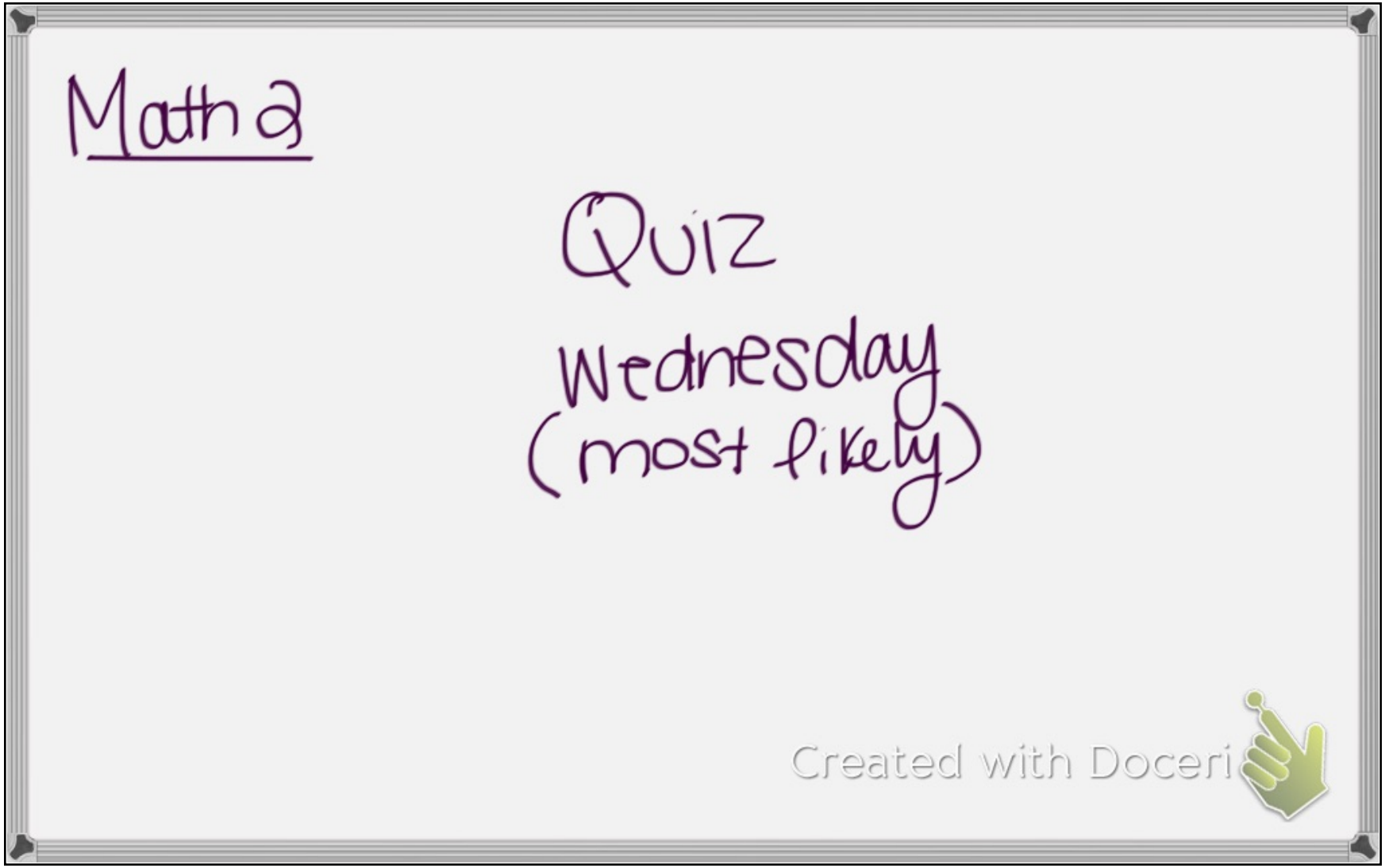
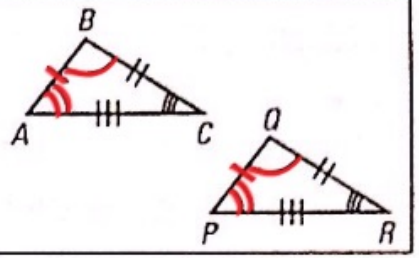

Math 2
Quiz
Wednesday
(most likely)
Created with Doceri

Math II – Notes --- Congruence and Triangles

Corresponding angles	Corresponding sides
$\angle A \cong \angle P$	$\overline{AB} \cong \overline{PQ}$
$\angle B \cong \angle Q$	$\overline{BC} \cong \overline{QR}$
$\angle C \cong \angle R$	$\overline{CA} \cong \overline{RP}$



Example 1 *Naming Congruent Parts*

Write a congruence statement for the triangles. Identify all pairs of congruent corresponding parts.

