Lesson 7-4R :Dilations and Similarity Criteria in the Coordinate Plane

Agenda

- Check & Review HW 7.3 Proofs & Constructions
- 7-4 Exploration and Guided Notes - Need compass and ruler

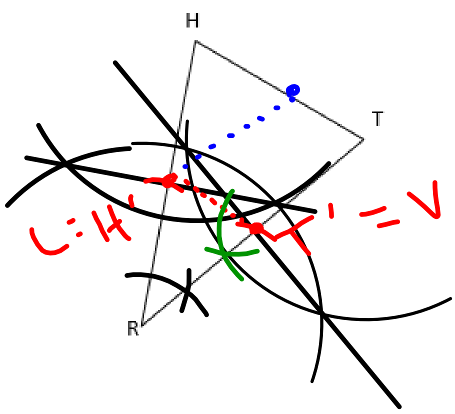
Homework:

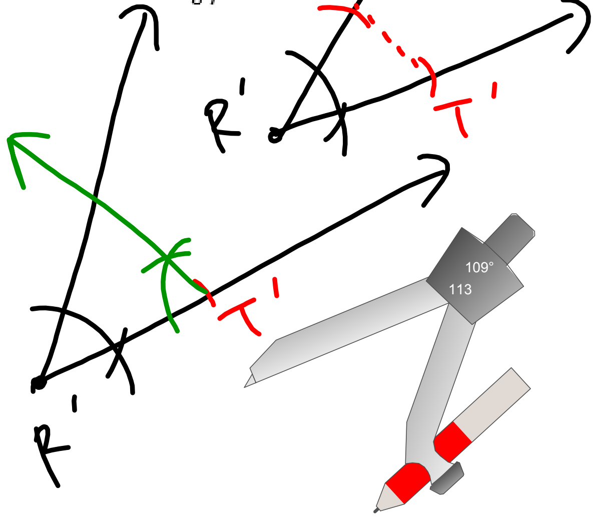
- Problem Set 7.4
- CR#6 due Thurs 2/16 - Blue/Green ; Fri 2/17 - Orange/Purple

Finish for HW

PRACTICE:

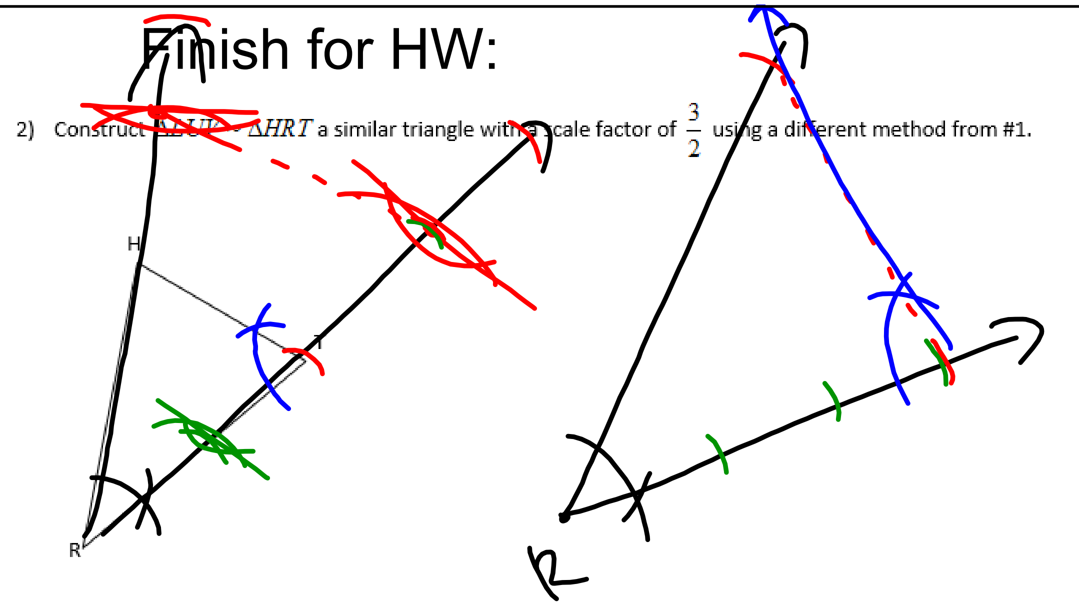
1) Construct $\Delta LUV \sim \Delta HRT$ a similar triangle with a scale factor of ½ using your choice of method.





