Unit 1

Lesson 2

Reflections

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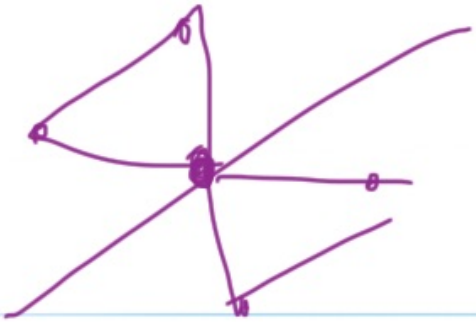
Math 2 – Honors
Unit 1 – Geometric Transformations
Lesson 2 – Reflections

Name_____
Date_____ Pd_____

Reflections:

- A reflection is a transformation in which the image is a mirror image of the preimage.
- A point on the line of reflection maps to itself.
- Other points map to the opposite side of the reflection line so that the reflection line is the perpendicular bisector of the segment joining a preimage and image point.
- Preimage and image points are **equidistant** from the line of reflection.
- Notation for reflections is $R_{Line\ of\ Reflection}$. Example: R_{x-axis} means reflection in or across the $x-axis$.



R_{y-axis}

$R_{y=x}$

$R_{y=-x}$

$R_{y=4}$

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Reflections in the coordinate plane. Given ΔREF: $R(-3,1), E(0,4), F(2,-5)$

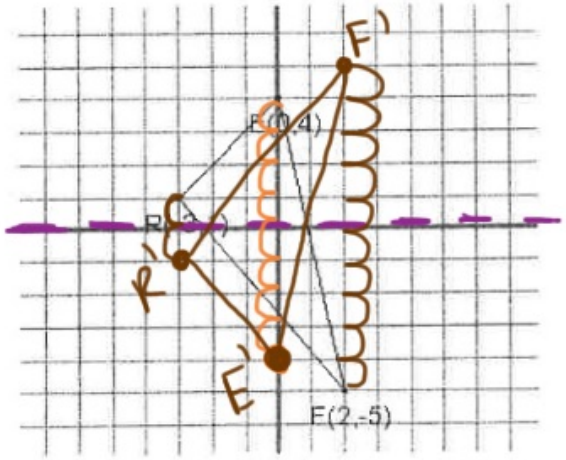
1) On the first grid, draw the reflection of ΔREF in the $x-axis$. Notation: R x-axis

Record the new coordinates: $R'(\underline{3},\underline{-1}),\ E'(\underline{0},\underline{-4}),\ F'(\underline{2},\underline{5})$

2) On the second grid, draw the reflection of ΔREF in the $y-axis$. Notation: R y-axis

Record the new coordinates: $R'(\underline{3},\underline{1}),\ E'(\underline{0},\underline{4}),\ F'(\underline{-2},\underline{-5})$

1)



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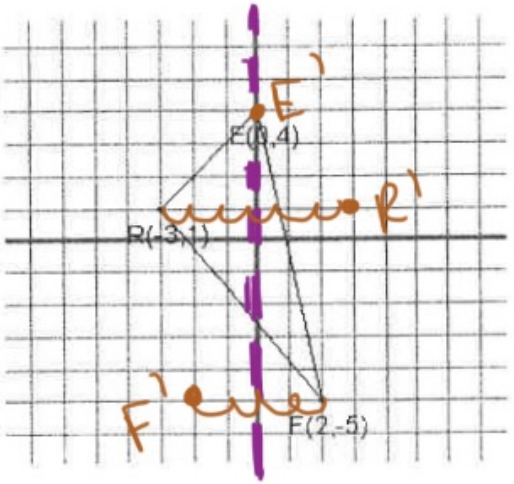

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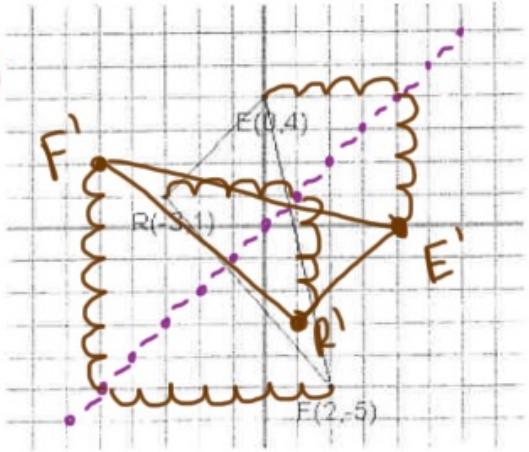
3) Graph the line $y = x$ on the third coordinate grid. Reflect the triangle in the line $y = x$.
Record the new coordinates: $R'(\underline{1}, \underline{-3})$, $E'(\underline{4}, \underline{0})$, $F'(\underline{-5}, \underline{2})$ Notation: $R_{y=x}$

4) Graph the line $y = -x$ on the fourth coordinate grid paper. Reflect the triangle in the line $y = -x$.
Record the new coordinates: $R'(\underline{-1}, \underline{3})$, $E'(\underline{-4}, \underline{0})$, $F'(\underline{5}, \underline{-2})$ Notation: $R_{y=-x}$

3



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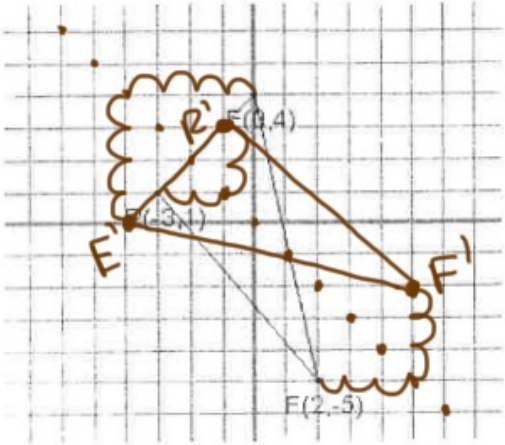

