



Translating and Reflecting ... Points in the Cartesian plane

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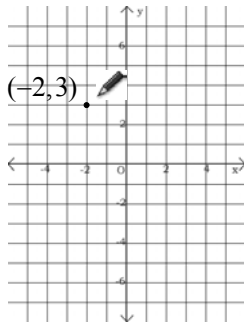


First, let's plot some points...



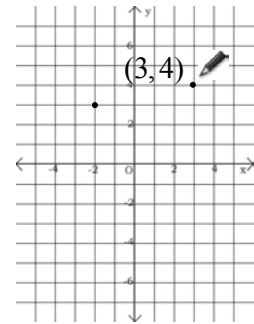
2

Plotting Points



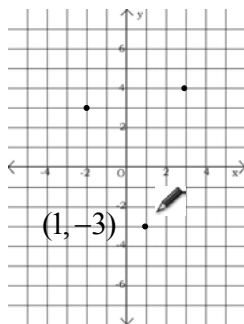
3

Plotting Points




4

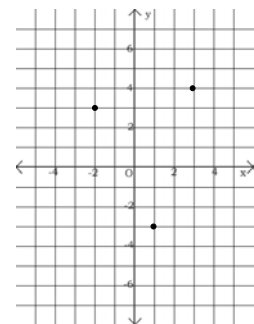
Plotting Points



5

Plotting Points

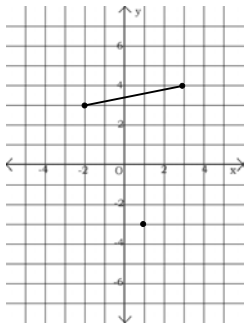
Connect the
points with
straight lines 



6

Plotting Points

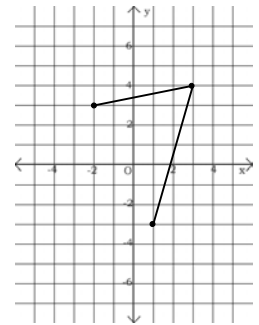
Connect the points with straight lines



7

Plotting Points

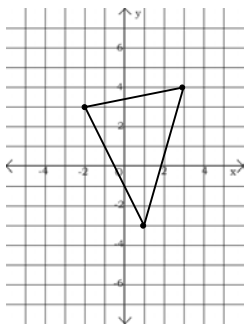
Connect the points with straight lines



8

Plotting Points

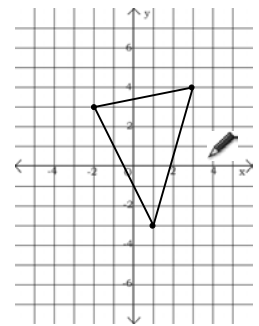
Connect the points with straight lines



9

Plotting Points

Note the resulting triangle



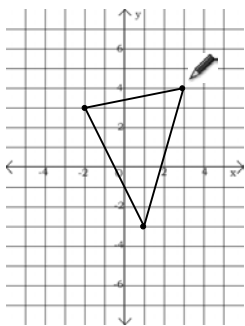
10

Plotting Points



Math Alert

The end points of the created triangle are called vertices



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Now, let's take a look at translating points...



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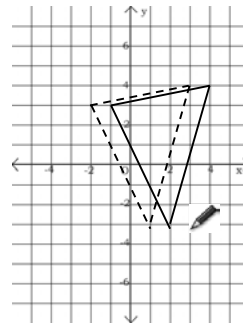
Now, let's take a look at translating points...geometrically



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Translating Points

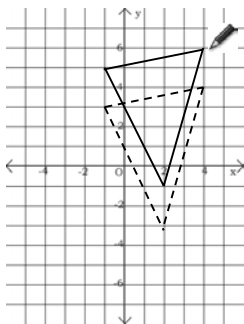
Shift the triangle 1 unit right--- (horizontally)



14

Translating Points

Then shift the triangle---2 units up (vertically)



15



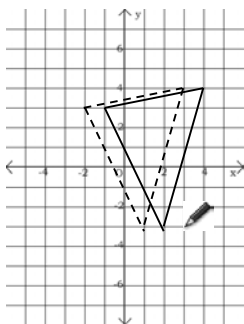
Let's take a look at the translation... again



16

Translating Points

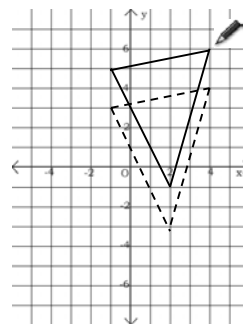
Shift the triangle 1 unit right--- (horizontally)



17

Translating Points

Then shift the triangle---2 units up (vertically)



18



Now, let's take a look at translating points...



