Lesson 4-15: Congruent Triangles w/Rigid Motion in the Coordinate Plane

AGENDA:

- Homework 4-14 Check & Review
- Lesson Notes with Guided Practice

Homework:

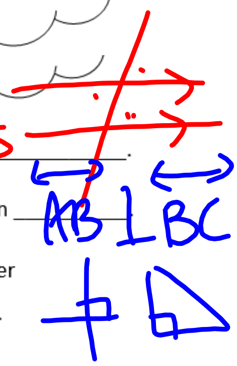
- Book p270 #10,24
- Book p265 #12, 35-37
- Test is Tuesday

▶ **Concluding Statements can prove triangle type or triangle congruency using criteria in a coordinate proof**

Sometimes you need several statements!

Slope: Since $m\overleftrightarrow{AB} = \frac{2}{3} = m\overleftrightarrow{CD}$, then $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$.

This could give you ≅ OR SUPP ∡ PAIRS.

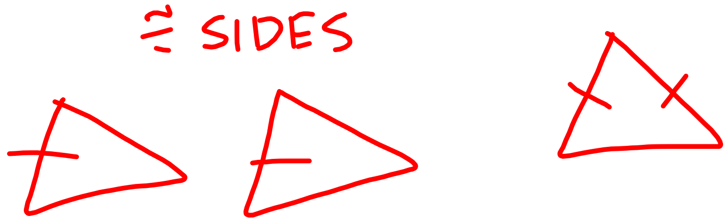


Since $m\overleftrightarrow{AB} = \frac{2}{3}$ and $\overleftrightarrow{BC} = -\frac{3}{2}$ are opposite reciprocals or have a product of -1, then $\overleftrightarrow{AB} \perp \overleftrightarrow{BC}$

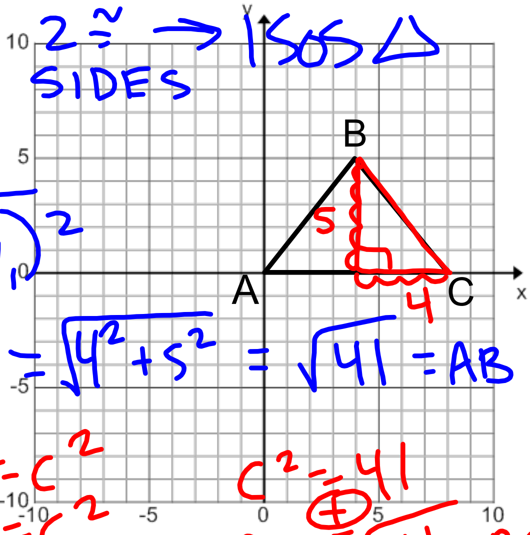
This could give you RIGHT ∡'S which means you have either RIGHT △ or ≅ ∡'S.

Distance: Since $AB = \sqrt{7} = BC$, then $\overline{AB} \cong \overline{BC}$

This could give you a SET OF ≅ SIDES or triangle classification by ISOS △



EXAMPLE 1 DISTANCE → = → 2 ≅ SIDES → ISOS △



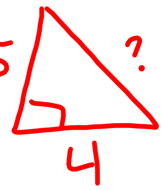
GIVEN: A(0,0), B (4,5), C(8,0)

PROVE: ΔABC is isosceles

$$AB = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$

$$= \sqrt{(4-0)^2+(5-0)^2} = \sqrt{4^2+5^2} = \sqrt{41} = AB$$

BC = 5



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

$$4^2+5^2=c^2$$

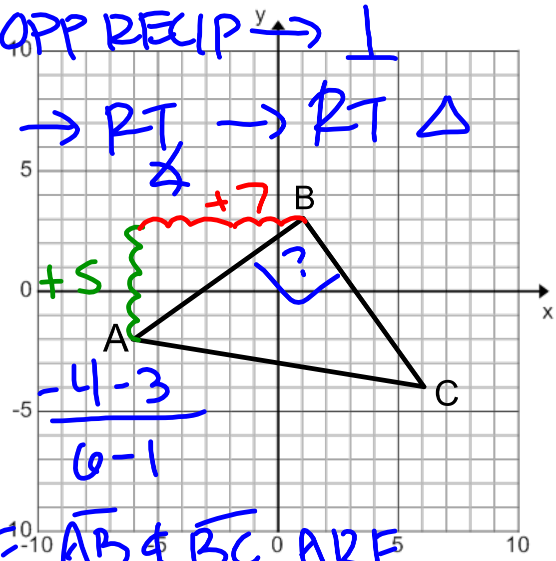
$$c^2=41$$

$$c = \pm\sqrt{41} = BC$$

SINCE $AB = \sqrt{41} = BC$, THEN $\overline{AB} \cong \overline{BC}$.

SINCE ΔABC HAS 2 ≅ SIDES, THEN IT IS ISOSCELES.

