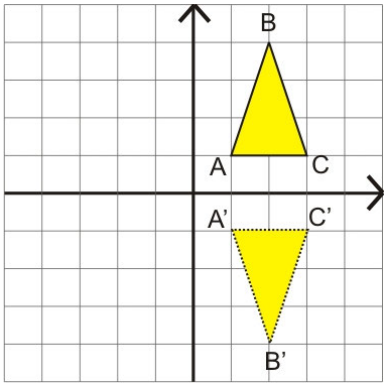
Transformations in the Coordinate Grid

When a figure is reflected in either x- or y-axis, there is a very simple relationship between the coordinates of the original figure and the coordinates of the reflected figure. Let's explore.

1. These images have been reflected in the x-axis. Write the coordinates of their vertices.

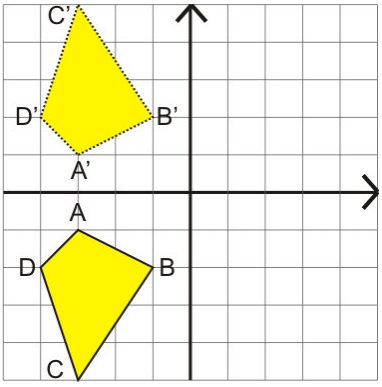
a.



The original figure	The reflected figure
A (_____, _____)	A' (_____, _____)
B (_____, _____)	B' (_____, _____)
C (_____, _____)	C' (_____, _____)

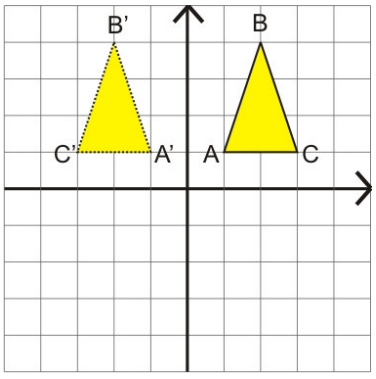
How do the coordinates change?

b.



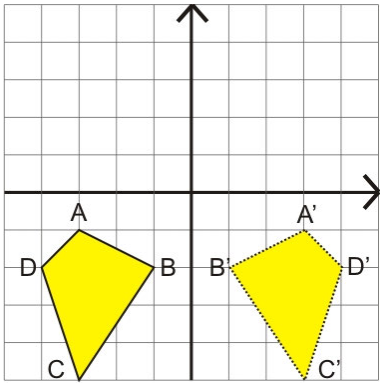
The original figure	The reflected figure
A (_____, _____)	A' (_____, _____)
B (_____, _____)	B' (_____, _____)
C (_____, _____)	C' (_____, _____)
D (_____, _____)	D' (_____, _____)

2. These images have been reflected in the y-axis. Write the coordinates of their vertices.



The original figure	The reflected figure
A (_____, _____)	A' (_____, _____)
B (_____, _____)	B' (_____, _____)
C (_____, _____)	C' (_____, _____)

How do the coordinates change?



The original figure	The reflected figure
A (_____, _____)	A' (_____, _____)
B (_____, _____)	B' (_____, _____)
C (_____, _____)	C' (_____, _____)
D (_____, _____)	D' (_____, _____)

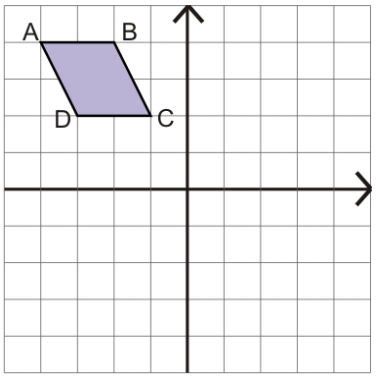
Sample worksheet from
www.mathmammoth.com

When a point is reflected in the x-axis, its x-coordinate does not change. Its y-coordinate changes to the opposite number.

When a point is reflected in the y-axis, its y-coordinate does not change. Its x-coordinate changes to the opposite number.

