Math Virtual Learning

Grade 8

Geometric Transformations: Multiple Transformations

April 24, 2020

Math 8
Lesson: April 24, 2020

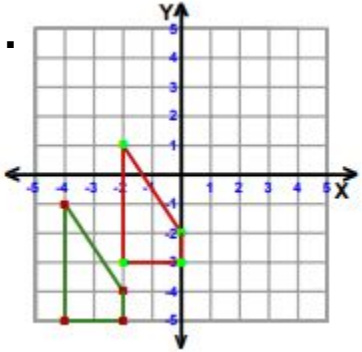
Objective/Learning Target:
I can describe a possible sequence of transformations between two similar and/or congruent figures.

If you need extra graph paper as you complete this lesson, see slides 17-19.

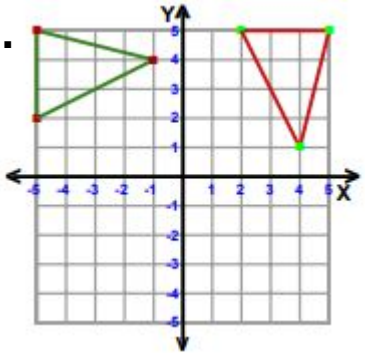
Warm Up:

Match the graph on the left with the transformation performed on the right.

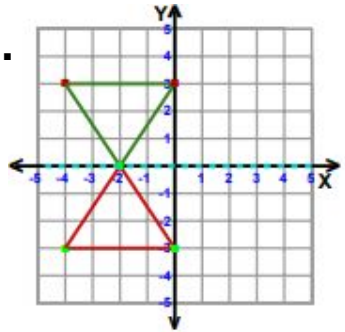
1.



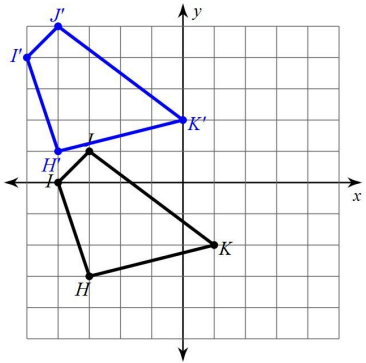
2.



3.



4.



