Agenda- 6.9

Rigid Motion on and off the Coordiante Plane

- Check HW 6.8
- Guided Notes 6.9

HW - Worksheet 6.9

Test - TUESDAY (MON PURPLE)

Unit 6-9R & 6-12L Notes & Problem Set – Rigid Motions

REVIEW & EXPLORATION

Identify a single transformation that would map $\overline{TH}$ onto

i. $\overline{AB}$ ROTATION 90° AROUND ORIGIN

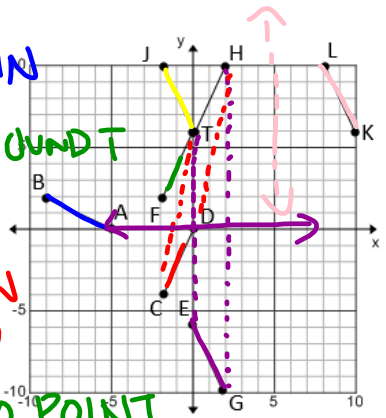
ii. $\overline{CD}$ TRANSLATION <-2,-10>

iii. $\overline{TF}$ REFLECT INTO T ; ROT 180° AROUND T

iv. $\overline{EG}$ REFLECT INTO X-AXIS

v. $\overline{TJ}$ REFLECT INTO Y-AXIS

vi. $\overline{KL}$ REFLECT INTO X=5



b. Which transformation(s) produced a parallelogram? TRANSLATION

What happeded to the slope of the pre-image? PRESERVED

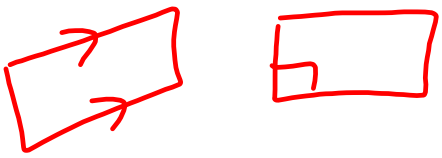
c. What other transformation(s) preserved slope? REFLECT INTO POINT
ROTATE 180°

d. Which transformstion(s) produced a trapezoid?

REFLECT INTO LINE NOT ON VERTEX

EXPLORING PARALLELISM AND PERPENDICULARITY THROUGH RIGID MOTION

Recall how we have mapped segments and polygons through rigid motions and found that both DISTANCE and ∠ MEAS. are preserved under translations, rotations, and reflections through the concepts of between-ness. Thus, the pre-image and image were congruent to each other, which means that these rigid motion transformations are ISOMETRIC. Also remember that line reflections do not preserve orientation. Do any or all rigid motions preserve parallelism and perpendicularity?

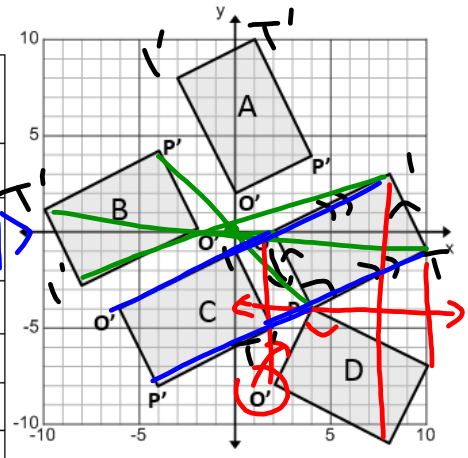


1) Given rectangle OPTI, determine which image is the result of each transformation of the pre-image. Then label the other corresponding vertices.

= R 180°

	Reflection into a line	Reflection into a point	Rotation around the origin	Translation
Which Image?	D	B	A	C
Details	Y=-4	ORIGIN	90°	⟨8,-4⟩
$\overline{O'P'} \parallel \overline{T'I'}$?	YES	YES	YES	YES
$\overline{P'T'} \parallel \overline{I'O'}$?	YES	YES	YES	YES
$\overline{O'P'} \perp \overline{P'T'}$?	YES	YES	YES	YES
Was slope preserved?	NO	YES	NO	YES

