Sec 3.1 - Reflection

Reflection: "Flip"

- Must know reflection line

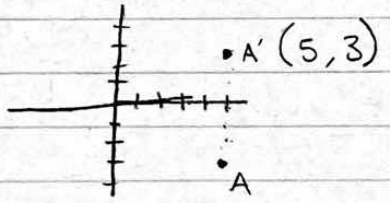
  Ex) x-axis

  y-axis

  Any linear equation

- Distance from the preimag to the reflection line must equal the distance from the image to reflection line

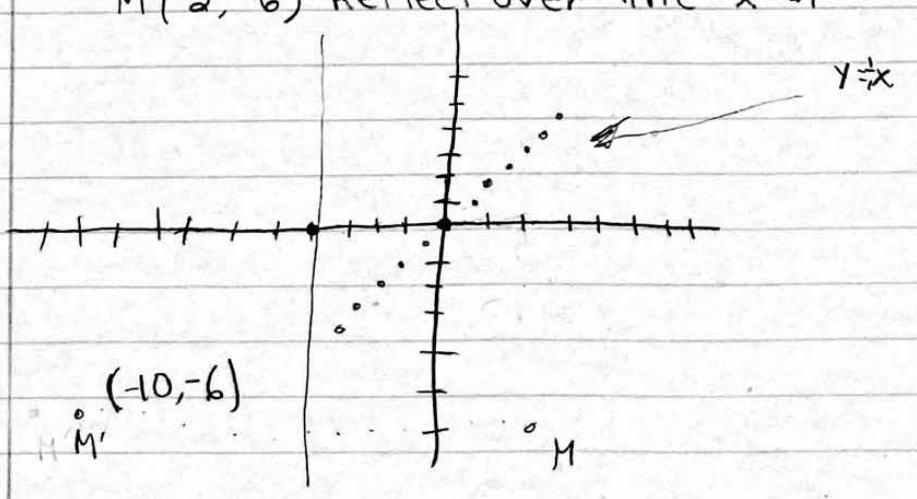
- Ex) A(5, -3) Reflect over the x-axis



X (-3, -4) Reflect over y-axis

X' (3, -4)

M(2, -6) Reflect over line x = -4



- A reflection in the line y = x:

Preimage (x, y) → becomes (y, x) Image

Sec 3.2 ~ Translations

• Translation: "Slide"

• Vector Notation: $\langle a, b \rangle$

a: Moves left/right

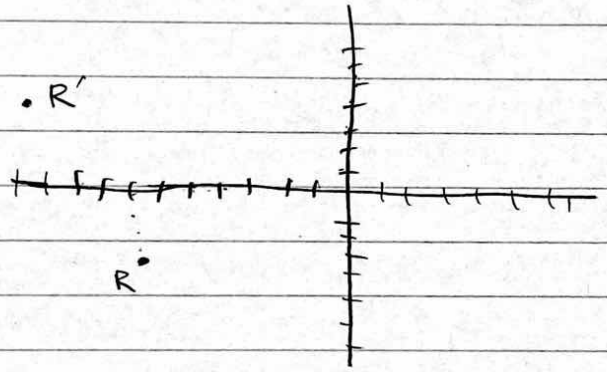
b: Moves up/down

Ex)

$\langle -3, 6 \rangle$

3 left 6 up

Ex) R(-7, -4) Translate it according to $\langle -4, 9 \rangle$



R'(-11, 5)

Set 3.3 Rotations:

Rotation: Is a Turn of an object about the origin

- We will Rotate objects 90°, 180°, 270°
- We Rotate clockwise & counter clockwise. READ THE DIRECTIONS

••• For our Textbook if it Doesn't say which Direction Assume Counter clockwise!

Rotation Rules — Memorize Them

	original Point		New Point
90° counter clockwise:	(x, y)	becomes	$(-y, x)$
180° counter clockwise:	(x, y)	becomes	$(-x, -y)$
270 counter clockwise:	(x, y)	becomes	$(y, -x)$

Move 1 point @ a Time-

90° clockwise: $(x, y) \longrightarrow (y, -x)$ * Is 90° clockwise = to 270 counter clockwise ??

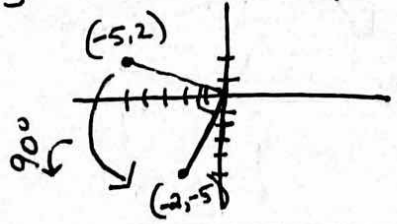
180° clockwise: $(x, y) \longrightarrow (-x, -y)$

270 clockwise: $(x, y) \longrightarrow (-y, x)$

Ex) Rotate the point $(-5, 2)$ 90 counter clockise

90 ↶ $\longrightarrow (x, y) \Longrightarrow (-y, x)$

$(\underset{x}{-5}, \underset{y}{2}) \longrightarrow$ so after the rotation we get $\boxed{(-2, -5)}$



over.

-1+2
-4+2

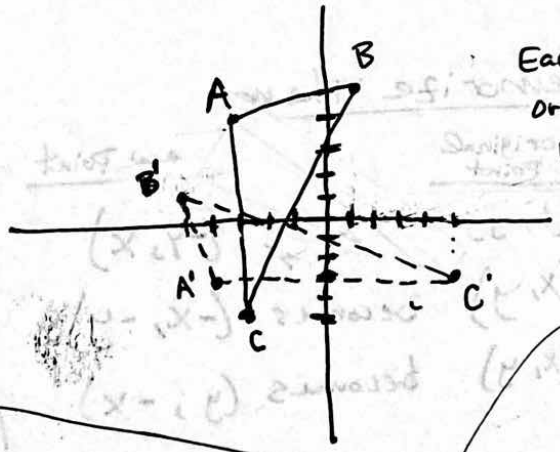
Ex] Rotate $\triangle ABC$ 270 clockwise if A(-3,4) B(1,5) C(-3,-5)

• Move 1 pt @ a Time. $270\curvearrowright = (x,y) \Rightarrow (-y,x)$

$A(-3,4) \Rightarrow A'(-4,-3)$

$B(1,5) \Rightarrow B'(-5,1)$ = New Points.

$C(-3,-5) \Rightarrow C'(5,-3)$



Each pt is Rotated about the origin 270↷ resulting in the whole object being Rotated.

Ex) Rotate A(5,-1) B(9,-1) C(9,-4) around (3,-2) 90° ↶

STEP 1: Subtract (3,-2) from Each pt → makes center of Rotation the origin

A(2,1) B(6,1) C(6,-2)

STEP 2: Apply the 90 ↶ Rule

A(-1,2) B(-1,6) C(2,6)

STEP 3: Add (3,-2) → Takes the Center of Rotation back To (3,-2).

A(2,0) B(2,4) C(5,4)

Assignment

[illegible]

[illegible]

[illegible]

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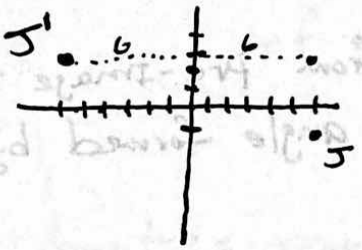
Sec 3.4 glide Reflection

glide Reflection: A translation followed by a Reflection.

Ex) J(6,-1) graph and label J' after a Translation of ⟨0,4⟩ and Reflection over y-axis.



Translate (6,-1) by ⟨0,4⟩ = (6,3)
Reflect (6,3) over y-axis = (-6,3)
so J' = (-6,3).

Isometry: is a Transformation in which all Lengths and angle measure stay the same. meaning the figure stays same size after the transformation

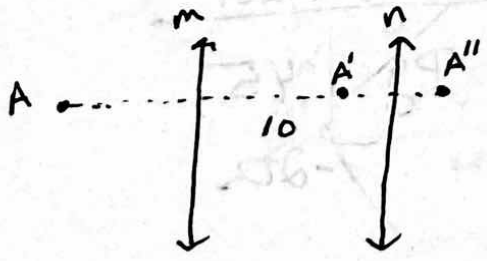
Thm: 2 Reflections (Double Reflection) over Parallel lines is A TRANSlation.

The Image is:

1.) ⊥ To the 2 Parallel lines

2) Twice the Distance between the // lines

Ex)



m // n, A is Reflected over both m and n giving A''. So A TO A' is a Translation.

$\overline{AA''}$ is ⊥ TO m & n. AND since The Distance between m and n = 10
The Distance of $\overline{AA''}$ = 20

OVER

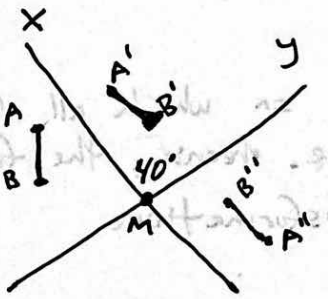
Th^{m}: 2 Reflections over Intersecting lines is a <u>Rotation</u>

The Image is:

1) Rotated about the Intersecting Point

2) The angle of Rotation from Pre-Image to image is 2 Times the angle formed by the intersecting lines.

Ex)



NOT Drawn TO scale

lines x & y Intersect @ Point M. $\overline{AB}$ is Reflected over x, then Reflected over y which Results in a Rotation from $\overline{AB}$ TO $\overline{A''B''}$

Thus The angle of Rotation from $\overline{AB}$ TO $\overline{A''B''}$ = **80°**

because the angle of the intersecting lines = 40 & the angle of Rotation is Twice that angle.

Assignment

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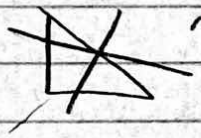
Sec 3.5 ~ Symmetry

- Line Symmetry:  Reflection

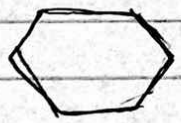
- Rotational Symmetry: How many time a figure rotates to get itself

Ex)  180°
90°
270°

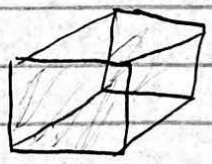
 No

- Order of Symmetry: How many times a figure has rotational symmetry

- Magnitude of Symmetry: Smallest ∠ of Rotational Symmetry
  - Magnitude = $\frac{360}{\text{Order}}$ $\frac{360}{6}$

Ex) 
Order: 6
Magnitude: 60°

- Plane Symmetry: Line Symetry for 3-D objects



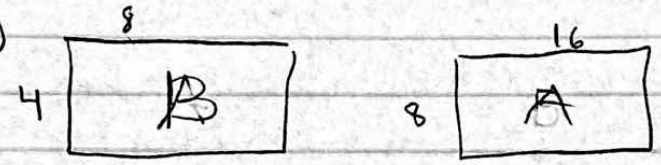
- Axis of Symmetry: Rotational Symmetry for 3-D objects

· Dialation: Enlargement or a Reduction

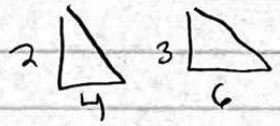
★★ Scale Factor: Tells us if its an enlargement or Reduction (K)

- S.F = Ratio of Corresponding Sides
- S.F > 1 Enlargement
- S.F < 1 Reduction

Ex)



S.F. of A to B: $\frac{8}{4} = \frac{4}{2}$ = SF Enlargement



S.F: $\frac{2}{3}$ Reduction