A. Translation

B. Reflection

C. Rotation

D. Dilation

Solution: 1=A 2=C 3=B 4=D

Reference: Transformation Rules

Translation

$(x,y) \rightarrow (x+a, y+b)$

Reflection Across the X-Axis

$(x,y) \rightarrow (x,-y)$

Reflection Across the Y-Axis

$(x,y) \rightarrow (-x,y)$

Rotate Clockwise 90^{o}

$(x,y) \rightarrow (y,-x)$

Rotate Counter-Clockwise 90^{o}

$(x,y) \rightarrow (-y,x)$

Rotate Clockwise 180^{o}

$(x,y) \rightarrow (-x,-y)$

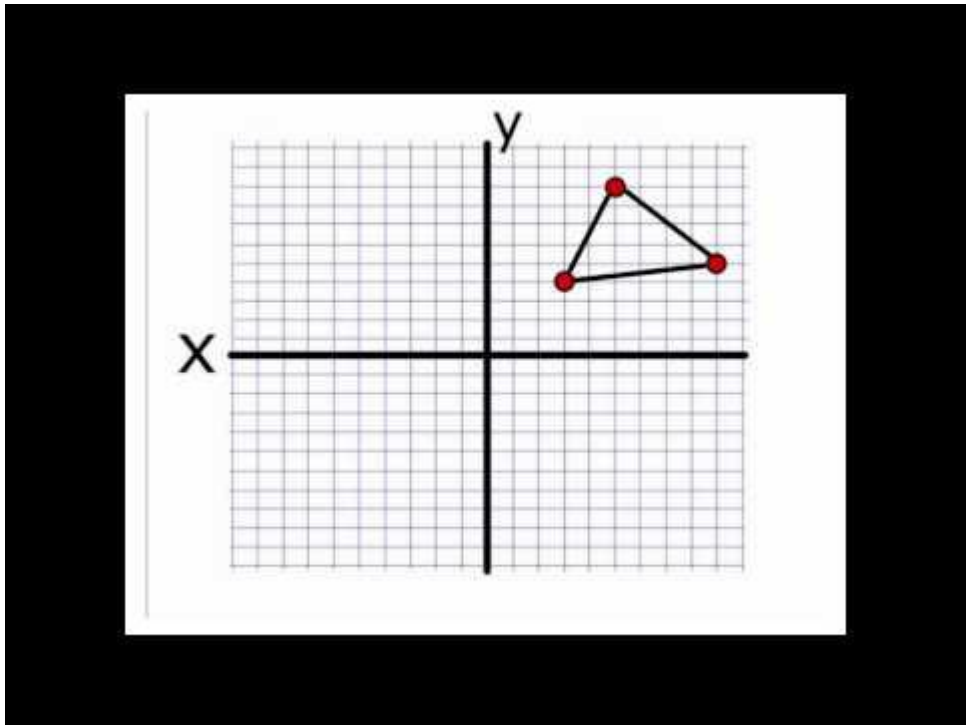
Dilation

$(x,y) \rightarrow (rx,ry)$

Review of Transformations

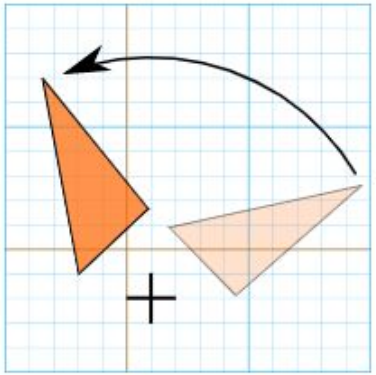
Take notes on a piece of paper

as you watch this video.



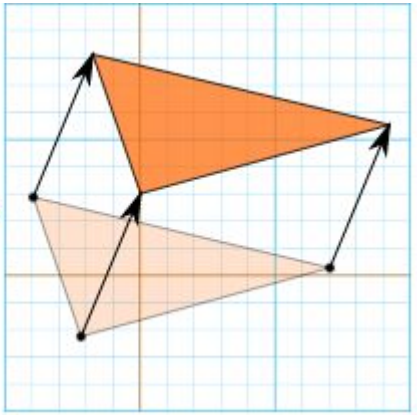
Translations and Dilations - Quick Look

Rotation



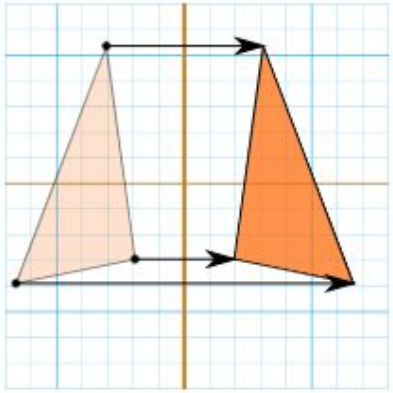
Turn!

Translation



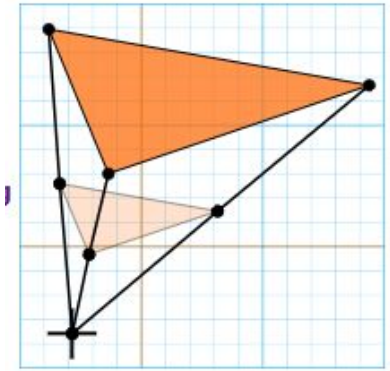
Slide!

Reflection



Flip!

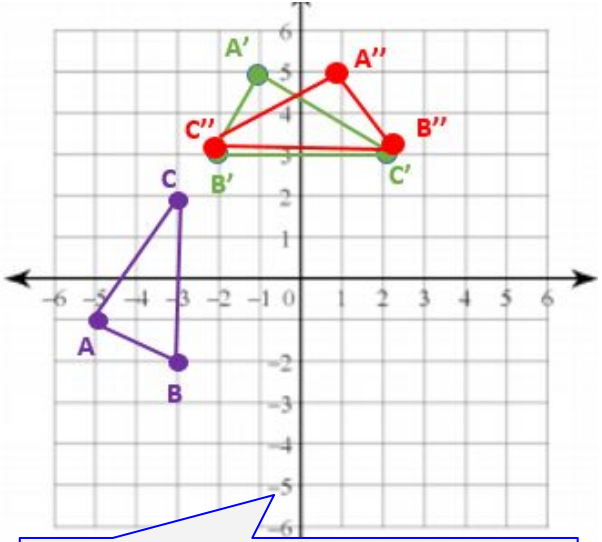
Dilation



How To: Multiple Transformations

Given:
ΔABC is A(-5,-1), B(-3,-2), C(-3,2)

Rule: Rotate 90^{O} clockwise about the origin, *then* reflect the image across the *y-axis.*



It is okay if they overlap!

1) Graph the pre-image.
For example, ABC is our pre-image.