Finish for HW:

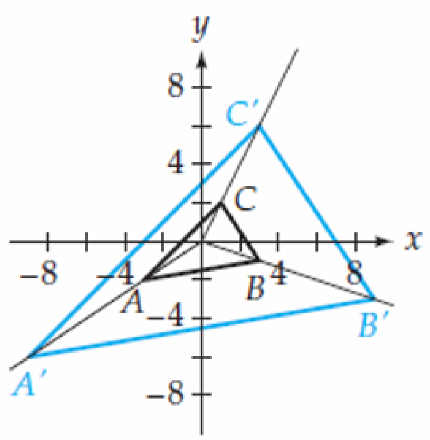
2) Construct $\Delta LUK \sim \Delta HRT$ a similar triangle with a scale factor of $\frac{3}{2}$ using a different method from #1.

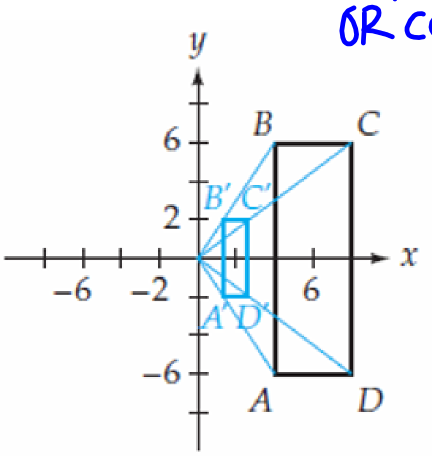


Dilations in the Coordinate Plane: Unless otherwise indicated, the center of dilation in the coordinate plane is the origin; however, you must state this.

For a dilation with scale factor k centered at the origin: $(a,b) \xrightarrow{D_k} (ka,kb)$

If not centered at the origin, this rule *does not* apply. USE CONSTRUCTION OR COUNTING





Ex 1: Dilate, centered at the origin, trapezoid PRST with right $\measuredangle T$ by a scale factor of $\frac{1}{2}$ using both the rule and a construction approach.

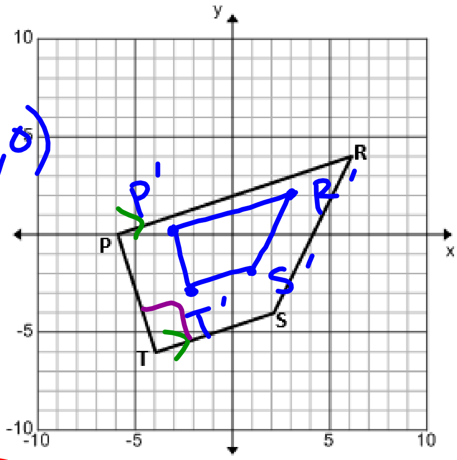
this page next page

P(-6,0) $\xrightarrow{D_{\frac{1}{2}}}$ P' $\left(-6\cdot\frac{1}{2}, 0\cdot\frac{1}{2}\right) = P'(-3,0)$