LIKE PARALLELISM

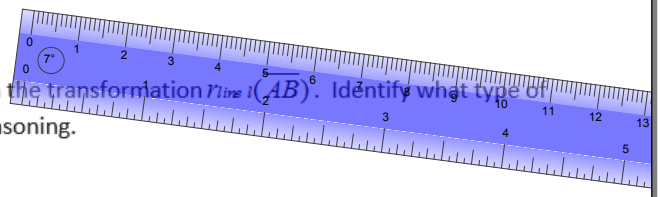


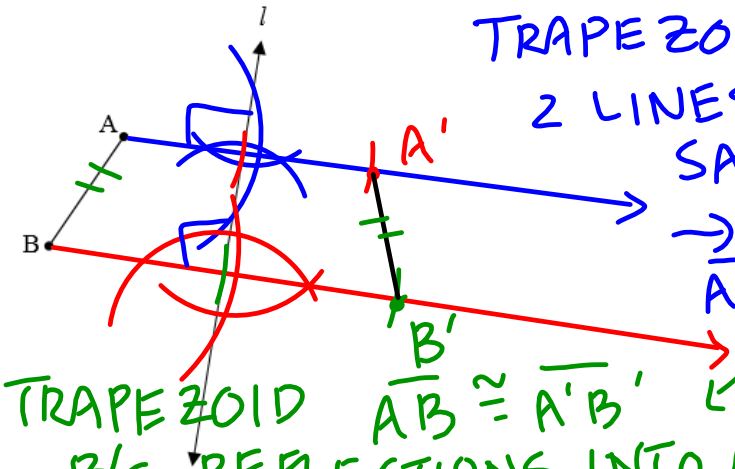
2) Use the properties of rigid motions to explain why each image O'P'T'I' is congruent to the pre-image OPTI.

A REFLECTION, TRANSLATION, OR ROTATION PRESERVES ∠ MEASURE & DISTANCE.

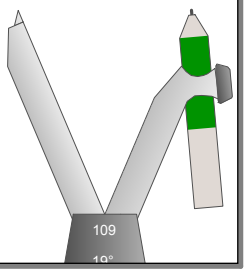
Planar Rigid Motions

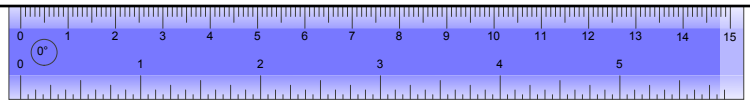
1. Using formal geometric construction skills, perform the transformation $r_{line\ l}(\overline{AB})$. Identify what type of quadrilateral ABB'A' is created and explain your reasoning.



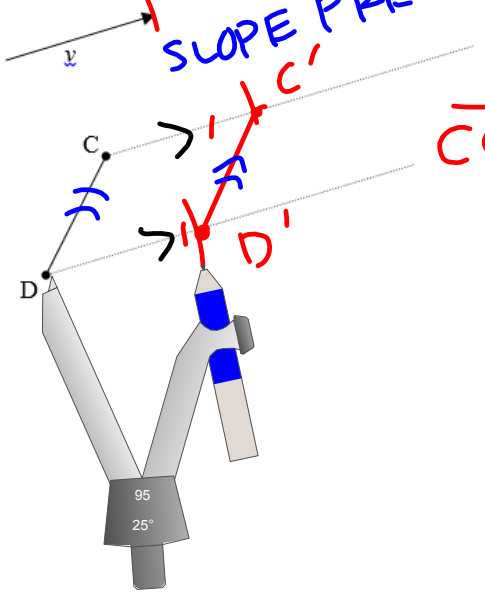


TRAPEZOID
2 LINES ⊥ TO SAME ℓ
→ ∥
$\overline{AA'} \parallel \overline{BB'}$
ISOS TRAPEZOID $\overline{AB} \cong \overline{A'B'}$ ∠ ≅ LEGS
B/C REFLECTIONS INTO A LINE PRESERVE DISTANCE