2) Plug the pre-image coordinates into the correct rule. (*You can use slide 4 for reference.*) **Write and plot the new points, labeling them with a single prime.**
The rule is: (x,y) → (y,-x)
A(-5,-1) → A'(-1,5)
B(-3,-2) → B'(-2,3)
C(-3,2) → C'(2,3)

3) Plug the single prime points into the next rule. (*You can use slide 4 for reference.*) **Write and plot the new points, labeling them with double prime.**
The rule is: (x,y) → (-x,y)
A'(-1,5) → A''(1,5)
B'(-2,3) → B''(2,3)
C'(2,3) → C''(-2,3)

FINAL ANSWER

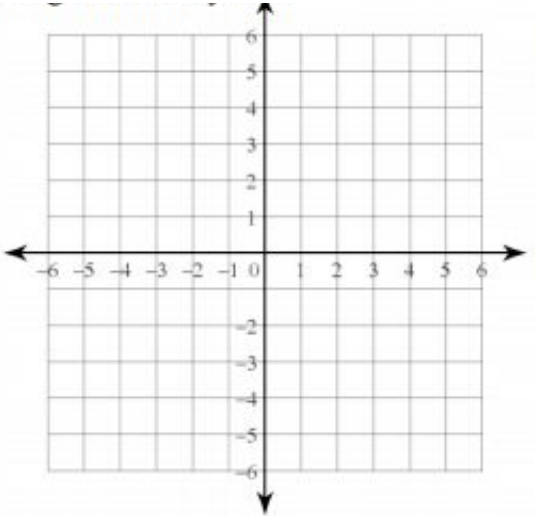
Practice 1

[Link: Printable Graph Paper]

Use the transformation rules to complete each problem.

Given:
ΔALT A(-5,-1) L(-3,-2) T(-3,2)

Rule: Translate the figure (x+6, y-3), *then* reflect the image across the *x-axis.*



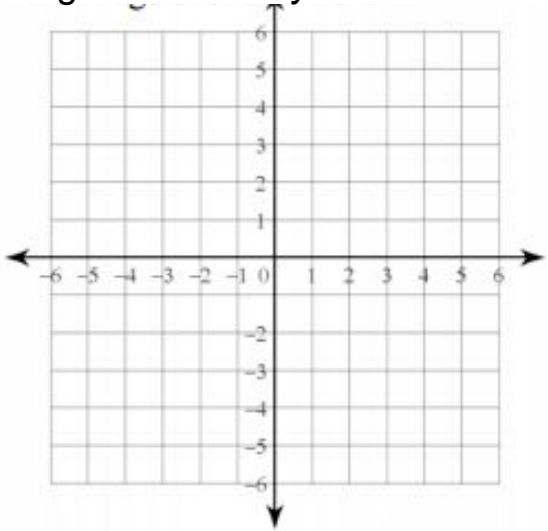
A' (__,__), L'(__,__), T'(__,__)

A''(__,__), L''(__,__), T''(__,__)

Answers on next page

Given:
ΔALT A(-4,-2) L(0,-2) T(-3,-5)

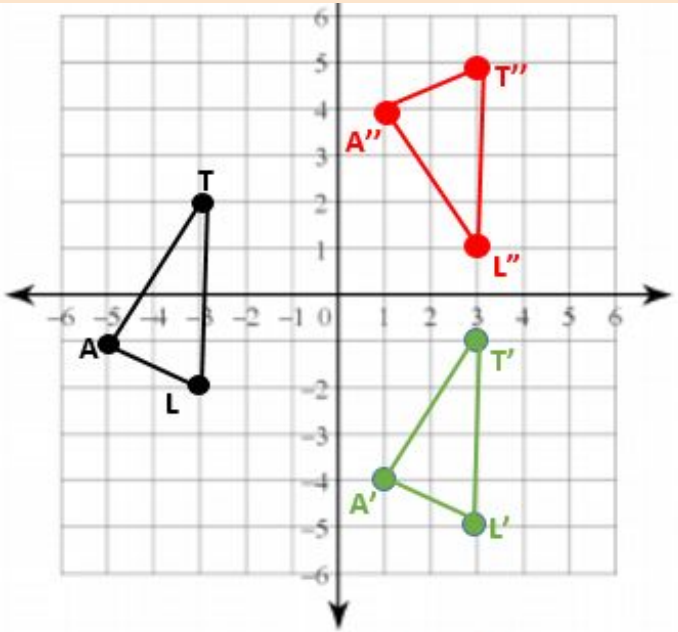
Rule: Rotate 180^{O}, *then* reflect the image across the *y-axis.*