R(6,4) $\longrightarrow$ R' $(3,2)$

S(2,-4) $\longrightarrow$ S' $(1,-2)$

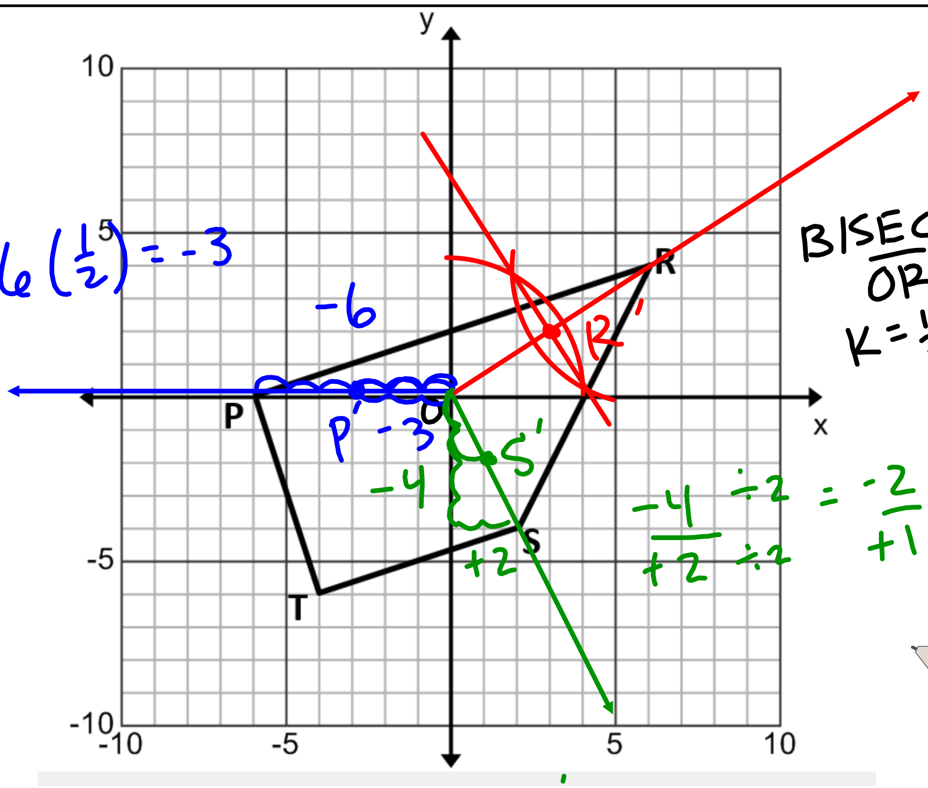
T(-4,-6) $\longrightarrow$ T' $(-2,-3)$



- What do you notice about the vertex that is located on an axis? STAYS ON AXIS - COLLINEAR FROM CENTER OF DILATION
- What do you notice about all the corresponding pre-image and image sides? ∥ + ½ LENGTH
- Do dilations preserve parallelism? YES Perpendicularity? YES Slope? YES

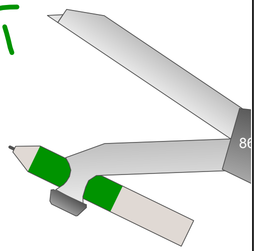
$-\frac{3}{1} \perp \frac{1}{3}$

$-6\left(\frac{1}{2}\right) = -3$



BISECT OR $K = \frac{1}{2}$

$\frac{-4}{+2} \begin{matrix}\div 2\\ \div 2\end{matrix} = \frac{-2}{+1}$



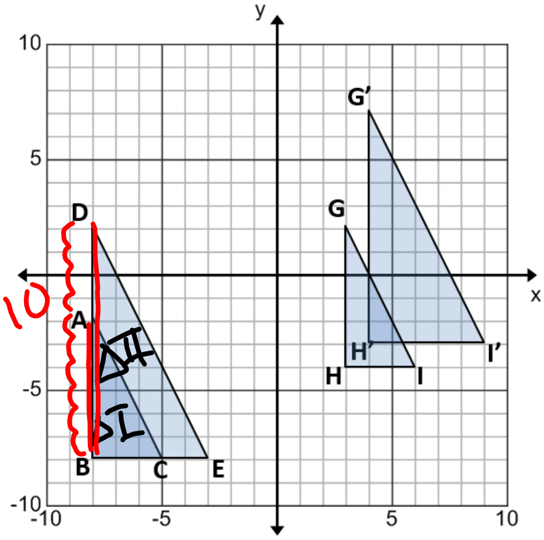
Ex 2: $\triangle ABC \sim \triangle DBE$. Find the center of dilation and the scale factor k that maps $\triangle ABC$ onto $\triangle DBE$.