EXAMPLE 2 SLOPES OPP RECIP → ⊥ → RT ∡ → RT △



GIVEN: A(-6,-2), B (1,3), C(6,-4)

PROVE: ΔABC is a right triangle.

$$m_{\overline{AB}} = \frac{\Delta y}{\Delta x} = \frac{+5}{7}$$

$$m_{\overline{BC}} = \frac{\Delta y}{\Delta x} = \frac{-7}{5} = \frac{-4-3}{6-1}$$

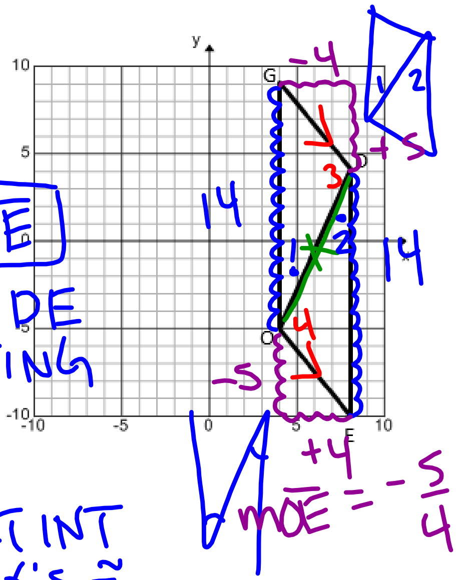
SINCE THE SLOPES OF $\overline{AB}$ & $\overline{BC}$ ARE OPPOSITE RECIPROCALS, THEN $\overline{AB} \perp \overline{BC}$. SO ∡B IS A RIGHT ∡ MAKING ΔABC A RIGHT TRIANGLE.

RHL, SSS, SAS, ASA, AAS

EXAMPLE 3 O(4,-5) , E(8,-10), D(8, 4) , G(4,9),

GIVEN: ~~O(5,-5), E(9,-10), D(9,4) and G(5,9)~~

PROVE: $\Delta DOG \cong \Delta ODE$ by ~~$SSS \cong SSS$~~



A

$m\overline{GD} = \frac{-5}{4}$

$= m\overline{OE}$

THEN

$\boxed{\overline{GD} \parallel \overline{OE}}$

$\boxed{\angle 3 \cong \angle 4}$

A

$\boxed{\overline{OG} \parallel \overline{DE}}$

VERTICAL LINES ARE $\parallel$

$\boxed{\angle 1 \cong \angle 2}$

S $\cong$

$\boxed{\overline{OG} \cong \overline{DE}}$

OG = 14 = DE BY COUNTING

$\parallel \rightarrow$ ALT INT $\angle$'s $\cong$

Identify a precise sequence of rigid motion transformations that maps ΔDOG onto ΔODE.

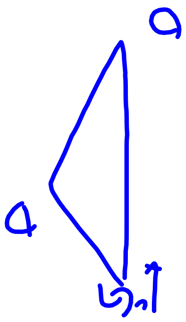
$\Delta DOG \cong \Delta ODE$ BY AAS $\cong$ AAS.

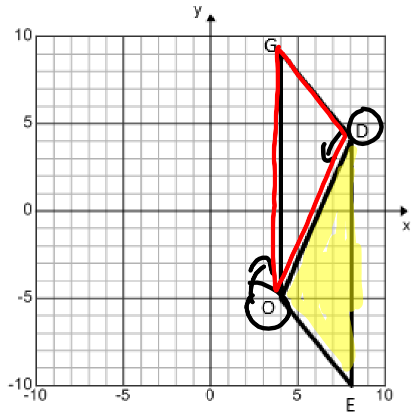
RHL, SSS, SAS, ASA, AAS

EXAMPLE 3 O(4,-5) , E(8,-10), D(8, 4) , G(4,9),

GIVEN: ~~O(5,-5), E(9,-10), D(9,4) and G(5,9)~~

PROVE: $\Delta DOG \cong \Delta ODE$ by $SSS \cong SSS$



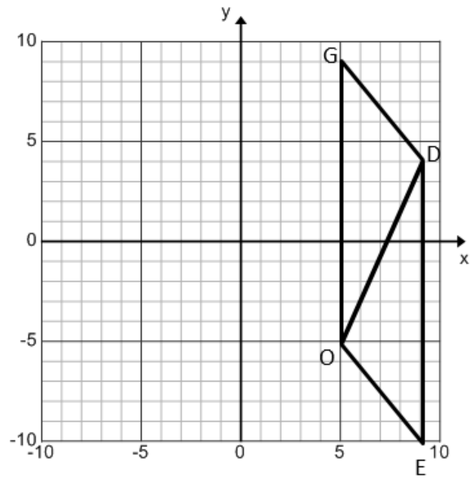


Identify a precise sequence of rigid motion transformations that maps ΔDOG onto ΔODE.

$\Delta DOG \cong \Delta ODE$ BY AAS $\cong$ AAS.

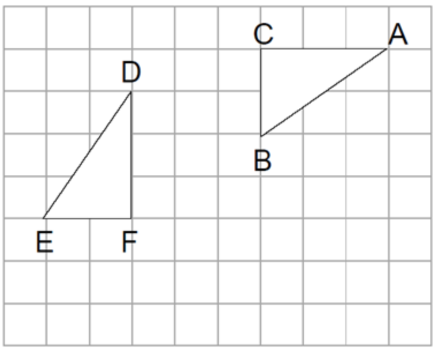
EXAMPLE 4

GIVEN: O (5,-5), E (9,-10), D (9, 4) and G (5, 9)
PROVE: $\Delta DOG \cong \Delta ODE$ by $ASA \cong ASA$



Proof by Rigid Motion Transformations

If there exists a series of rigid transformations that will map ΔABC onto ΔDEF, then $\Delta ABC \cong \Delta DEF$.



PROVE that $\Delta ABC \cong \Delta DEF$ by listing a series of rigid transformation that will map ΔABC onto ΔDEF. Sketch and explain each transformation as you go, stating the corresponding points.

Attachments

4-9 & 4-12L Homework.pdf