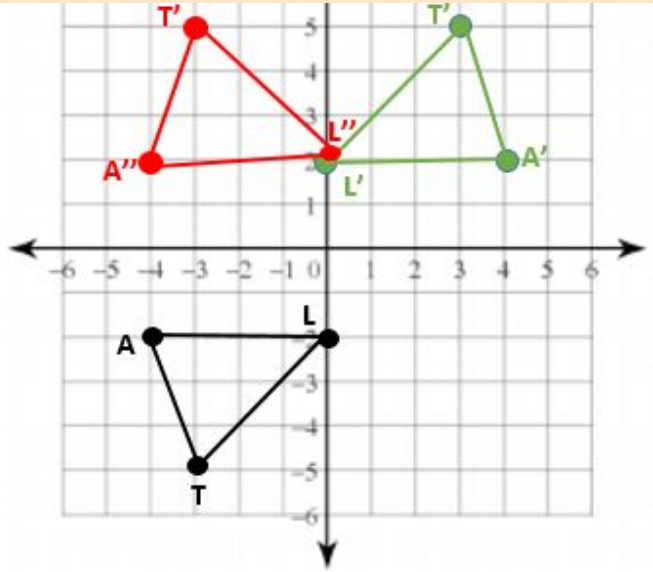
A' (__,__), L'(__,__), T'(__,__)

A''(__,__), L''(__,__), T''(__,__)

Practice 1: *Answer Key*



A' (1, -4)	A'' (1,4)
L' (3,-5)	L'' (3,5)
T' (3,-1)	T'' (3,1)



A' (4,2)	A'' (-4, 2)
L' (0,2)	L'' (0, 2)
T' (3,5)	T'' (-3, 5)

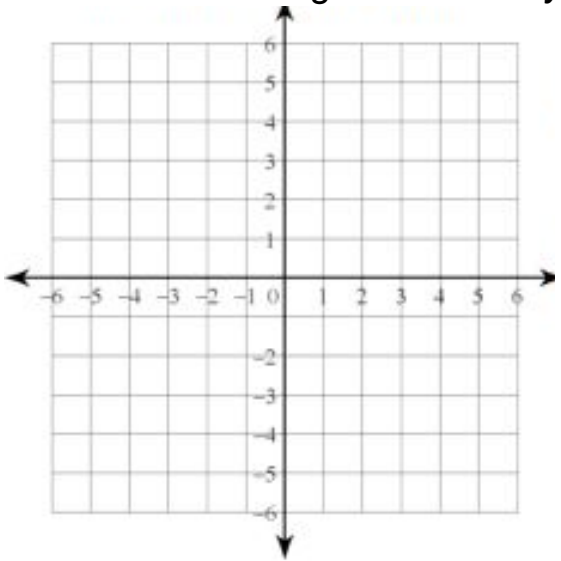
Practice 2

Link: Printable Graph Paper

Use the transformation rules to complete each problem.

Given:
ΔALT A(2,3) L(1,1) T(4,-3)

Rule: Reflect the image across the *x-axis, then* reflect the image across the *y-axis.*



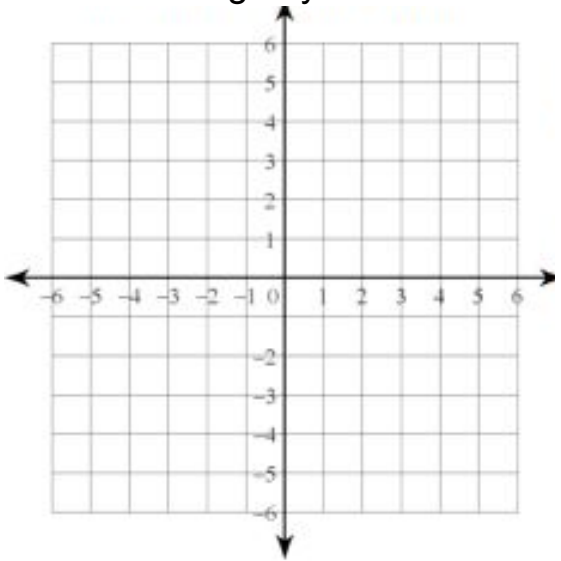
A' (__,__), L'(__,__), T'(__,__)

A"(__,__), L"(__,__), T"(__,__)

Answers on next page

Given:
ΔALT A(0,0) L(3,0) T(3,2)

