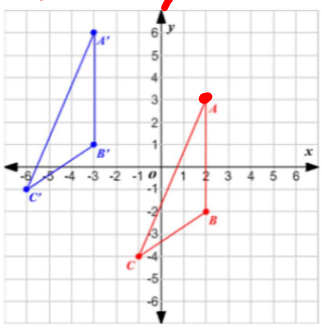
Bell Ringer

Section 9.1 - Translations

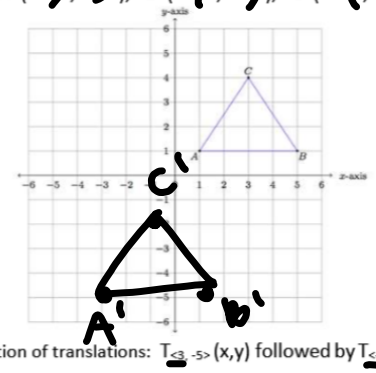
1. Write a rule to describe the transformation below.

T<-5, 3>



2. Graph $T_{<-4, -6>}$(ABC).

A'(-3, -5), B'(1, -5), C'(-1, -2)



3. Write a translation that has the same effect as the composition of translations: $T_{<3, -5>}$(x,y) followed by $T_{<-2, -2>}$(x, y)

T<1, -7>

4. $f(x) = 3x^2 - 7$. Find f(-3)

$f(-3) = 3(-3)^2 - 7$

$= 3(9) - 7$

$= 27 - 7$

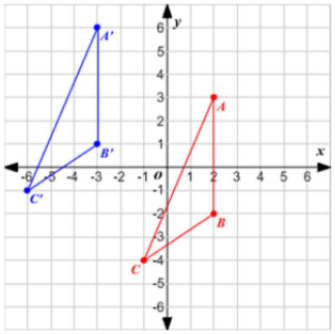
$= 20$

Solutions

Section 9.1 - Translations

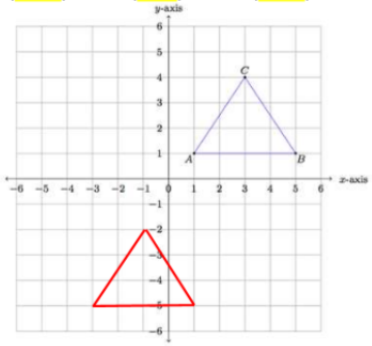
1. Write a rule to describe the transformation below.

$T_{<-5,3>}$



2. Graph $T_{<-4,\ -6>}$ (ABC).

A' (-3, -5) B' (1, -5), C' (-1, -2)



3. Write a translation that has the same effect as the composition of translations: $T_{<3,\ -5>}(x,y)$ followed by $T_{<-2,\ -2>}(x, y)$

$T_{<1,-7>}$

4. $f(x) = 3x^2 - 7$. Find f(-3) $f(-3) = 3(-3)^2 - 7 = 3(9) - 7 = 27-7 = \mathbf{20}$

due tomorrow 9.1 #s 1-2, 5-13, 15, 17-18, 27-28

Pre-Image:

Black

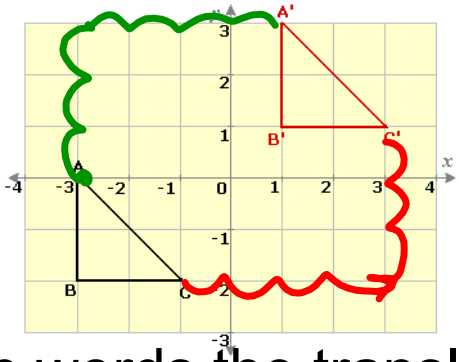


Image:

Red

Describe in words the translation shown

up 3 over 4

Write a rule for the translation shown

$T_{\langle -3,-4\rangle}$ $T_{\langle 4,3\rangle}$

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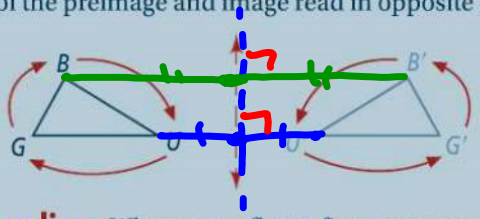
pg 485 Video

In the Solve It, you reflected shapes across lines. Notice that when you reflect a figure, the shapes have *opposite orientations*. Two figures have opposite orientations if the corresponding vertices of the preimage and image read in opposite directions.

The vertices of $\triangle BUG$ read clockwise.



The vertices of $\triangle B'U'G'$ read counterclockwise.

Essential Understanding When you reflect a figure across a line, each point of the figure maps to another point the same distance from the line but on the other side. The orientation of the figure reverses.

In order to precisely define reflections, you need to use the *perpendicular bisector* of a segment, which is the line perpendicular to the segment at its midpoint. A point (or line) is *equidistant* from a set of other points when it is the same distance from each of those other points.

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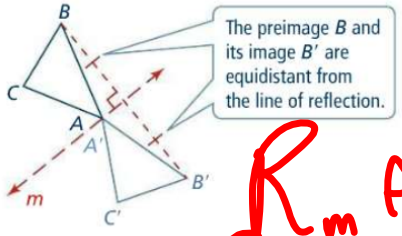
take note

Key Concept Reflection Across a Line

A **reflection** across a line m, called the **line of reflection**, is a transformation with the following properties:

- If a point A is on line m, then the image of A is itself (that is, $A' = A$).
- If a point B is not on line m, then m is the perpendicular bisector of $\overline{BB'}$.

You write the reflection across m that takes P to P' as $R_m(P) = P'$.



$R_{m\,ABC}$

$R_{x\text{-axis}}^{ABC}$ $R_{y=7}^{ABC}$

T< , >

You can use the equation of a line of reflection in the function notation. For example, $R_{y=x}$ describes the reflection across the line $y = x$.

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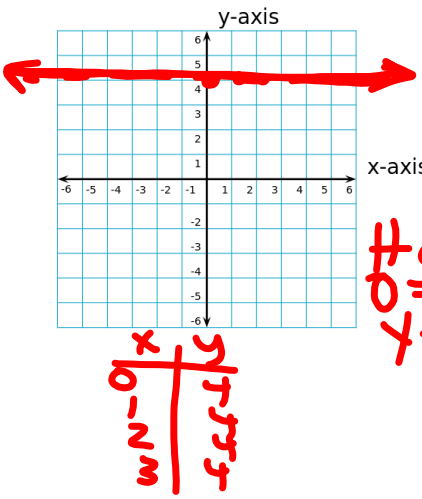
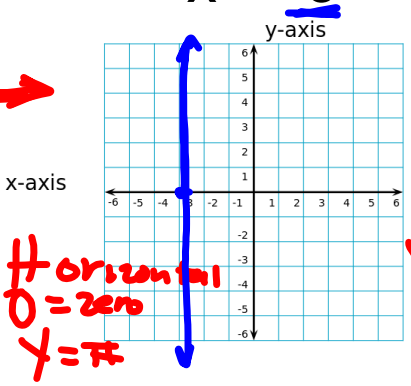
Graph:

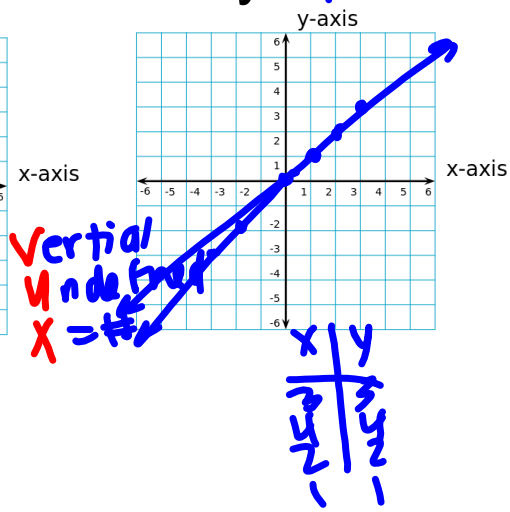
$y = 4$



$x = -3$

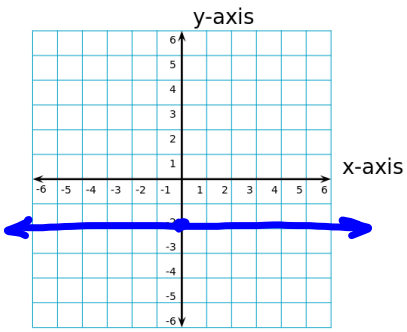


$y = |x| + 0$

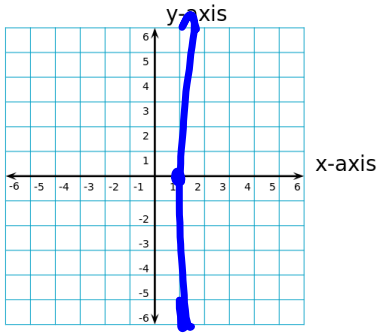


Graph:

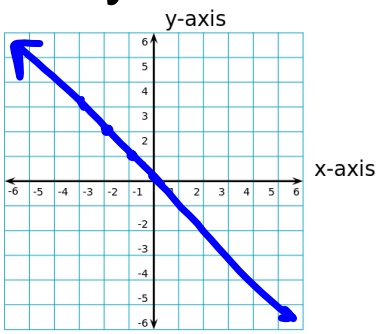
$y = -2$



$x = 1$



$y = -x$



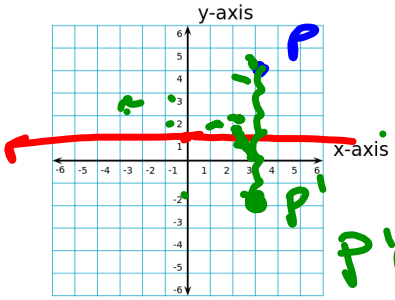
not in book...

Problem 1 Reflecting a Point Across a Line

Multiple Choice Point P has coordinates $(3, 4)$. What are the coordinates of $R_{y=1}(P)$?

x y

(A) $(3, -4)$ (B) $(0, 4)$ (C) $(3, -2)$ (D) $(-3, -2)$



Reflect over y=1

P'(3,-2)

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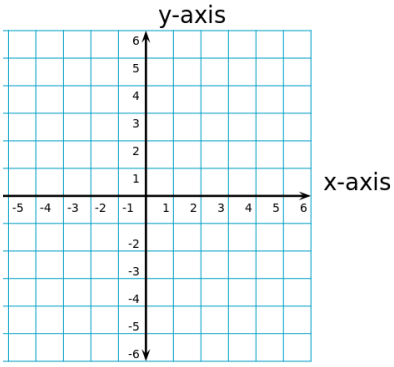
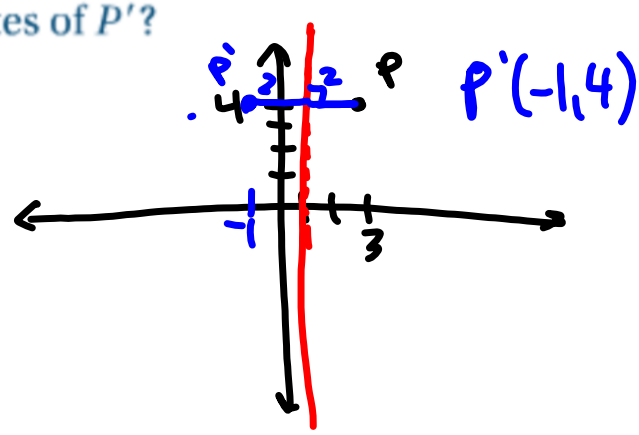
Got It? Point P has coordinates $(3, 4)$. If $R_{x=1}(P) = P'$, what are the coordinates of P'?





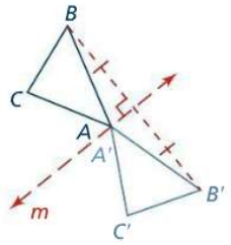
pg 486-487 - Reflections are Rigid Motions

You can also use the notation R_m to describe reflections of figures. The diagram on the next page shows $R_m(\triangle ABC)$, and function notation is used to describe some of the properties of reflections.

take note

Property Properties of Reflections

- Reflections preserve distance.
  If $R_m(A) = A'$, and $R_m(B) = B'$, then $AB = A'B'$.
- Reflections preserve angle measure.
  If $R_m(\angle ABC) = \angle A'B'C'$, then $m\angle ABC = m\angle A'B'C'$.
- Reflections map each point of the preimage to one and only one corresponding point of its image.
  $R_m(A) = A'$ if and only if $R_m(A') = A$.



Observe that the above properties mean that reflections are rigid motions, which you learned about in Lesson 9-1.

p486-487

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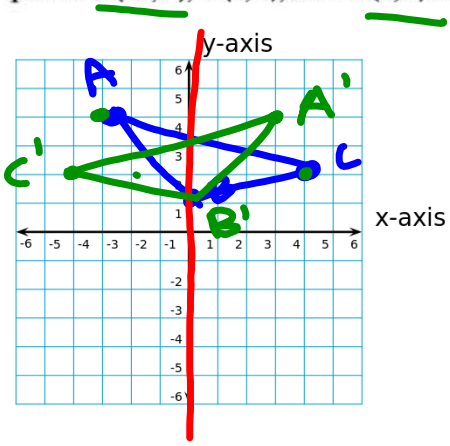
Problem 2 **Graphing a Reflection Image**

Coordinate Geometry Graph points $A(-3, 4)$, $B(0, 1)$, and $C(4, 2)$. Graph and label $R_{y\text{-axis}}(\triangle ABC)$.



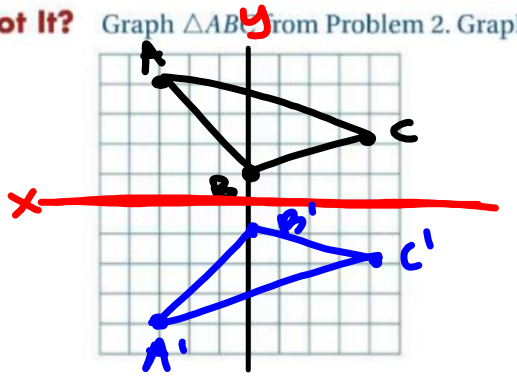
C'(-4,2)

A'(3,4)

got it pg 487

$A(-3, 4)$, $B(0, 1)$, and $C(4, 2)$

Got It? Graph $\triangle ABC$ from Problem 2. Graph and label $R_{x\text{-axis}}(\triangle ABC)$.

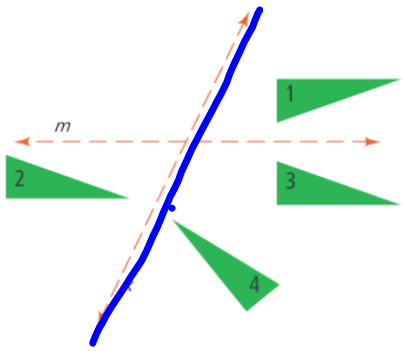


A' (-3, -4)
B' (0, -1)
C' (4, -2)

not in book

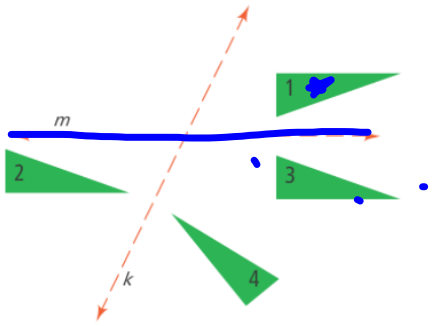
Problem 3 Writing a Reflection Rule

Each triangle in the diagram is a reflection of another triangle across one of the given lines. How can you describe Triangle 2 by using a reflection rule?



got it pg 488

Got It? Use the figure in Problem 3. How can you use a reflection rule to describe Triangle 1? Explain.



$R_m \Delta 3$

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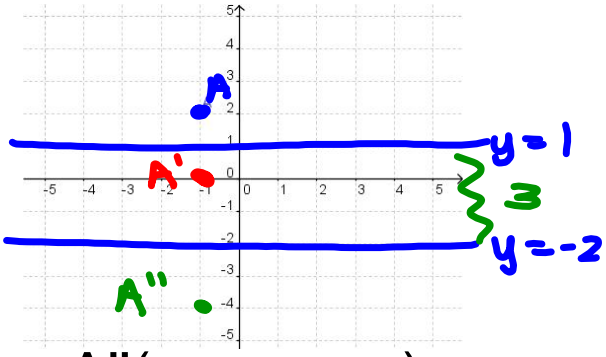
Double Reflection over parallel lines...

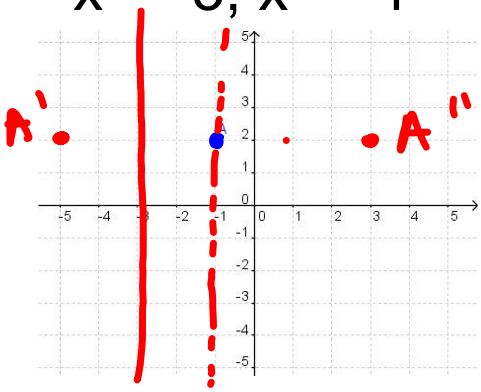
y = 1, y = -2



A"(-1 , -4)

T<0,-6>

x = -3, x = -1

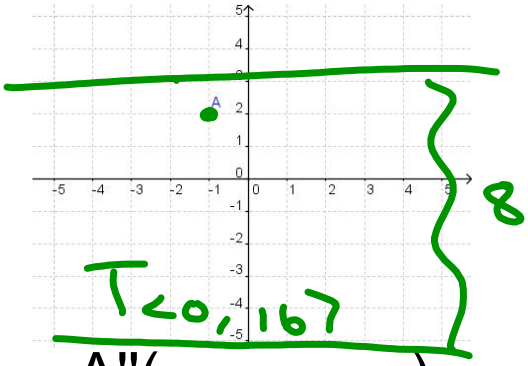


A"(3 , 2)

T<4,0>

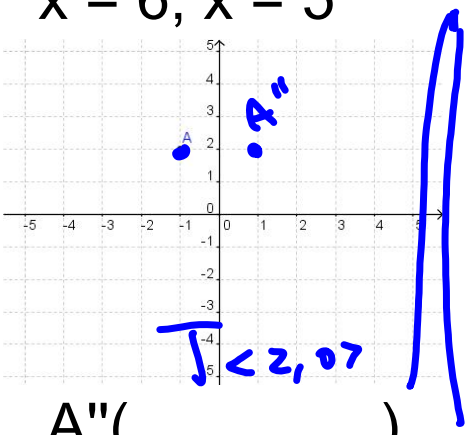
Double Reflection over parallel lines...

y = -5, y = 3



A"(,)

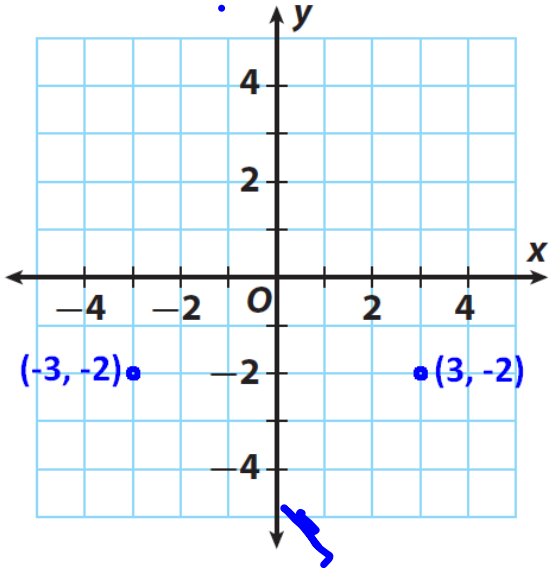
x = 6, x = 5



A"(,)

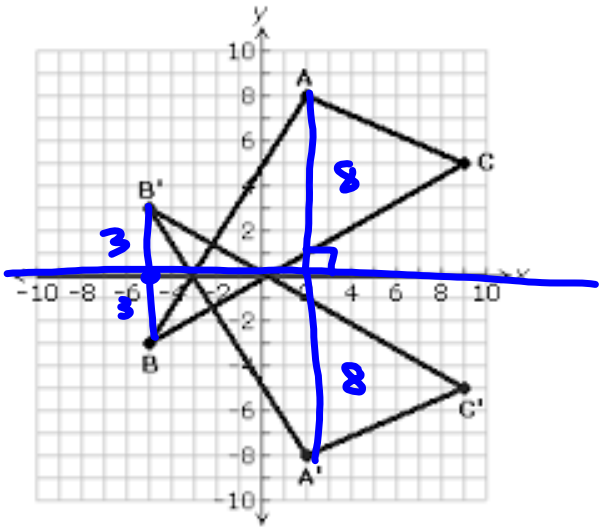
Write the equation of the line of reflection

y-axis



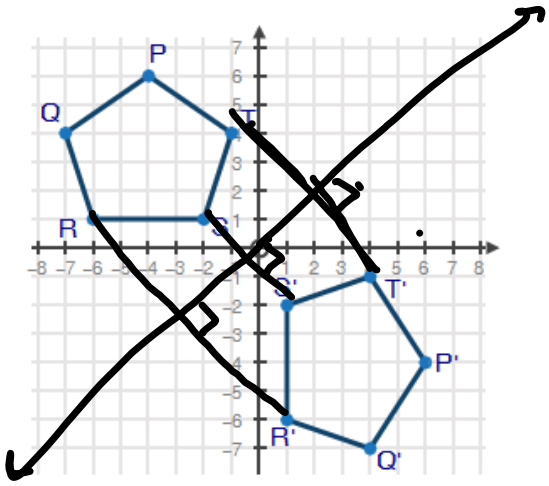
Write the equation of the line of reflection

X-AXIS

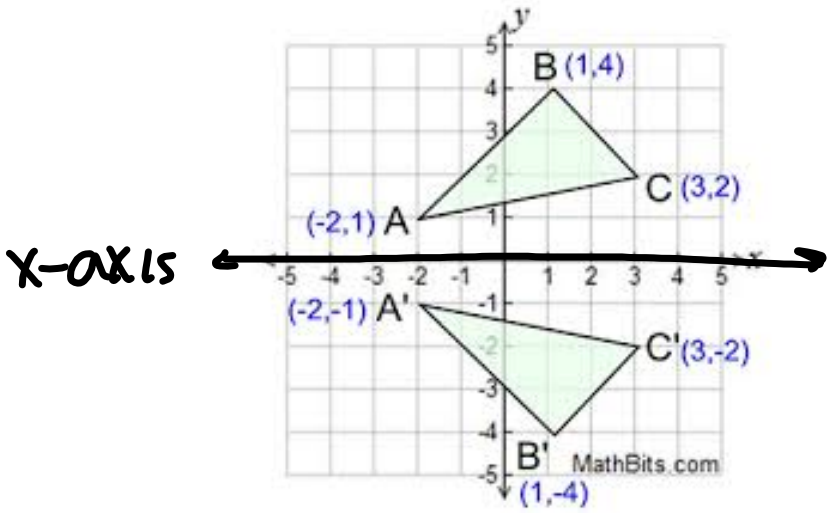


Write the equation of the line of reflection

$y = x$

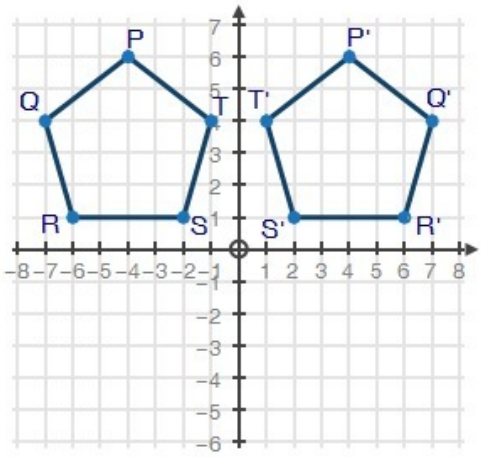


Write the equation of the line of reflection



Write the equation of the line of reflection

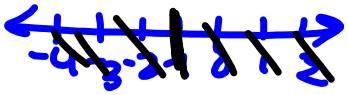
y-axis

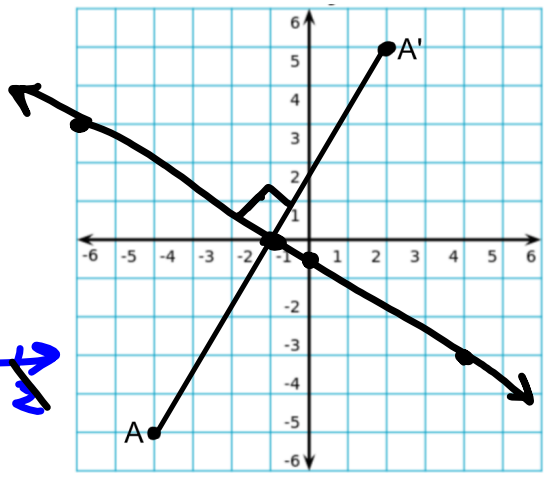


Write the equation of the line of reflection that maps A to A'

(-4, -5)
(2, 5)

(-1, 0)





$m = \frac{10}{6} = \frac{5}{3}$

$y = -\frac{3}{5} - \frac{1}{2}$

hw 9.2 #s 1-12, 15-18, 21-23