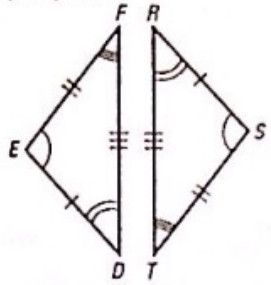
Solution

The diagram indicates that $\triangle DEF \cong \triangle RST$

The congruent angles and sides are as follows.

Angles: $\angle D \cong \angle R$, $\angle E \cong \angle S$, $\angle F \cong \angle T$

Sides: $\overline{DE} \cong \overline{RS}$, $\overline{EF} \cong \overline{ST}$, $\overline{DF} \cong \overline{RT}$

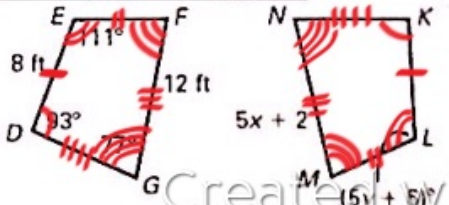


Example 2 *Using Properties of Congruent Figures*

In the diagram $DEFG \cong KLMN$.

a. Find the value of x.

b. Find the value of y.



Solution

a. You know that $\overline{FG} \cong \overline{MN}$

So, $FG =$ 12

b. You know that $\angle E \cong \angle L$

So, $m\angle E =$ 111°

$5x + 2 = 12$

$-2 \quad -2$

$\frac{5x}{5} = \frac{10}{5}$

$x = 2$

$5y + 16 = 111$

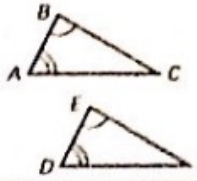
$-16 \quad -16$

$\frac{5y}{5} = \frac{105}{5}$

$y = 21$

THEOREM 4.3: THIRD ANGLES THEOREM

If two angles of one triangle are congruent to two angles of another triangle, then the third angles are also congruent.



If $\angle A \cong \angle D$ and $\angle B \cong \angle E$, then $\angle C \cong \angle F$.

Example 3 *Using the Third Angles Theorem*

Find the value of x.

Solution

$m\angle W = m\angle X$ Third Angles Theorem

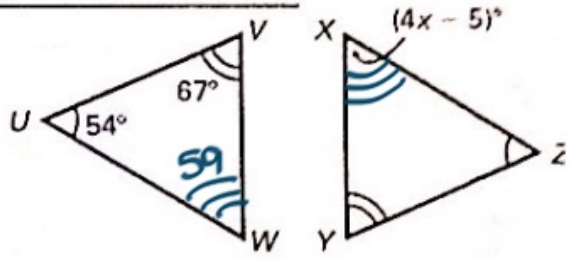
$59^\circ = (4x - 5)^\circ$ Substitute.

$+5 \quad +5$

$64 = 4x$

$\frac{64}{4} = \frac{4x}{4}$

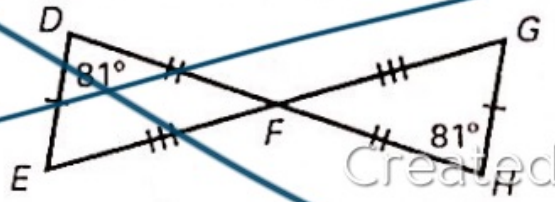
$16 = x$



Example 4 *Determining Whether Triangles are Congruent*

Decide whether the triangles are congruent. Justify your reasoning.

Solution

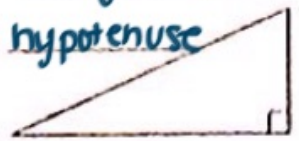


Triangle closed Polygon with 3 sides

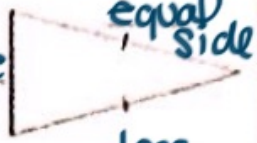
Adjacent sides sides that touch each other

Vertex Point where ~~two sides connect~~

right Δ



isosceles Δ



NAMES OF TRIANGLES

Classification by Sides

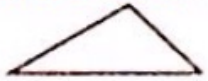
equilateral

3 congruent sides

isosceles

At least 2 congruent sides

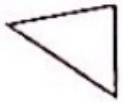
scalene



No congruent sides

Classification by Angles

acute

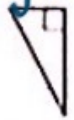


3 acute angles

equiangular

3 congruent angles

right



1 right angle

obtuse

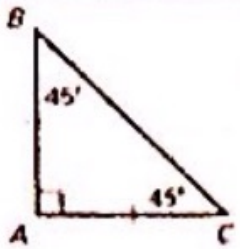
1 obtuse angle

Example 1 *Classifying Triangles*

Classify each triangle. Be as specific as possible.