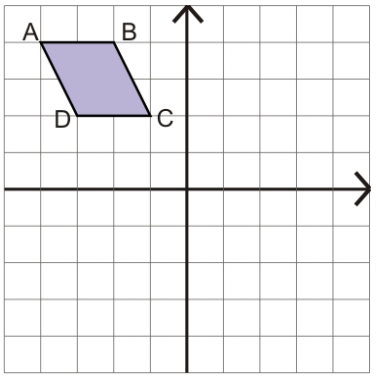
3. Reflect the figures.

a.



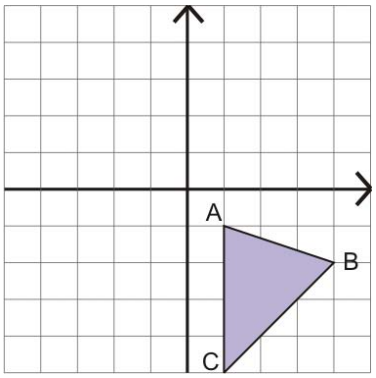
Reflect the figure in the x-axis.

b.



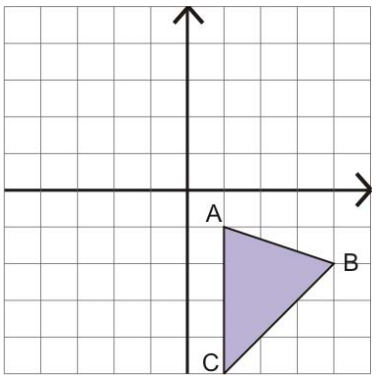
Reflect the figure in the y-axis.

c.



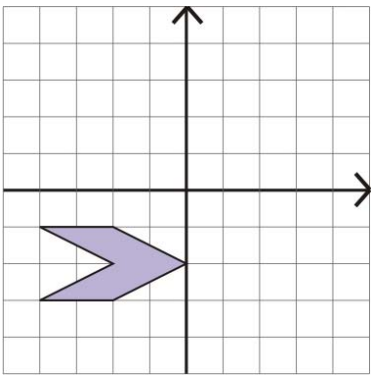
Reflect the figure in the x-axis.

d.



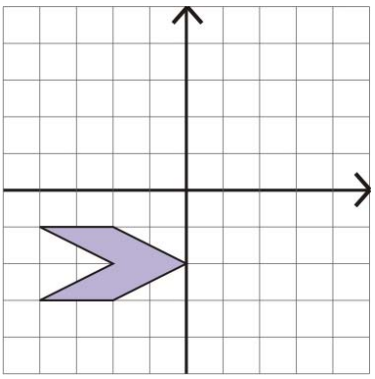
Reflect the figure in the y-axis.

e.



Reflect the figure in the x-axis.

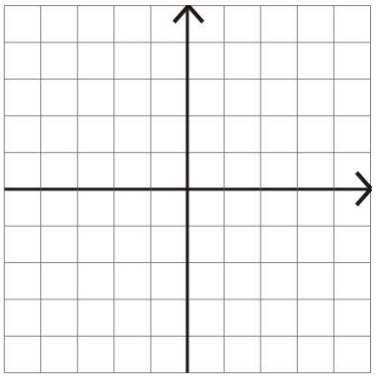
f.



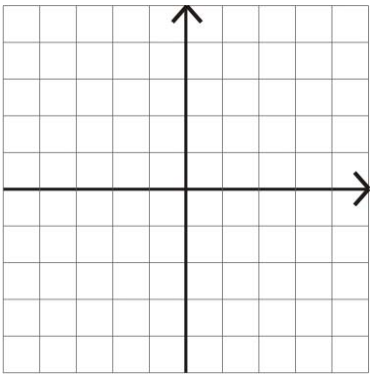
Reflect the figure in the y-axis.

4. Draw any shape you like in one of the quarters of the grid. Reflect your shape first in the x-axis. Then reflect the *resulting* figure in the y-axis. Yet one more time reflect the resulting figure in the x-axis. Can you notice an interesting pattern forming every time?

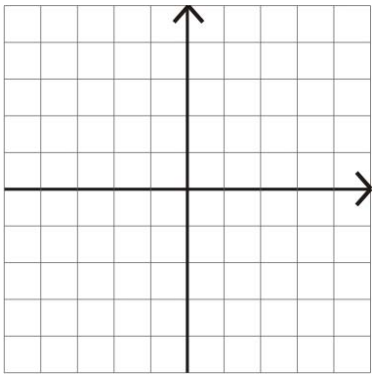
a.



b.

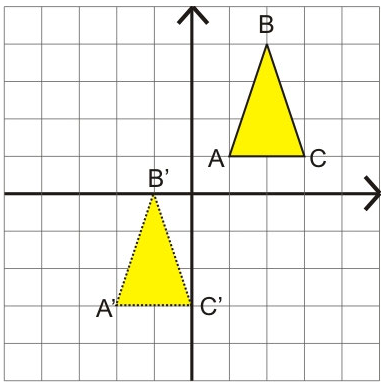


c.



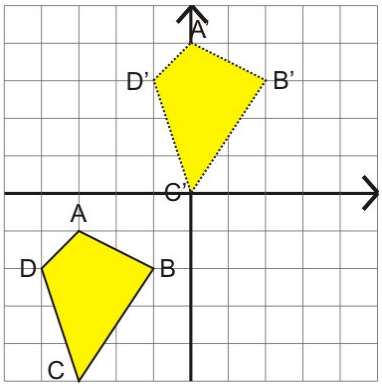
5. In (a), the figure is **translated** *(*moved) four units down and three units to the left. In (b), the figure is moved five units up and three units to the right. Write the coordinates of their vertices.

a.



The original figure	The moved figure
A (_____, _____)	A' (_____, _____)
B (_____, _____)	B' (_____, _____)
C (_____, _____)	C' (_____, _____)

b.



The original figure	The moved figure
A (_____, _____)	A' (_____, _____)
B (_____, _____)	B' (_____, _____)
C (_____, _____)	C' (_____, _____)
D (_____, _____)	D' (_____, _____)

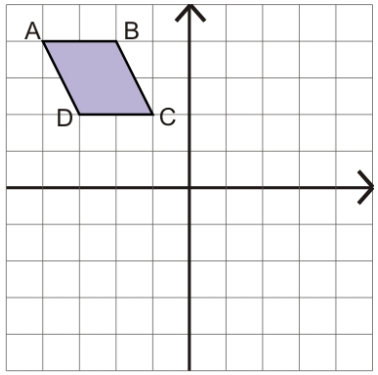
How do the coordinates change?

When a point is translated (moved) in the coordinate grid, its coordinates change accordingly.

- If a point moves up *n* units, its y-coordinate increases by *n* units.
- If a point moves down *n* units, its y-coordinate decreases by *n* units.
- If a point moves to the right *n* units, its x-coordinate increases by *n* units.
- If a point moves to the left *n* units, its x-coordinate decreases by *n* units.

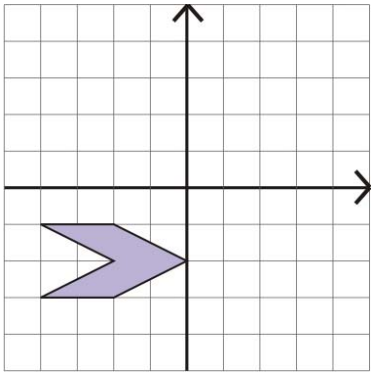
6. Move the figures.

a.



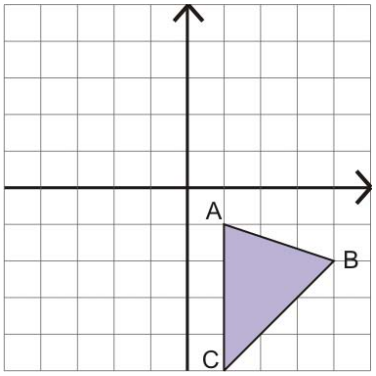
Three units down,
two units to the right.

b.



Five units up,
five units to the right.

c.

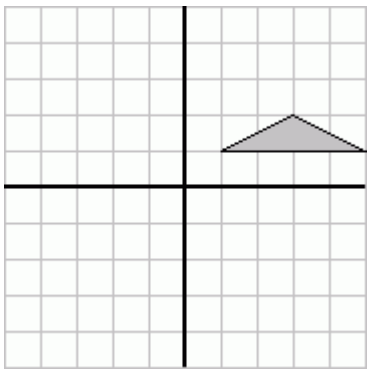


Four units up,
four units to the left.

Sample worksheet from
www.mathmammoth.com

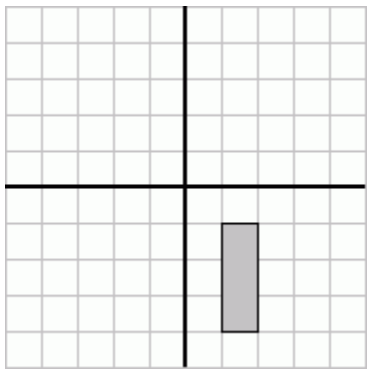
7. Follow the instructions.

a.



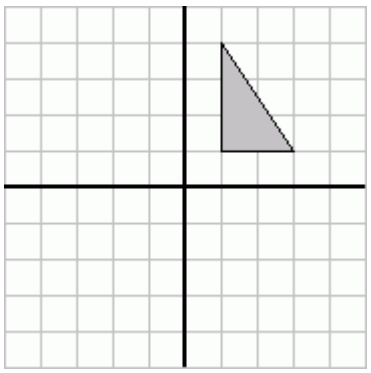
Reflect the figure in the x-axis. Reflect the resulting figure in the y-axis.

b.



Move the figure four units up. Reflect the resulting figure in the y-axis.

c.

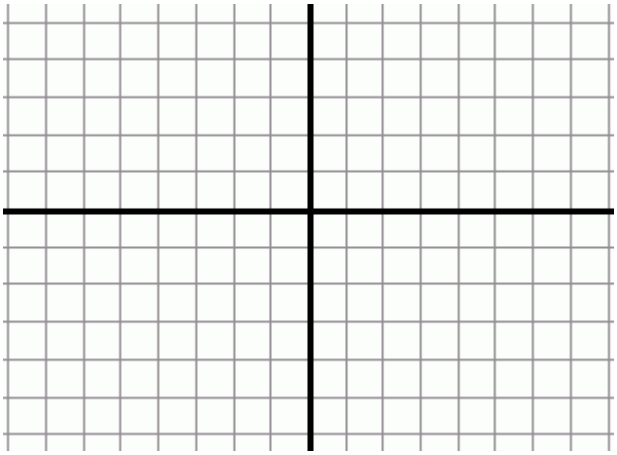


Reflect the figure in the y-axis. Move the resulting figure five units down, two to the right.

8. A figure whose vertices are at (−5, −3), (−1, −3), (0, −5), and (−7, −5) is transformed this way:

a. It is reflected in the x-axis.
b. It is moved seven units to the right, three down.
c. It is reflected in the y-axis.

Give the coordinates of its vertices after all three transformations.



9. The vertices of certain triangles were changed in the following ways. Describe the transformations.

a.

original	transformed
A (2, 4)	A' (−2, 1)
B (4, 5)	B' (0, 2)
C (3,1)	C' (−1, −2)

b.

original	transformed
A (−2, 4)	A' (−2, −4)
B (−4, 4)	B' (−4, −4)
C (−3,0)	C' (−3, 0)

c.

original	transformed
A (1, −2)	A' (−1, −2)
B (5, −1)	B' (−5, −1)
C (3, 3)	C' (−3, 3)

Puzzle Corner

A certain triangle underwent two transformations. The original and final coordinates of its vertices are given on the right.

What were the transformations?

original	intermediate	final
A (−5, 5)	A' (___, ___)	A" (−2, −5)
B (−2, 2)	B' (___, ___)	B" (1, −2)
C (−3, 1)	C' (___, ___)	C" (0, −1)

Sample worksheet from
www.mathmammoth.com