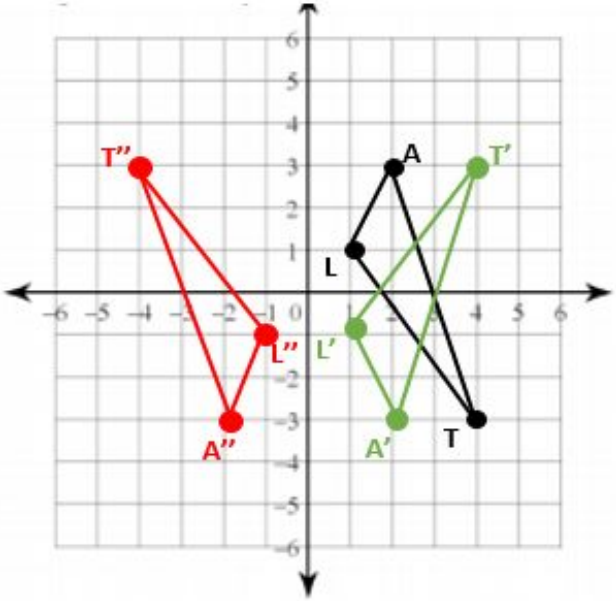
Rule: Reflect the image across the *y-axis, then* dilate the image by a scale factor of 2.



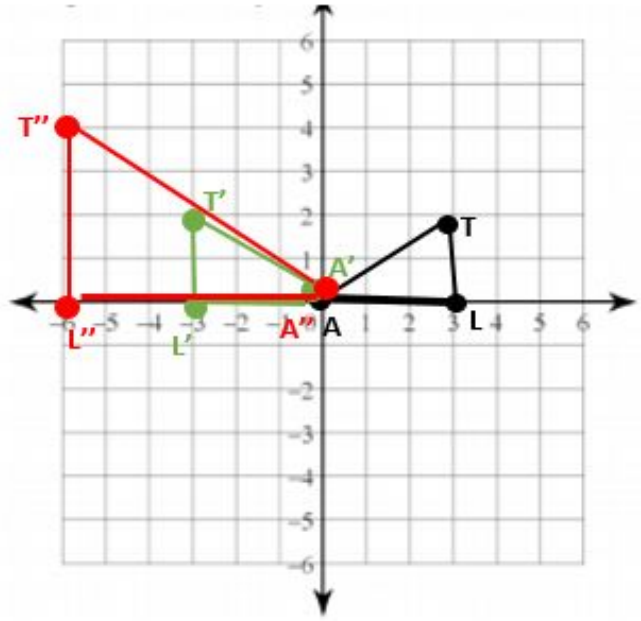
A' (__,__), L'(__,__), T'(__,__)

A"(__,__), L"(__,__), T"(__,__)

Practice 2: *Answer Key*

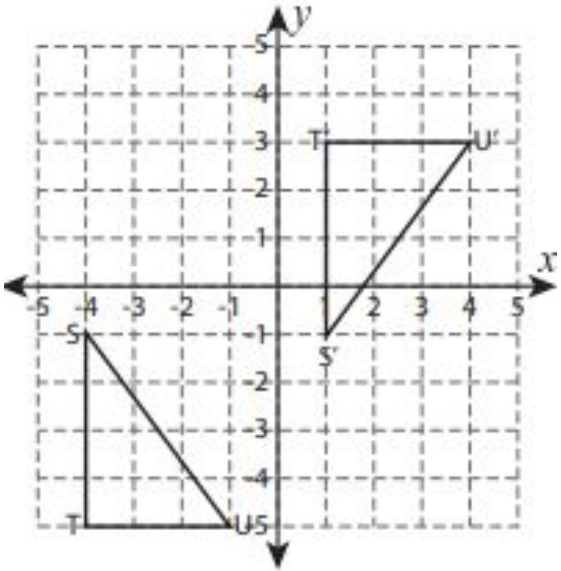


A' (2,-3)	A'' (-2,-3)
L' (1,-1)	L'' (-1,-1)
T' (4, 3)	T'' (-4, 3)



A' (0,0)	A'' (0,0)
L' (-3,0)	L'' (-6,0)
T' (-3,2)	T'' (-6,4)

How To: Identify the Transformation Rules



1) Are the image and pre-image congruent?

These figures are congruent, so a dilation has not occured.

2) Are the image and pre-image rotated (turned)?

These figures are oriented the same way, so a rotation has not occured.

3) Are the image and pre-image mirrored (flipped)?

These figures are mirrored (up and down) and have been flipped across the x-axis.

4) Are the image and pre-image translated (slide)?

These figures have been moved (down and right) and have been translated down 2, right 5.

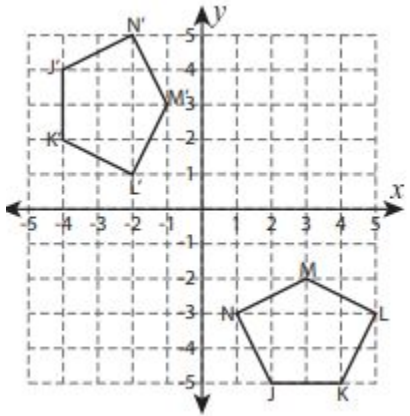
5) Double check your answer. Make sure the set of transformation rules work.