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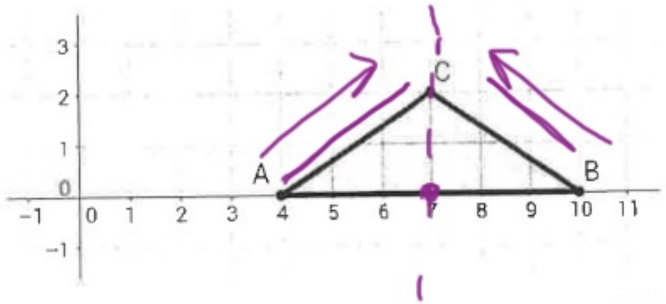
Look at the patterns and complete the rule. Then write the rule using proper notation.

1. Reflection in the $x-axis$ maps $(x, y) \rightarrow$ (x , -y) Notation: Rx-axis
2. Reflection in the $y-axis$ maps $(x, y) \rightarrow$ (-x , y) Notation: Ry-axis
3. Reflection in the line $y = x$ maps $(x, y) \rightarrow$ (y , x) Notation: Ry=x
4. Reflection in the line $y = -x$ maps $(x, y) \rightarrow$ (-y , -x) Notation: Ry=-x

Reflections with Polygons

Reflection Symmetry

1. Given $Triangle\ ABC$.
   a. What is the equation of the line of reflection that maps angle A onto angle B? x=7
   b. If we reflect $Triangle\ ABC$ over the line of reflection found in part a, $\overline{AC}$ maps to BC.
   c. What can we conclude about the **measures** of $\angle A$ and $\angle B$? ≅ b/c map onto another Rx=7
      What can we conclude about the **lengths** of $\overline{AC}$ and $\overline{BC}$? ≅
   d. What kind of triangle is ABC? Isosceles



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2. Given *Regular Hexagon ABCDEF*.

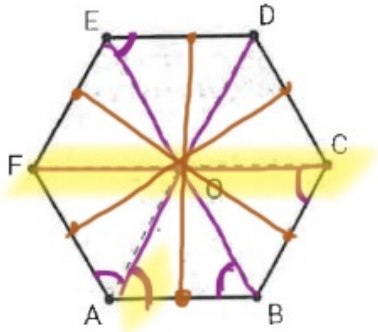
   a. List the three lines of symmetry drawn on the diagram at right: $\overline{FC}$, $\overline{EB}$, $\overline{DA}$

   b. What is the image of point D when reflected across $\overleftrightarrow{BE}$? F

   c. What is the image of $\angle OED$ when reflected across $\overleftrightarrow{FC}$? $\angle OAB$

   d. What conclusions can you make about these angles? $\cong$ b/c Reflection map onto another

   e. Draw the **other** 3 lines of symmetry not already shown on the diagram. ✓



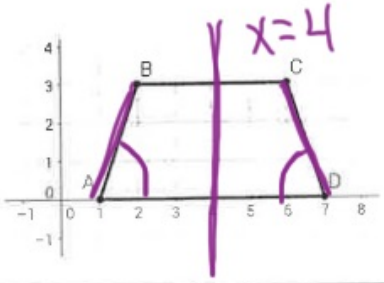
3. Given *Quadrilateral ABCD*.

   a. The slope of $\overline{BC}$ is 0 (horizontal). The slope of $\overleftrightarrow{AD}$ is 0.
   What kind of quadrilateral is ABCD? Explain how you know. Trapezoid

   b. Let line *m* be the equation of the reflection line mapping $\overline{CD}$ to $\overline{BA}$.
   Write the equation of line *m*. $x=4$

   c. Reflect *Quadrilateral ABCD* over *line m*.

