theorem 5.3: Third Angles Theorem

Words	If two angles of one triangle are congruent to two angles of a second triangle, then the third angles of the triangles are congruent.
Example	If $\angle C \cong \angle K$ and $\angle B \cong \angle J$, then $\angle A \cong \angle L$. 

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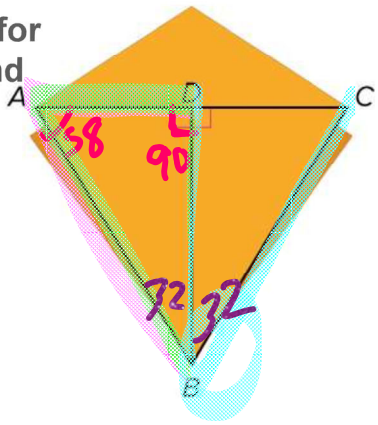
Example 4
Use the Third Angles Theorem

ORIGAMI Aika is folding origami dragons for a party she is hosting. If $\angle ABD \cong \angle CBD$ and $m\angle BAD = 58°$, find $m\angle CBD$.



$180 - 148 = 32$

$90 + 58 = 148$

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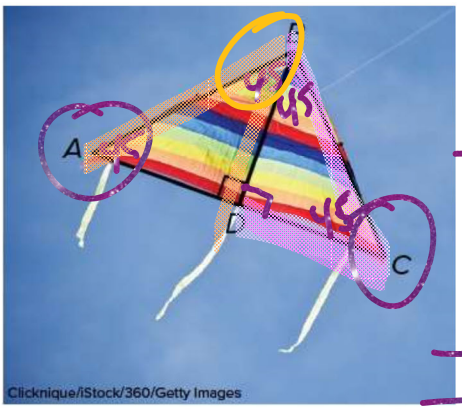
Example 4
Use the Third Angles Theorem

Check

KITES In the kite shown, $\angle BAD \cong \angle BCD$ and $m\angle BCD = 45°$. Find $m\angle ABD$.

45°



90
+45
135

180
−135
45

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