Answer: Reflection across the x-axis, Translation Down 2, Right 5.

Practice 3

[Link: Printable Graph Paper]

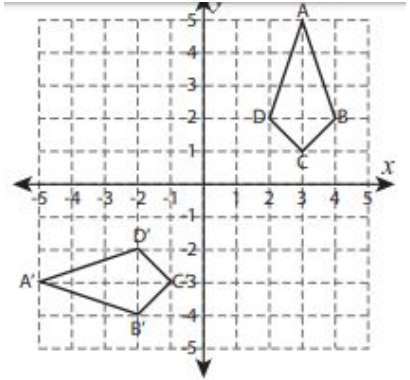
Identify the transformation rule for each problem.



a) reflected, then translated

b) rotated, then translated

c) rotated, then reflected



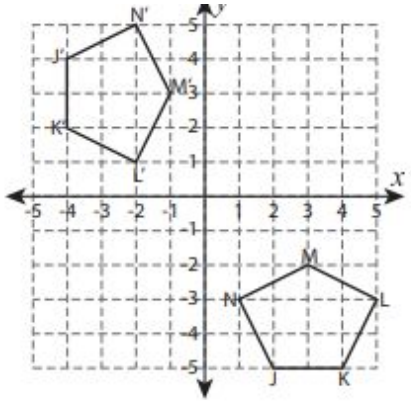
a) rotated, then translated

b) translated, then reflected

c) reflected, then rotated

Answers on next page

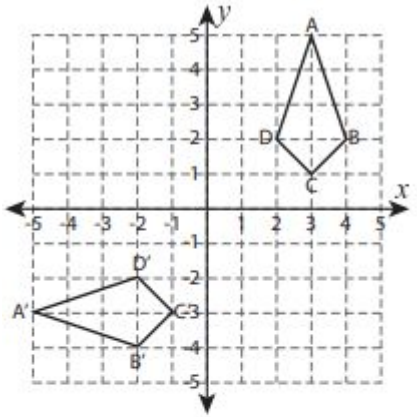
Practice 3: *Answer Key*



a) reflected, then translated

b) ~~rotated, then translated~~

c) rotated, then reflected



a) rotated, then translated

b) translated, then reflected

c) ~~reflected, then rotated~~

Additional Resources:

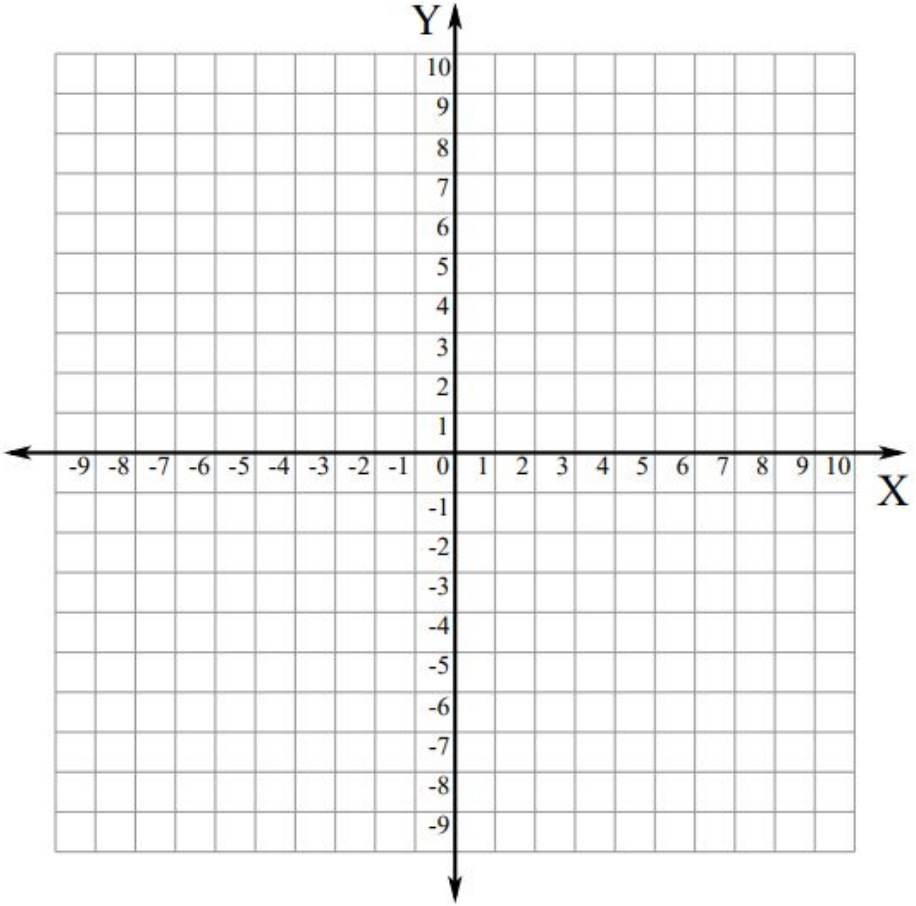
ShapeMods Game - Multiple Transformations