$\angle A$ maps to $\angle D$ $\angle B$ maps to $\angle C$



What can be concluded about both pairs of base angles? $\cong$

Therefore an isosceles trapezoid

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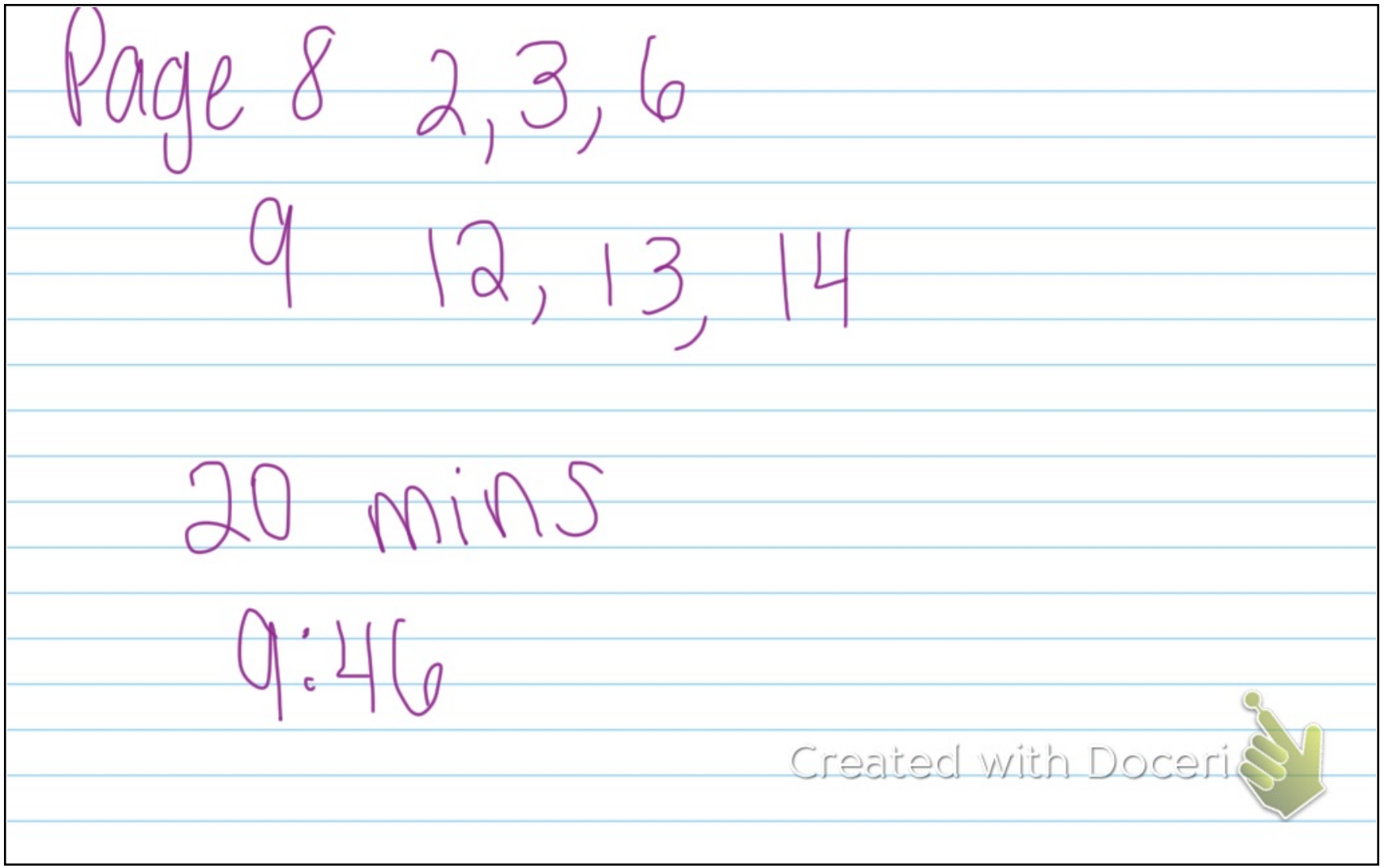
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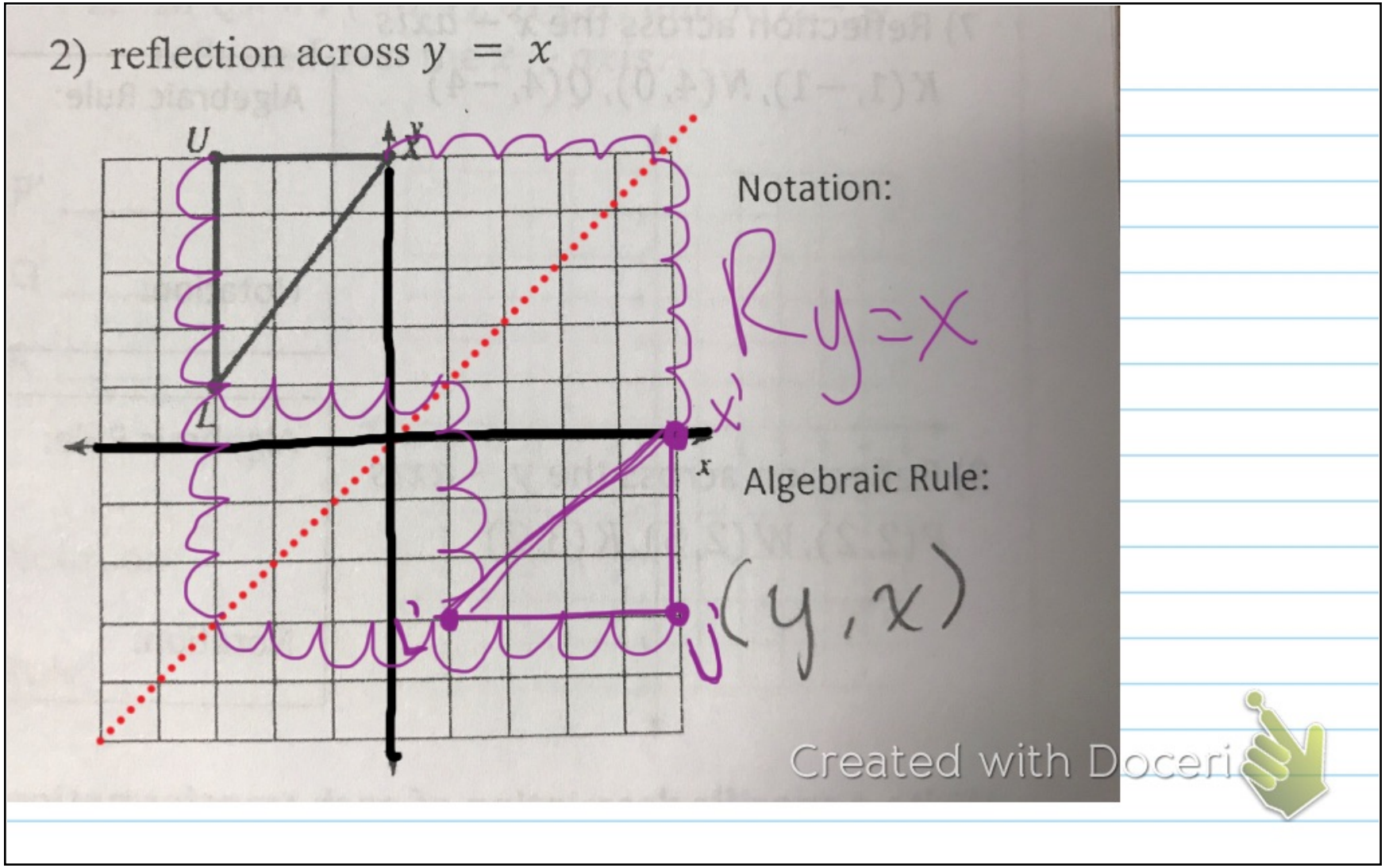
2) reflection across $y = x$
U
L
x'
x
Notation:
$R_{y=x}$
Algebraic Rule:
(y, x)
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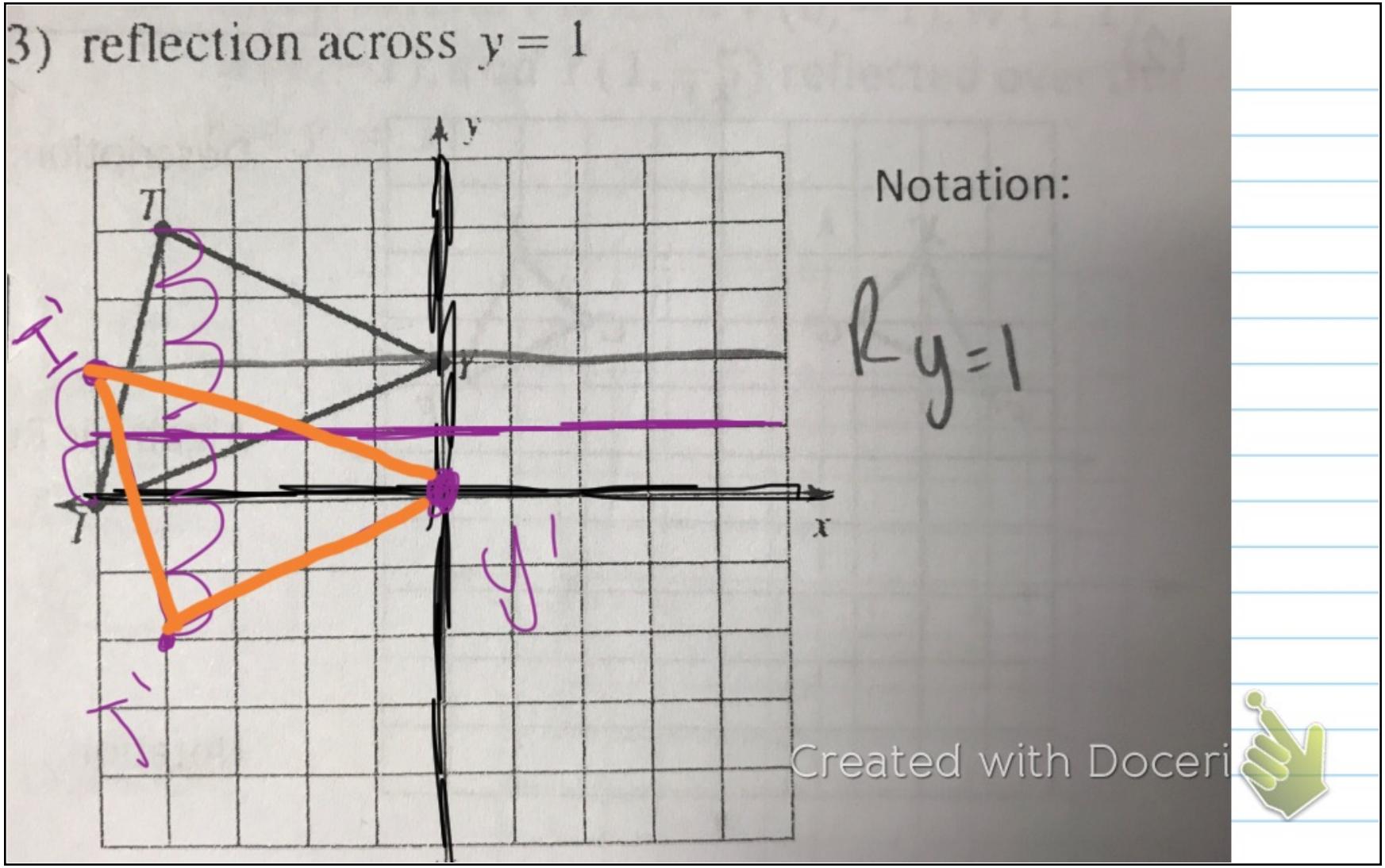
3) reflection across $y = 1$
y
x
T
T'
y=1
Notation:
$R_{y=1}$
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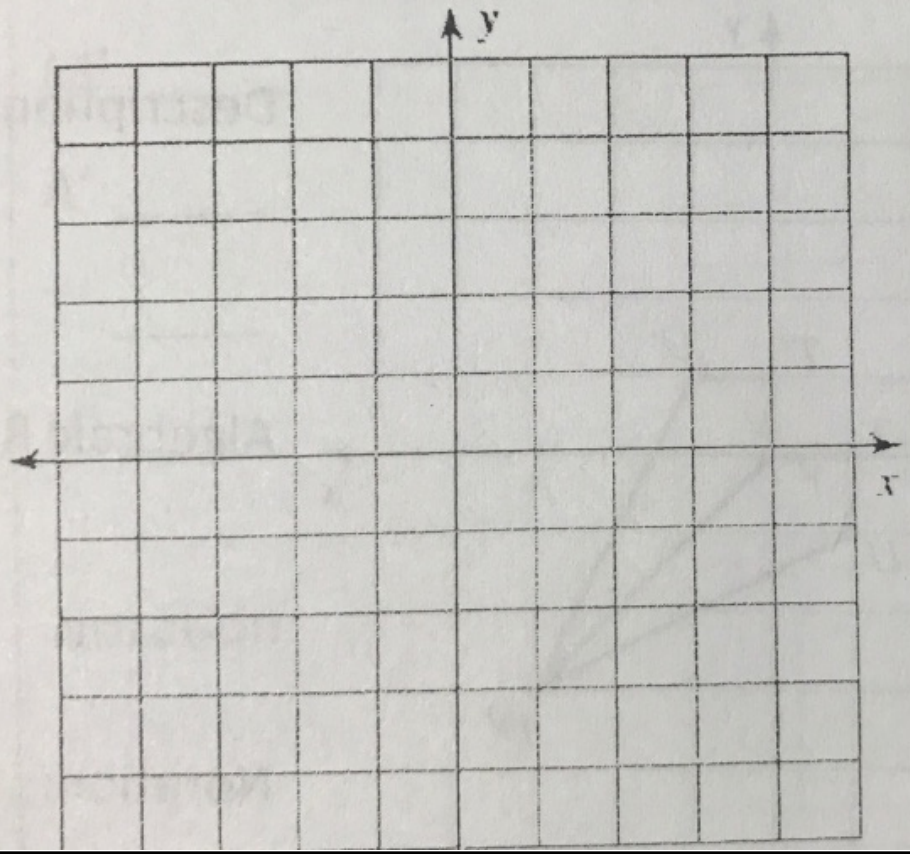
6) reflection across $y = -2$

$H(-1, -5)$, $M(-1, -4)$, $B(1, -2)$, $C(3, -3)$



Notation:

R_{-2}

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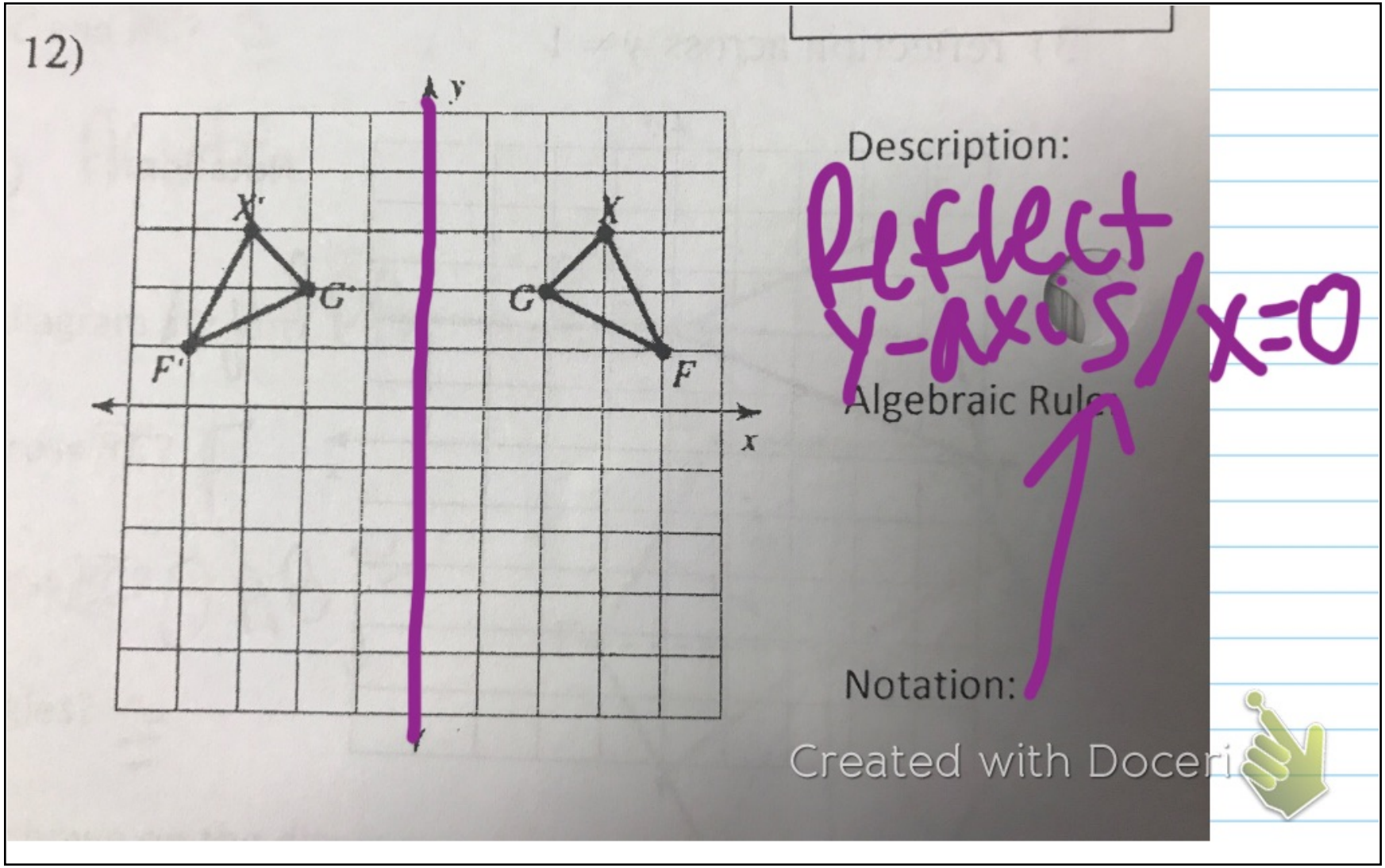
12)
y
x
X'
G'
F'
X
G
F
Description:
reflect
y-axis / x=0
Algebraic Rule:
Notation:
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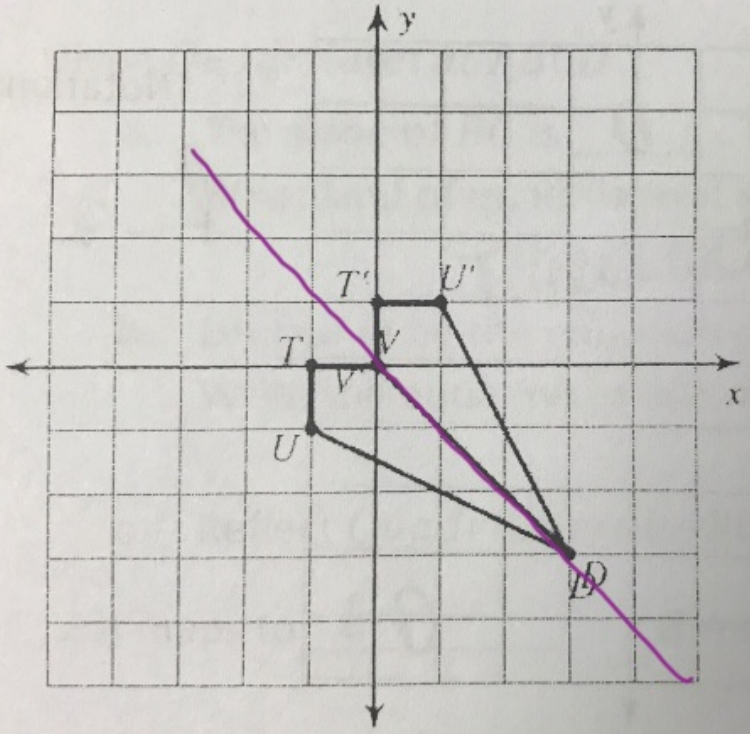
13)



14)

Description:

Reflect $y = -x$

Algebraic Rule:

Notation:

$R_{y=-x}$

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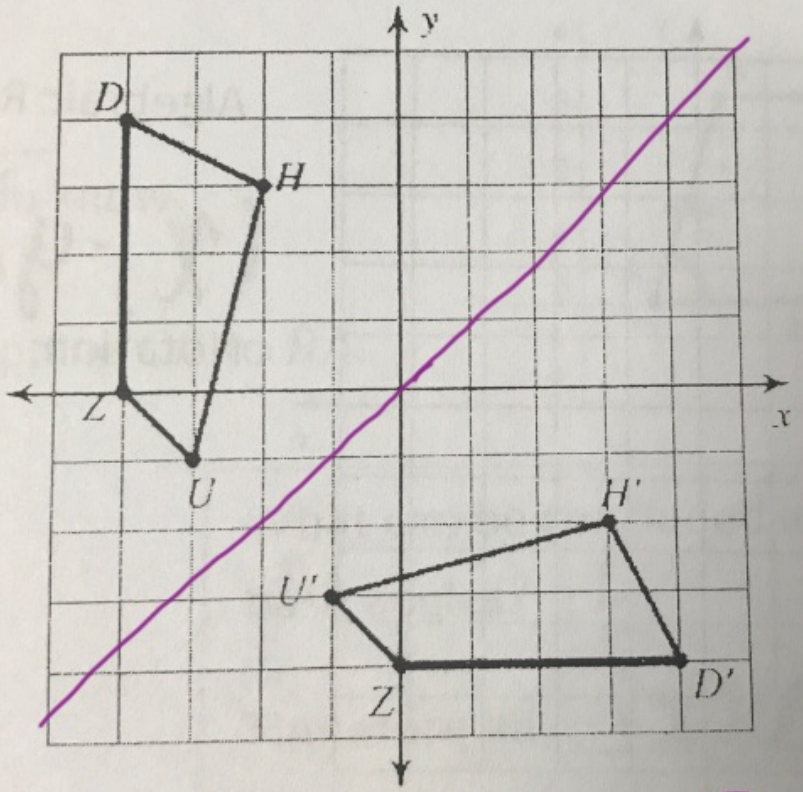
14)



Description:

Reflect y=x

Algebraic Rule:

(y, x)

Notation:

Ry=x

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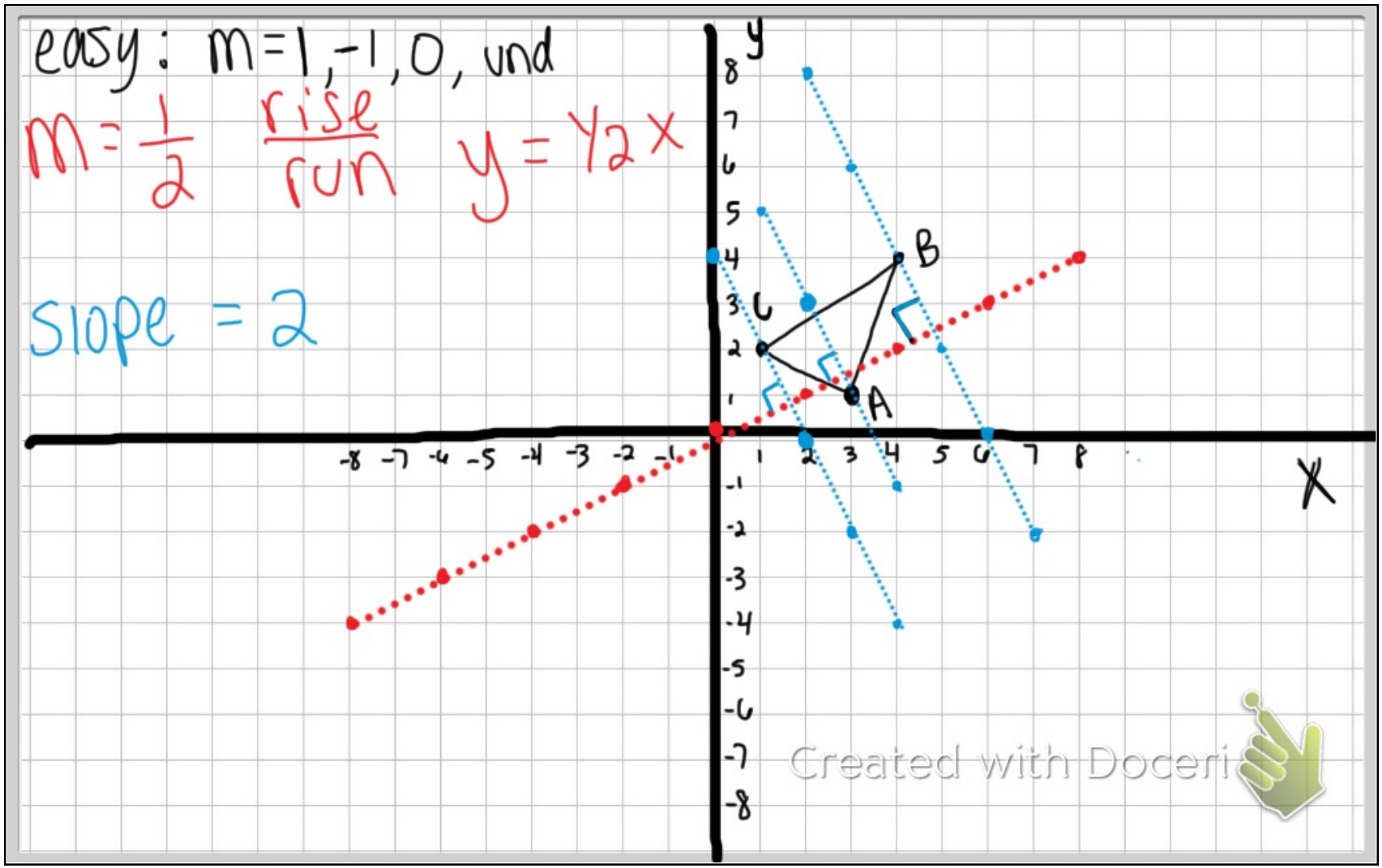
9


easy: m = 1, -1, 0, und
m = 1/2
rise/run
y = 1/2 x
slope = 2
y
x
A
B
C
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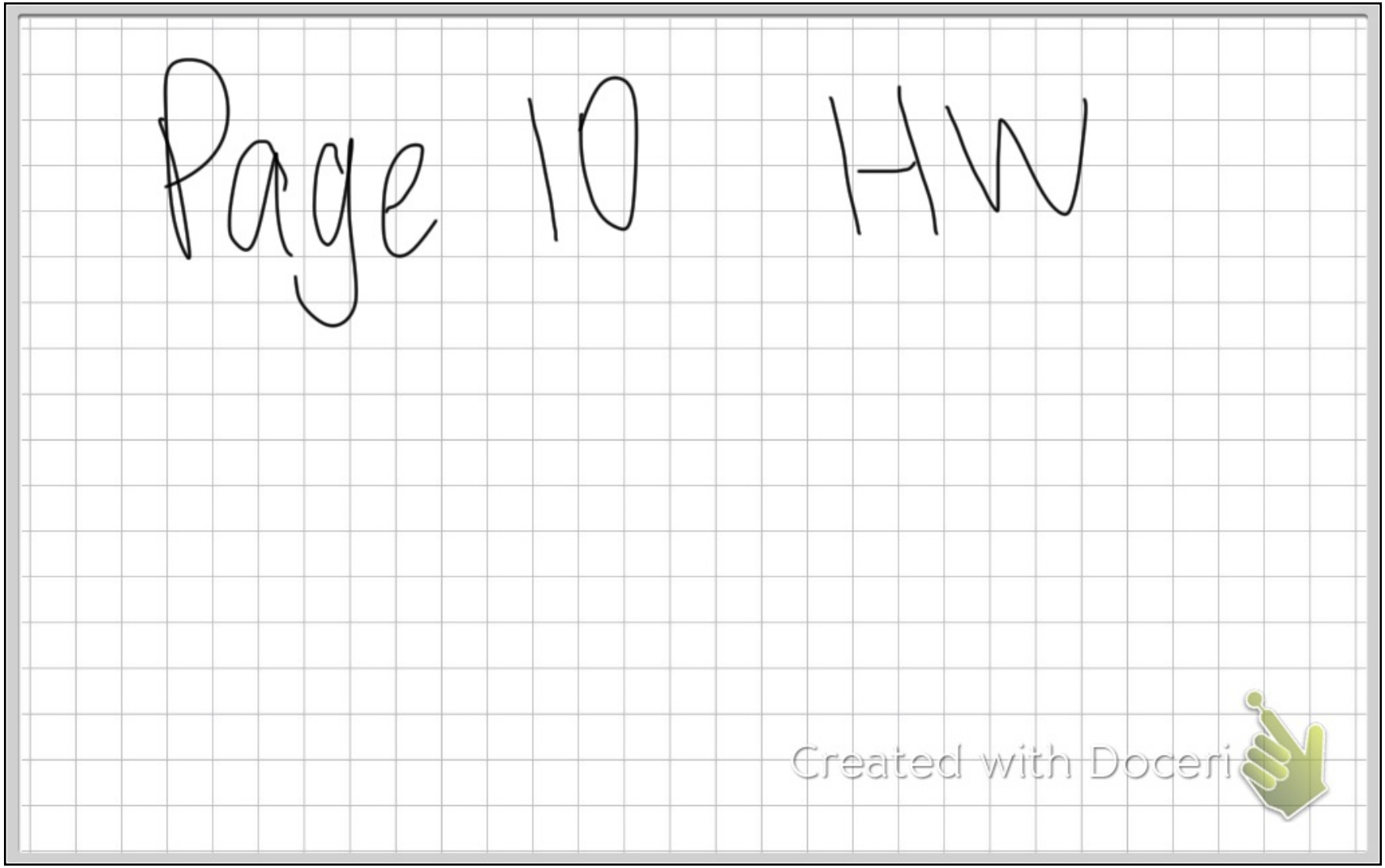
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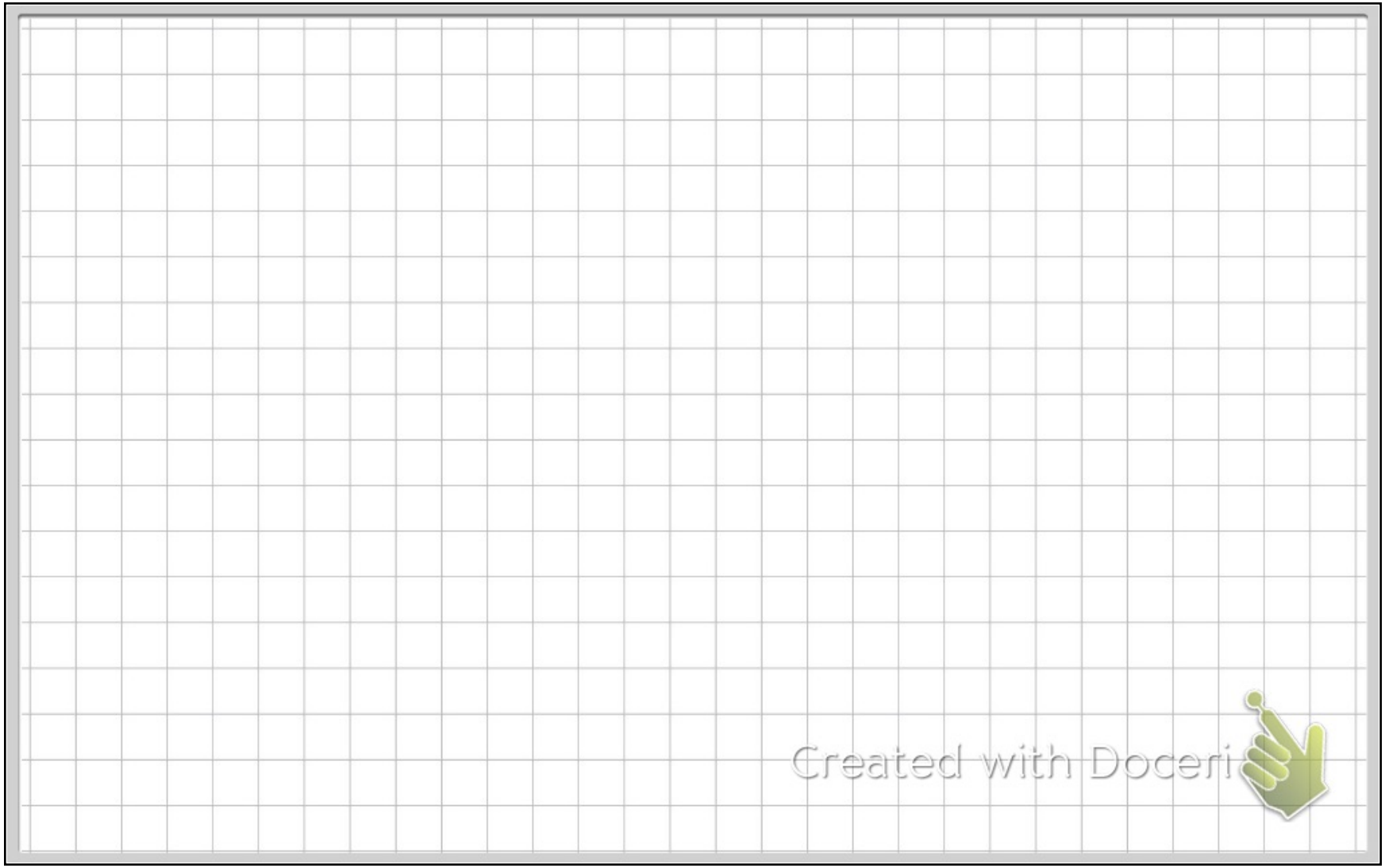
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