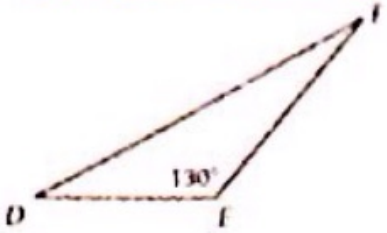
a. $\triangle ABC$ has two acute angles, one right angle and two congruent sides.

right isosceles Δ



b. $\triangle DEF$ has one obtuse angle and no congruent sides

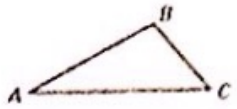
obtuse scalene Δ



THEOREM 4.1: TRIANGLE SUM THEOREM

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

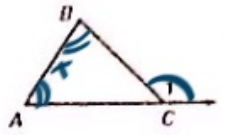
$m\angle A + m\angle B + m\angle C = 180$



THEOREM 4.2: EXTERIOR ANGLE THEOREM

The measure of an exterior angle of a triangle is equal to the sum of the measures of the two nonadjacent interior angles.

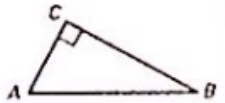
$m\angle 1 = \angle A + \angle B$



COROLLARY TO THE TRIANGLE SUM THEOREM

The acute angles of a right triangle are complementary.

$m\angle A + m\angle B = 90$

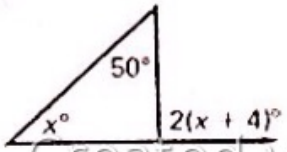


Triangle Inequalities: The sum of two sides of a triangle must be greater than the length of the third side.

Example 2 *Finding an Angle Measure*

Solve for x.

$x + 50 = 2(x + 4)$ Apply the Exterior Angle Theorem.



$x + 50 = 2x + 8$

$-x \quad -x$

$42 = x$ Solve for x.

$50 = x + 8$

$-8 \quad -8$

$x = 42$

Answer So, the measure of the exterior angle is $2 \cdot (42 + 4)°$, or 92°.

Practice Problems

1. Would the following side lengths form a triangle? Why?

a. 3, 4, 5?

$3+4 \stackrel{?}{>} 5 \quad 7>5$ ✓

b. 5, 7, 11?

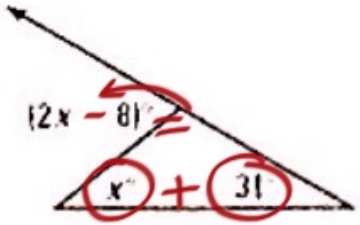
$5+7 \stackrel{?}{>} 11 \quad 12>11$ ✓

c. 3, 4, 7?

$3+4 \stackrel{?}{>} 7 \quad 7=7$ X

ext. ∠ thm

2. Solve for x.



$x + 31 = 2x - 8$

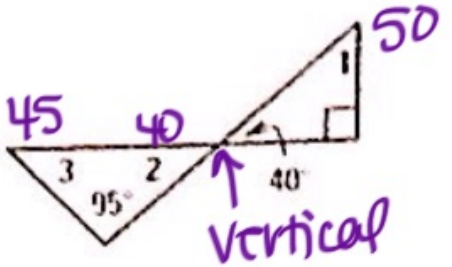
$-x \quad -x$

$31 = x - 8$

$+8 \quad +8$

$x = 39$

3. Find all missing angles

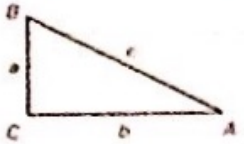


Vertical

Math II – Notes — Verifying Right Triangles Pythagorean Theorem: $a^2+b^2=c^2$

THEOREM 9.5: CONVERSE OF THE PYTHAGOREAN THEOREM

If the square of the length of the longest side of a triangle is equal to the sum of the squares of the lengths of the other two sides, then the triangle is a right triangle.



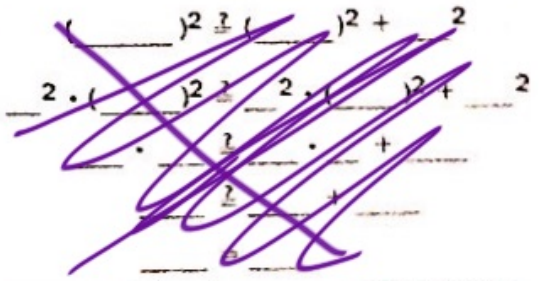
If $c^2 = a^2 + b^2$, then $\triangle ABC$ is a right triangle.

Example 1 *Verifying Right Triangles*

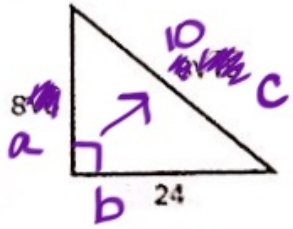
Tell whether the triangle at the right is a right triangle.

Solution

Let c represent the length of the longest side of the triangle. Check to see whether the side lengths satisfy the equation $c^2 = a^2 + b^2$.



Answer The triangle _____ a right triangle.



$a^2 + b^2 = c^2$

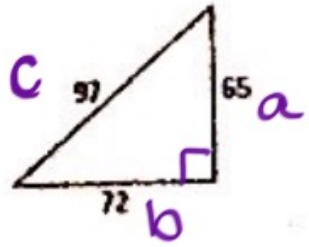
$(8)^2 + (24)^2 = (10)^2$

$64 + 576 = 100$

$650 \neq 100$ Not a right $\triangle$

Practice Problems

VERIFYING RIGHT TRIANGLES Tell whether the triangle is a right triangle.



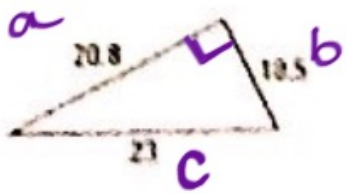
Yes!

$a^2 + b^2 = c^2$

$65^2 + 72^2 = 97^2$

$4225 + 5184 = 9409$

$9409 = 9409$ ✓



No

$a^2 + b^2 = c^2$

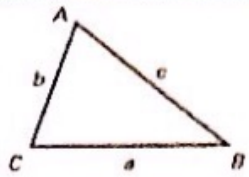
$20.8^2 + 10.5^2 = 23^2$

$432.64 + 110.25 = 529$

$542.89 \neq 529$ X

THEOREM 9.6

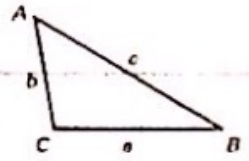
If the square of the length of the longest side of a triangle is less than the sum of the squares of the lengths of the other two sides, then the triangle is acute.



If $c^2 < a^2 + b^2$, then $\triangle ABC$ is acute

THEOREM 9.7

If the square of the length of the longest side of a triangle is greater than the sum of the squares of the lengths of the other two sides, then the triangle is obtuse



If $c^2 > a^2 + b^2$, then $\triangle ABC$ is obtuse

Example 2 *Classifying Triangles*

Decide whether the set of numbers can represent the side lengths of a triangle. If they can, classify the triangle as *right*, *acute*, or *obtuse*.

a. 28, 40, 48

a b c

Acute Δ

$a^2 + b^2 = c^2$

$28^2 + 40^2 = 48^2$

$784 + 1600 = 2304$?

$2384 > 2304$

$a^2+b^2 \quad c^2$

b. 5.7, 12.2, 13.9

a b c

$5.7^2 + 12.2^2 = 13.9^2$

Obtuse

$32.49 + 148.84 = 193.21$

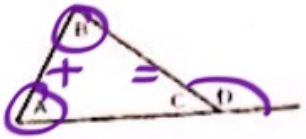
$181.33 < 193.21$

$< c^2$

t 6 Lesson 1: Angles & Congruence Theorems Name _____

rior Angle Theorem The exterior angle is equal to the sum of the Opposite interior ∠s

Angle A + Angle B = Angle D



- Example

$2x+40=3x$

$-2x \quad -2x$

$40 = x$

- Independent Practice

1.

$2z+60=120$

$-60 \quad -60$

$\frac{2z}{2} = \frac{60}{2}$

$z = 30$

2.

$x+20+3x=100$

$4x+20=100$

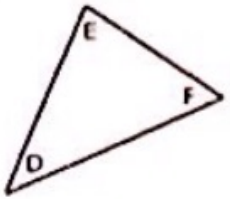
$-20 \quad -20$

$\frac{4x}{4} = \frac{80}{4}$

$x = 20$

Angle Sum Theorem – All three angles in a triangle *ADD* up to equal 180

Angle A + Angle B + Angle C = 180



- Example

$90 + x + 37 + x + 67 = 180$

$2x + 194 = 180$

$-194 \quad -194$

$\frac{2x}{2} = \frac{-14}{2}$

$x = -7$

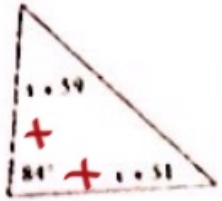
- Independent Practice: Solve for x

1.

$55 + 54 + x + 74 = 180$

$x = -3$

2.



$x + 59 + 84 + x + 51 = 180$

$x = -7$

Single sheet
#2-11

Due Wed.

Pg 1

#1, 3, 8, 12, 14, 16, 17, 20, 21

Pg 2

9b, 10-15, 28, 30, 34, 37

Pg #3

#1, 5, 7, 9, 12, 13, 18, 19, 21, 25, 27