Now, let's take a look at translating points... algebraically



Translating Points

- To make a **horizontal** shift, add the positive or negative number to the "x" of the ordered pair

(x, y)



Translating Points

(x, y)

$$(-2 + 1, 3)$$

$$(3 + 1, 4)$$

$$(1 + 1, -3)$$

To make a horizontal shift, add the positive or negative number to the "x" of the ordered pair

'New' Points

$$(-1, 3)$$

$$(4, 4)$$

$$(2, -3)$$



Translating Points

- To make a **vertical** shift, add the positive or negative number to the "y" of the ordered pair

(x, y)



Translating Points

(x, y)

$$(-1, 3 + 2)$$

$$(4, 4 + 2)$$

$$(2, -3 + 2)$$

To make a vertical shift, add the positive or negative number to the "y" of the ordered pair

'New' Points

$$(-1, 5)$$

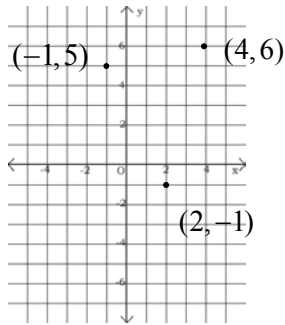
$$(4, 6)$$

$$(2, -1)$$



Translating Points

Then plot the new translated points

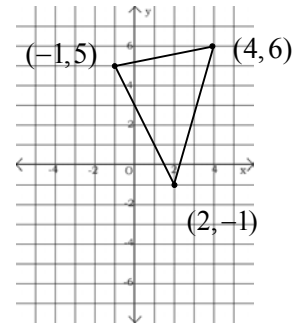


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Translating Points

Then plot the new translated points

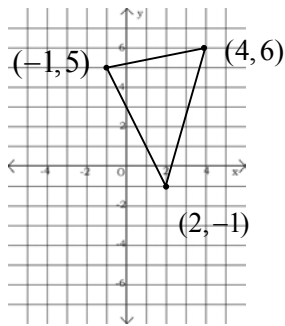
Connect the vertices with lines



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Translating Points

Then plot the translated points.
Connect the vertices with lines.



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Let's do a little translation practice



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Translating Points

Original Points

$(-4, -4)$

$(-2, 5)$

$(2, 2)$

Translate these points **three units right** and **two units down** and draw the figure

(x, y)

$(-4 + 3, -4 - 2)$

$(-2 + 3, 5 - 2)$

$(2 + 3, 2 - 2)$



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Translating Points

Original Points

$(-4, -4)$

$(-2, 5)$

$(2, 2)$

Translate these points **three units right** and **two units down** and draw the figure

(x, y)

$(-4 + 3, -4 - 2)$

$(-2 + 3, 5 - 2)$

$(2 + 3, 2 - 2)$



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Translating Points

New Points

$(-1, -6)$

$(1, 3)$

$(5, 0)$

Translate these points **three units right** and **two units down** and draw the figure

(x, y)
 $(-4 + 3, -4 - 2)$


$(-2 + 3, 5 - 2)$

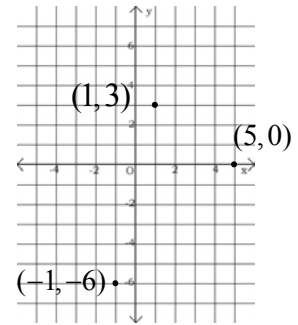
$(2 + 3, 2 - 2)$



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Translating Points


 Plot the new translated points

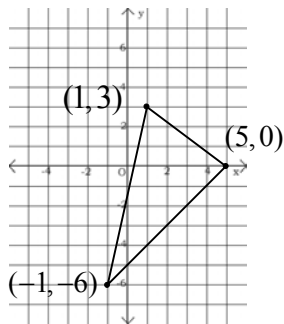


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Translating Points

Plot the new translated points

 Draw lines connecting vertices



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Now, let's take a look at....



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Now, let's take a look at....
reflecting points



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Reflecting Points

- To reflect a point about the **y-axis** take the **opposite** of the **x-value** in the ordered pair

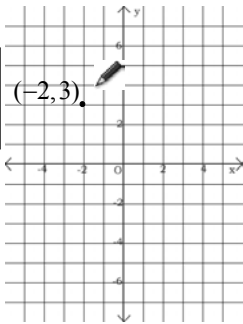
(x, y)  $(-x, y)$



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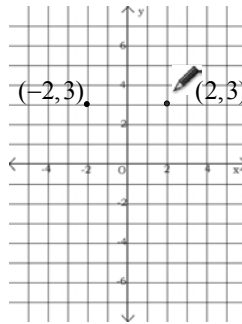
Reflecting Points

What is the y-axis reflection?



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Reflecting Points



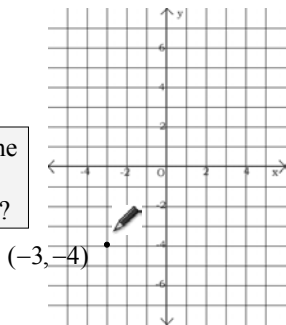
y-axis reflection



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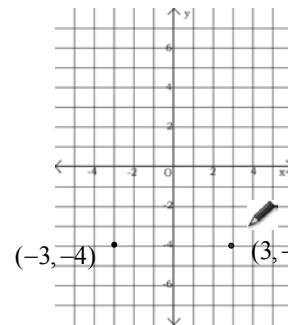
Reflecting Points

What is the y-axis reflection?



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Reflecting Points



y-axis reflection



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Reflecting Points

• To reflect a point about the **x-axis** take the opposite of the y-value in the ordered pair

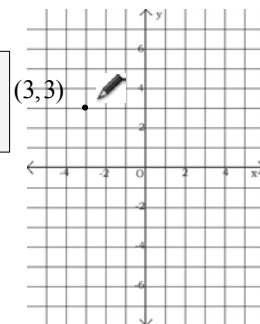
$$(x, y) \quad \img alt="pencil icon" data-bbox="240 830 275 850" \quad (x, -y)$$



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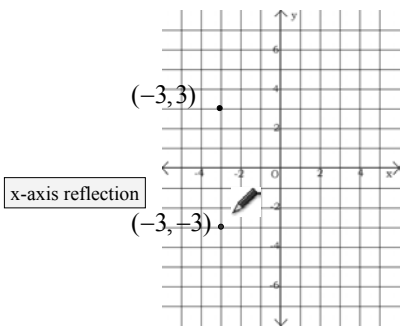
Reflecting Points

What is the x-axis reflection?



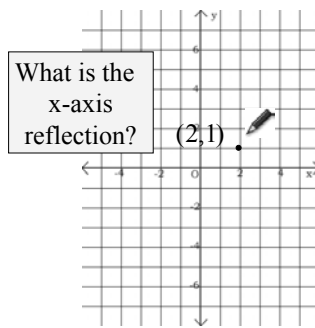
42

Reflecting Points



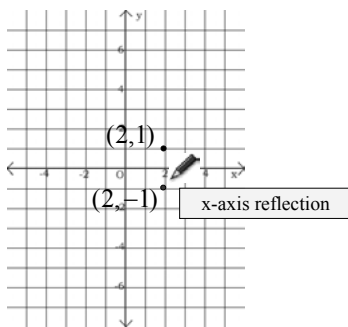
43

Reflecting Points




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Reflecting Points



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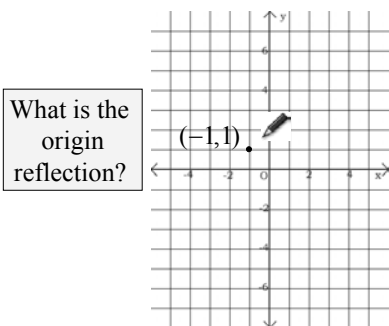
Reflecting Points

- To reflect a point about the **origin** take the opposite of both the **x** and **y**-value in the ordered pair
 (x, y)  $(-x, -y)$



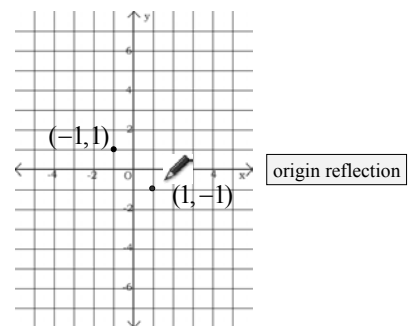
46

Reflecting Points



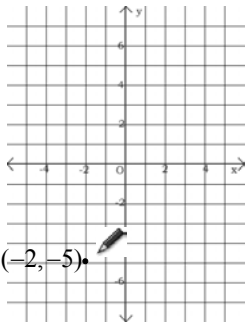
47

Reflecting Points



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Reflecting Points

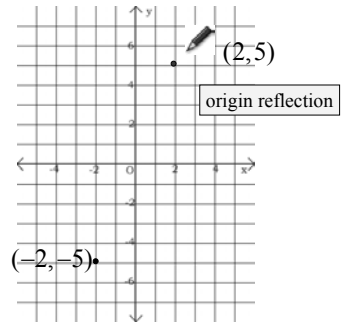


What is the origin reflection?



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Reflecting Points



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Let's review the Translation Rules 



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Translating Points

- To make a **horizontal** shift, add the positive or negative number to the "x" of the ordered pair


 (x, y)



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Translating Points

- To make a **vertical** shift, add the positive or negative number to the "y" of the ordered pair

(x, y) 



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Let's review the Reflection Rules 



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Reflecting Points

- To reflect a point about the **y-axis** take the opposite of the **x**-value in the ordered pair

$$(x, y) \quad \img alt="hand cursor icon" data-bbox="240 220 275 240" \quad \downarrow \quad (-x, y)$$



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Reflecting Points

- To **reflect** a point about the **x-axis** take the opposite of the **y**-value in the ordered pair

$$(x, y) \quad \downarrow \quad (x, -y) \quad \img alt="hand cursor icon" data-bbox="865 220 900 240"/>$$



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Reflecting Points

- To **reflect** a point about the **origin** take the opposite of both the **x** and **y**-value in the ordered pair

$$(x, y) \quad \img alt="hand cursor icon" data-bbox="240 523 275 543" \quad \downarrow \downarrow \quad (-x, -y)$$



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Translating and Reflecting ...
Points in the Cartesian plane

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You can do this!



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