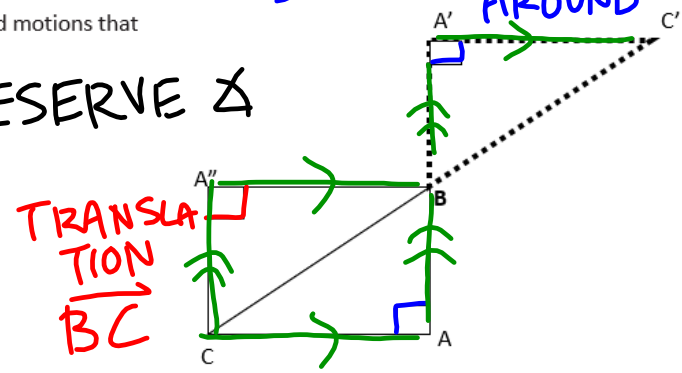
2. Using formal geometric construction skills on the provided parallel segments, perform the transformation $T_{\vec{v}}(\overline{CD})$. Identify what type of quadrilateral CDD'C' is created and explain your reasoning.



SLOPE PRESERVED
CDD'C' ≠ ⏢
$\overline{CC'} \cong \overline{DD'}$ ≅ VECTORS (= MAGNITUDES)
$\overline{CD} \cong \overline{C'D'}$ TRANSLATIONS PRESERVE DISTANCE

REFLECTION INTO B OR ROTATION 180° AROUND B

3. Given right ΔABC, prove through a series of rigid motions that quadrilateral ABA"C is rectangle.



RT Δ: T, R, Γ PRESERVE Δ MEASURE

∠A" RT ∠

TRANSLATION $\overrightarrow{BC}$

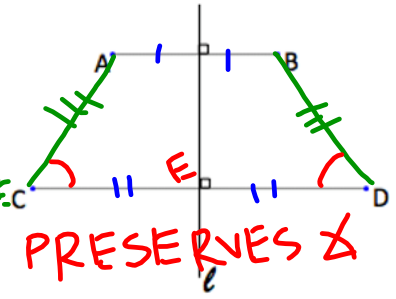
$\overline{AC} \parallel \overline{A"B}$

$\overline{A"C} \parallel \overline{AB}$

SLOPE IS PRESERVED UNDER 180° ROTATION / REFLECTION INTO A POINT & TRANSLATIONS

LINE OF REFLECTION

4. Given in the figure below, line l is the perpendicular bisector of $\overline{AB}$ and of $\overline{CD}$. Use a transformational approach to explain why:



a. $\overline{AB} \parallel \overline{CD}$. 2 LINES ⊥ TO SAME LINE ARE ||

b. $\overline{AC} \cong \overline{BD}$

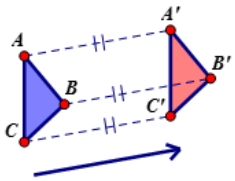
REFLECTION INTO A LINE PRESERVES DISTANCE

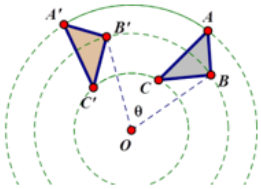
c. $\angle ACD \cong \angle BDC$.

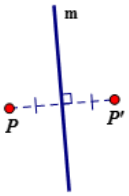
REFLECTION INTO LINE PRESERVES ∠ MEASURE

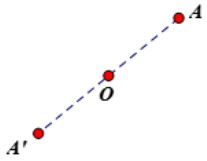
d. Quadrilateral ABDC is an isosceles trapezoid.

1 SET || SIDES + ≅ LEGS OR 1 SET ≅ BASE ∠'S









	Translation	Rotation	Reflection into Line	Reflection into Point / 180° Rotation
Angle Measure	✓	✓	✓	✓
Distance	✓	✓	✓	✓
Orientation	✓	✓	NO	✓
Parallelism	✓	✓	✓	✓
Perpendicularity	✓	✓	✓	✓
Slope	✓	NO	NO	✓
Invariant Points	NO	CENTER OF ROTATION	IF ON LINE OF REFLECTION	IF CENTER OF ROTATION, POINT REFL INTO