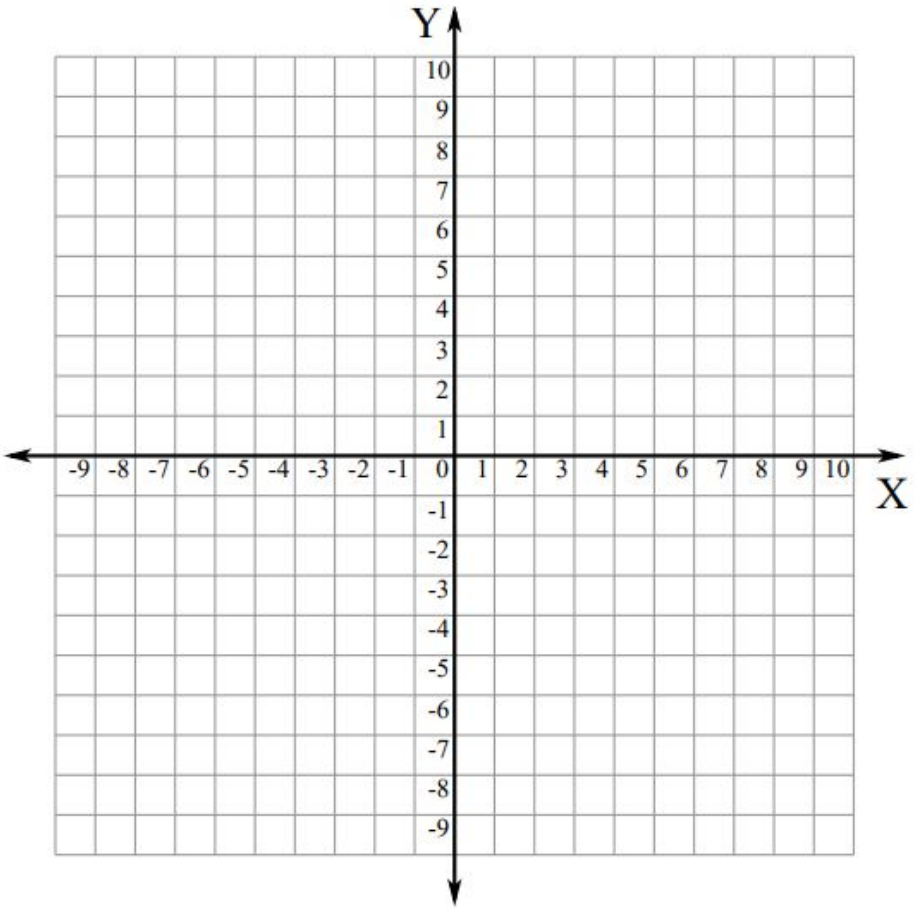
Khan Academy - Lessons and Practice on Translations