ΔI ΔII

- Center of dilation: B
- Scale factor: $\frac{5}{3}$

$K: \frac{\Delta II}{\Delta I} = \frac{BD}{BA} = \frac{10}{6} = \frac{5}{3}$

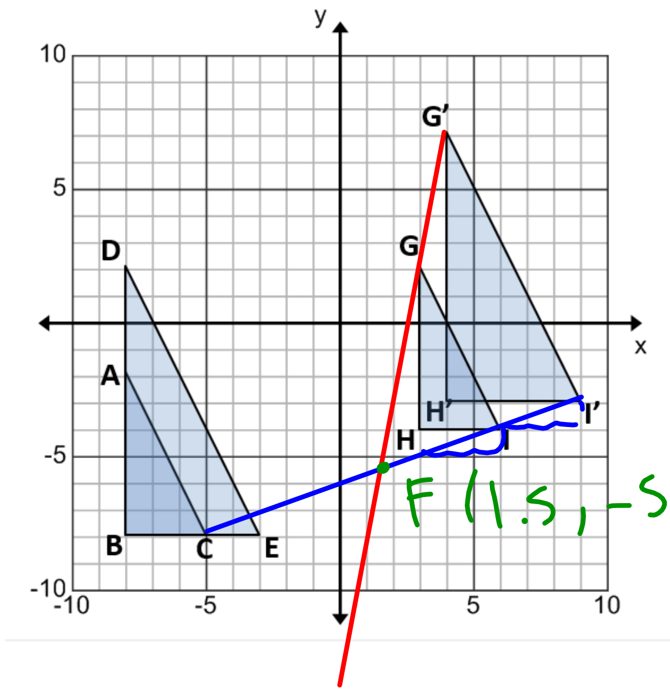
SIM RATIO: $\frac{\Delta I}{\Delta II} = \frac{BA}{BD} = \frac{6}{10} = \frac{3}{5}$



- What do you notice about a vertex that is also the center of dilation? INVARIANT

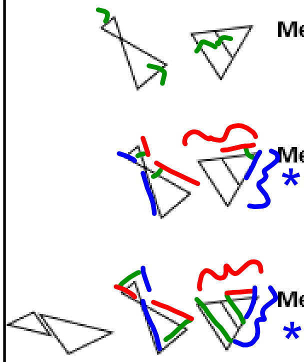
Ex 3: $\triangle IGH \sim \triangle I'G'H'$. Find the coordinates of the center of dilation, F. ____________

Were there any invariant points when the center of dilation was not on a vertex of the pre-image? NO



F (1.5, -5.5) APPROX.

COORDINATE PLANE PROOFS



Method #1 AA~
- Use SLOPE formula 2 times to show that 2 sides are parallel. Then use $||$ lines $\longrightarrow \cong$ corresponding $\measuredangle s$ or $\cong$ alternate interior $\measuredangle$'s for two sets

Method #2 SAS~ *
- Use DISTANCE formula 4 times to show that 2 pairs of corresponding sides are proportional. Use reflexive property or vertical angle theorem (depending on the problem) to prove the included angles congruent. $\frac{\Delta I}{\Delta II}$ = SIM RATIO

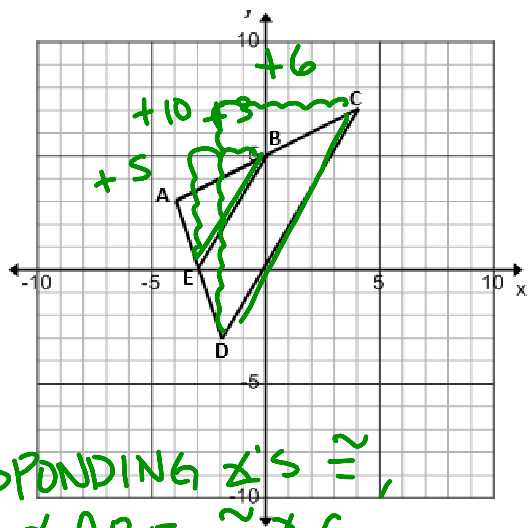
Method #3 SSS~ *
- Use DISTANCE formula 6 times to show 3 pairs of corresponding sides are proportional.

*Must get sim ratios.
If equal, then proportional sides!

Given: A(-4,3), B(0, 5), C(4, 7), D(-2, -3), E(-3, 0)

Prove: $\Delta ABE \sim \Delta ACD$ using two different criteria

ΔI ΔII



AA~: $m_{\overline{EB}} = \frac{\Delta y}{\Delta x} = \frac{+5}{3}$

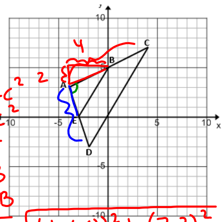
$m_{\overline{DC}} = \frac{\Delta y}{\Delta x} = \frac{10}{6} = \frac{5}{3}$

$\overline{EB} \parallel \overline{DC}$

SINCE $\parallel$ LINES $\rightarrow$ CORRESPONDING $\measuredangle$'S $\cong$,
THEN $\measuredangle AEB \cong \measuredangle D$ & $\measuredangle ABE \cong \measuredangle C$.
$\therefore \Delta ABE \sim \Delta ACD$ BY AA~.

Given: A(-4,3), B(0, 5), C(4, 7), D(-2, -3), E(-3, 0)

Prove: $\Delta ABE \sim \Delta ACD$ using two different criteria



SAS~

AB: 2, 4, A, B, C

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

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

$\pm\sqrt{20}=\sqrt{c^2}$

$2\cancel{\sqrt{4}}\sqrt{5}=AB$

$2\sqrt{5}=AB$

AC: $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}=\sqrt{(4-(-4))^2+(7-3)^2}$

$\sqrt{8^2+4^2}=\sqrt{64+16}=\sqrt{80}=4\cancel{\sqrt{16}}\sqrt{5}$

$AC=4\sqrt{5}$

SIM RATIO: $\frac{\Delta I}{\Delta II}$: $\frac{AB}{AC}=\frac{2\cancel{\sqrt{5}}}{4\cancel{\sqrt{5}}}=\frac{1}{2}$

ALT: $\frac{\sqrt{20}}{\sqrt{80}}=\sqrt{\frac{2\cancel{0}}{8\cancel{0}}}=\sqrt{\frac{1}{4}}=\frac{\sqrt{1}}{\sqrt{4}}=\frac{1}{2}=\frac{AB}{AC}$

AE: A, 3, 1, E

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

$3^2+1^2=c^2$

$\pm\sqrt{10}=\sqrt{c^2}$

$\sqrt{10}=AE$

AD = $\sqrt{(-2-(-4))^2+(-3-3)^2}=\sqrt{2^2+(-6)^2}$

$\sqrt{4+36}=\sqrt{40}=2\cancel{\sqrt{4}}\sqrt{10}$ $AD=2\sqrt{10}$

$\frac{\Delta I}{\Delta II}$: $\frac{AE}{AD}=\frac{1\cancel{\sqrt{10}}}{2\cancel{\sqrt{10}}}=\frac{1}{2}$

SINCE $\frac{AE}{AD}=\frac{1}{2}=\frac{AB}{AC}$ THEN THE SIDES ARE PROPORTIONAL W/ INCLUDED $\measuredangle A \cong \measuredangle A$ BY REFLEXIVE.

$\therefore$ $\Delta ABE \sim \Delta ACD$ BY SAS~