Printable Graph Paper

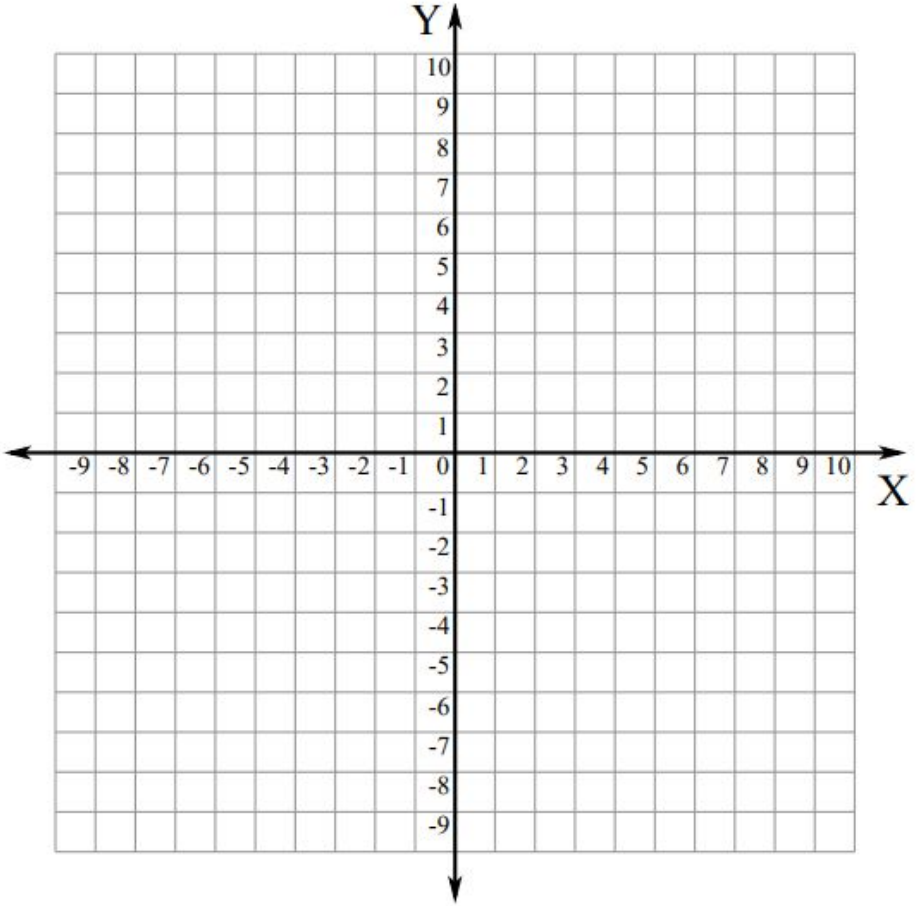
Virtual Graph Paper

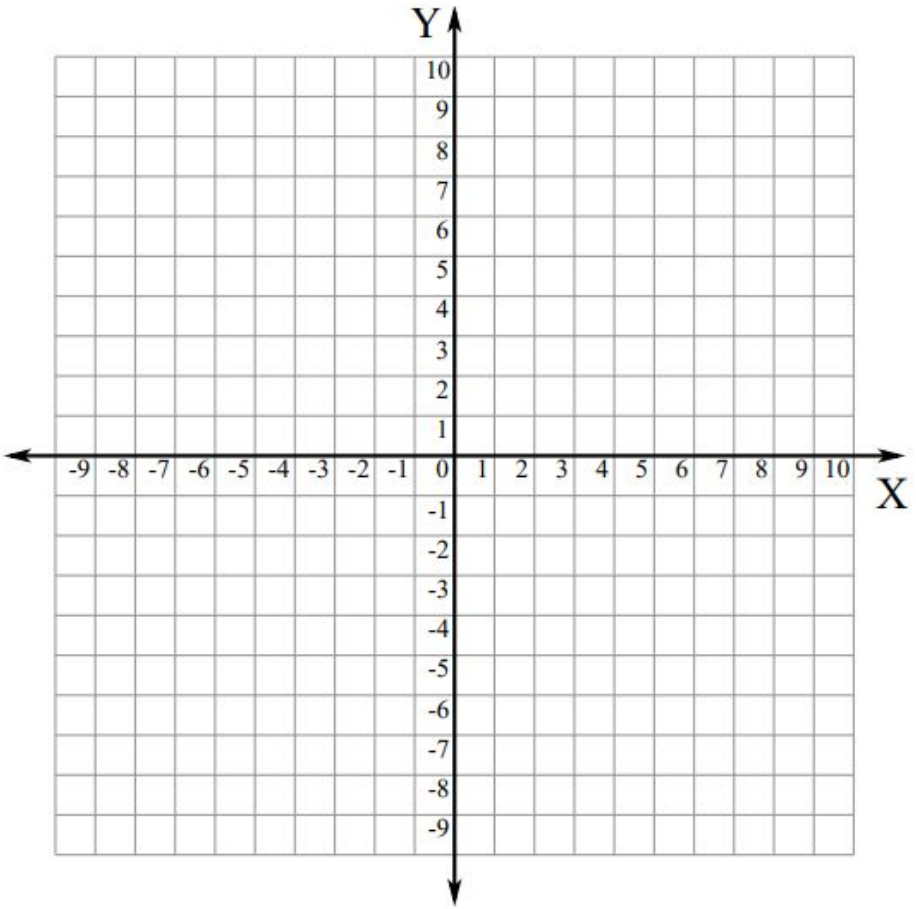
If you need extra graph paper:





If you need extra graph paper:





If you need extra graph paper: