Math Virtual Learning

Math 8

Translations of two dimensional figures
(Day 2-Translations on a coordinate plane)

April 15, 2020

Lesson: April 15th, 2020

Objective/Learning Target:
Students will describe the effect of translations of two-dimensional figures using coordinates.

Warm-Up

Suppose a chair at position *P* in a classroom is moved to another position *A* as shown.

From *P*, the chair is moved 2 units to the right and 3 units towards the front to position *A*.

This type of movement is called a translation. In this case, it is 2 units to the right and 3 units forward.

Translation is a commutative movement. This means that the new position is the same whether you translate 2 units to the right then 3 units forward, or 3 units forward then 2 units to the right.

Front of Classroom

A

3 units forward

P

2 units to the right
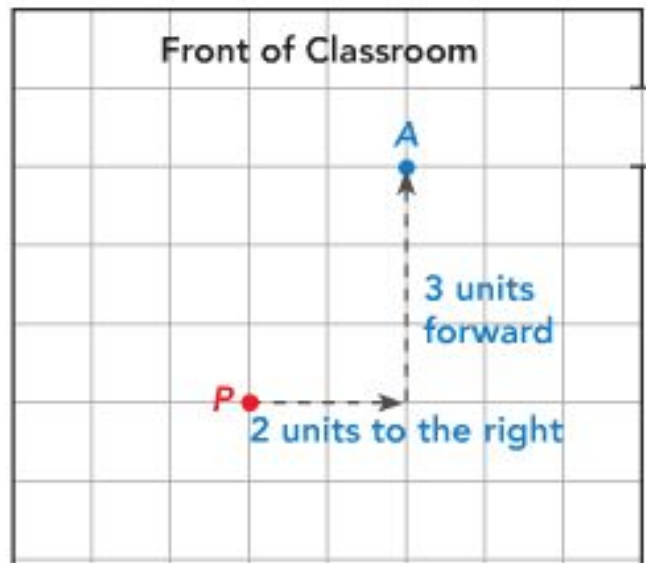
Math Note

A translation can be vertical, horizontal, or a combination of horizontal and vertical motions. You can represent the horizontal and vertical parts of a combination with dashed arrows.

Source: Math in Focus

Guided Practice: Translate a Point

Marcus walks from a point A (2, 1) in a campsite to point A', as described by a translation of 3 units to the left and 2 units down. Mark the position of A' on the coordinate plane.

Solution

3 units to the left

2 units down

The point A' is read as "A prime."

Source: Math in Focus
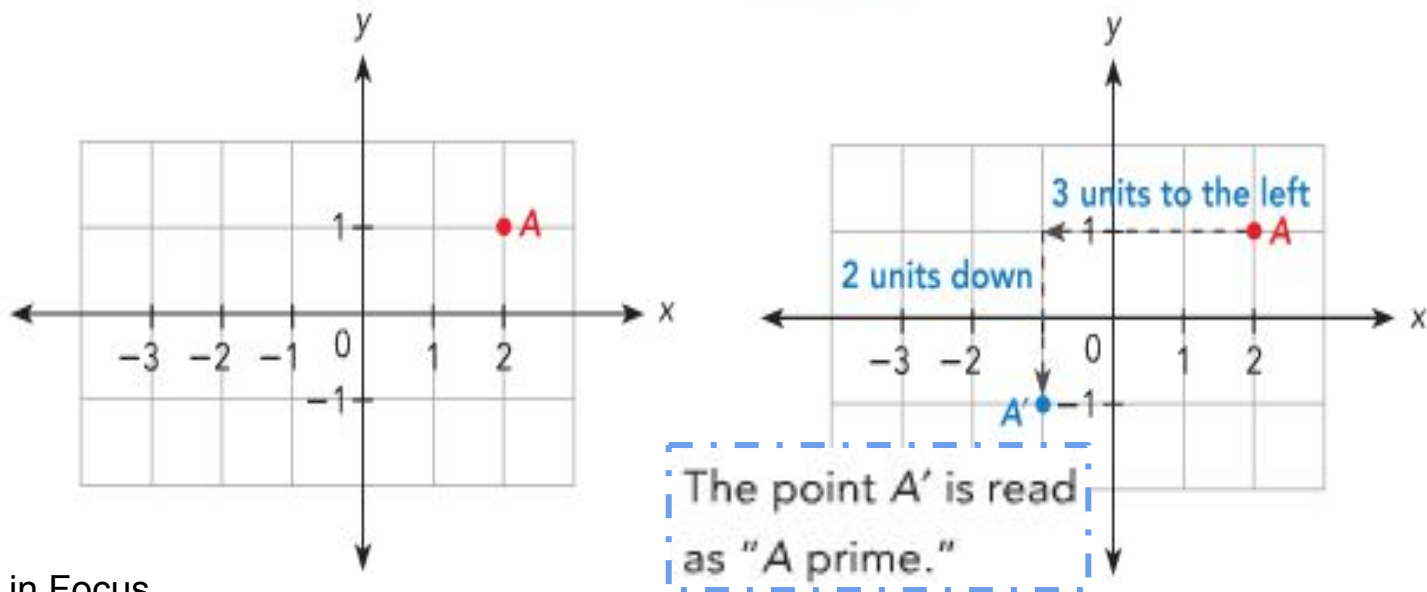
Guided Practice: Translate a Line Segment

Ronald set up his tent. The position of one side of the base of the tent is represented by $\overline{AB}$. Due to strong wind, he relocated his tent to $\overline{A'B'}$. This movement is described by the translation 3 units to the left and 2 units up. Draw and label $\overline{A'B'}$ on the coordinate plane.
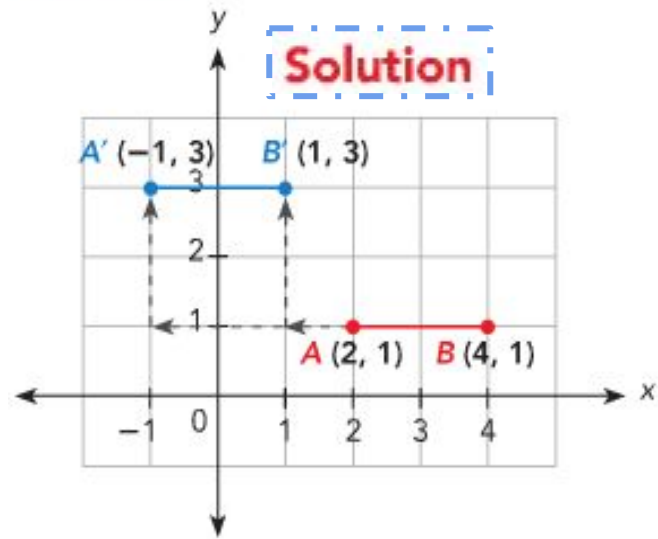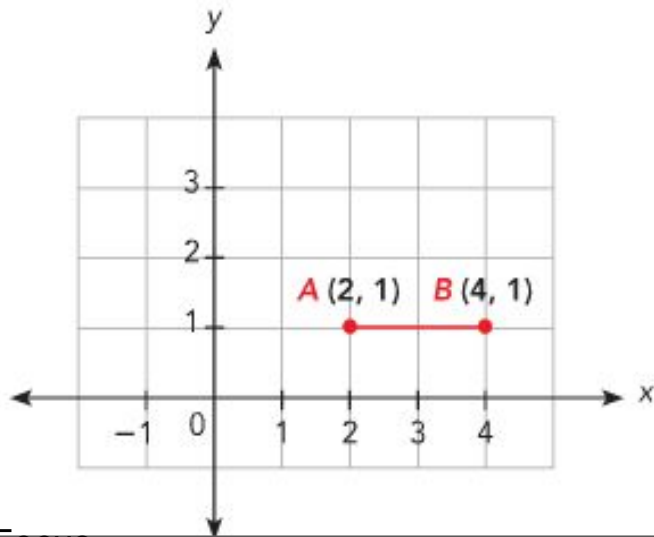
Solution

Every point between A and B is also translated 3 units to the left and 2 units up to a point between A' and B'. For example, the point $(3, 1)$ on $\overline{AB}$ moves to $(0, 3)$ on $\overline{A'B'}$.

Guided Practice: Translate a Figure

The diagram shows triangle *ABC* with vertices
A (−4, −4), *B* (−1, −4), and *C* (−3, −2). Triangle
A′B′C′ is the image of triangle *ABC* under the
translation of 4 units to the right and 7 units up.
Draw triangle *A′B′C′* on the same coordinate
plane.

A (−4, −4) is mapped onto *A′*(_0_, _3_).

B (−1, −4) is mapped onto *B′*(_3_, _3_).

C (−3, −2) is mapped onto *C′*(_1_, _5_).
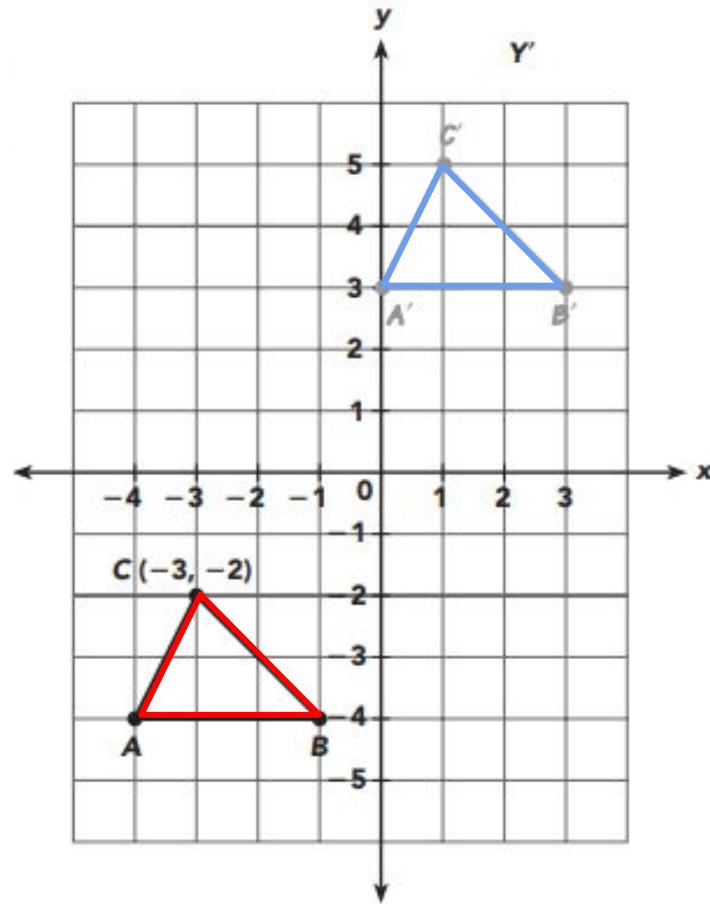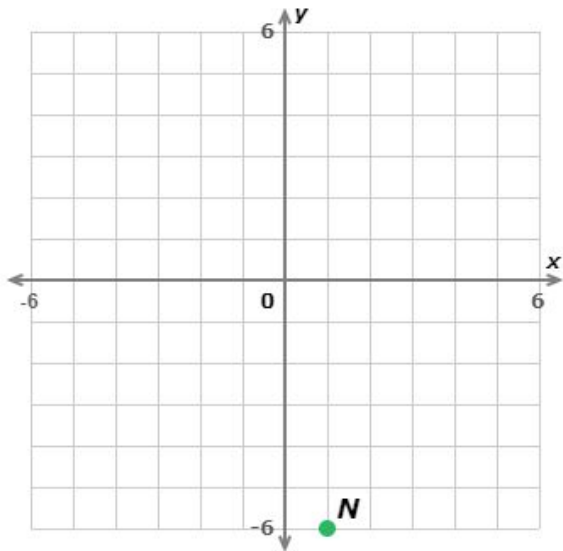
Guided Practice: Identifying Translation

For example, to translate A (1, 1) by **5** units to the right and **3** units up, the image A' (6, 4) is found by (1 + **5**, 1 + **3**). If A is translated by **5** units to the left and **3** units down, the image A" (−4, −2) is found by (1 + (−5), 1 + (−3)), or (1 − **5**, 1 − **3**).
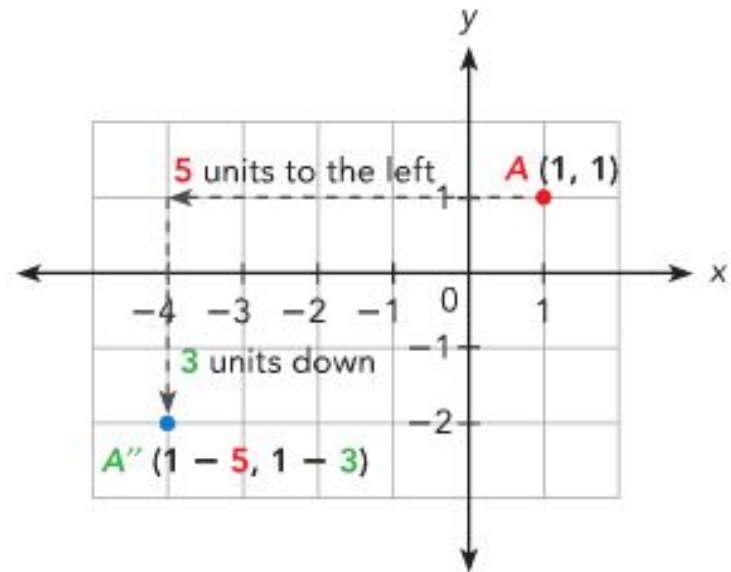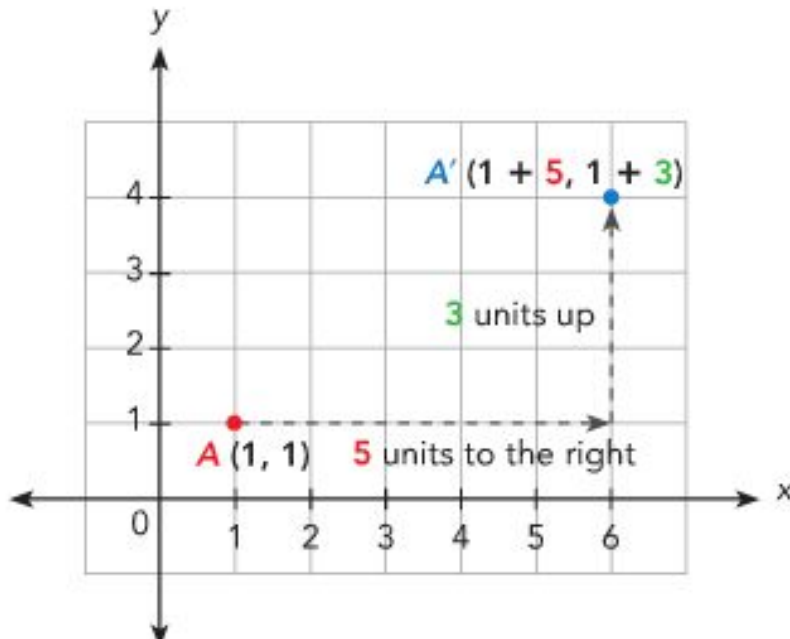
Practice:
Click the link below for additional practice on:
Graphing Translations

The point $N(1, -6)$ is translated 4 units right. What are the coordinates of the resulting point, N'?

1. Apply what you have learned about translations to complete the given practice problems.
2. Enter your answer in the given box as an ordered pair.
3. Press submit for feedback to see how you are doing.

5

$N' = (\boxed{}, \boxed{})$

Click here to check your answer

Submit

Independent Practice: Problem 1

Work through the following examples on a seperate piece of paper.

Draw the image under each translation

1. A band member marches from a point Q (5, 0) on a parade square to point Q', as described by a translation of 8 units to the left and 1 unit down. Write the coordinates of the position of Q' on the coordinate plane.
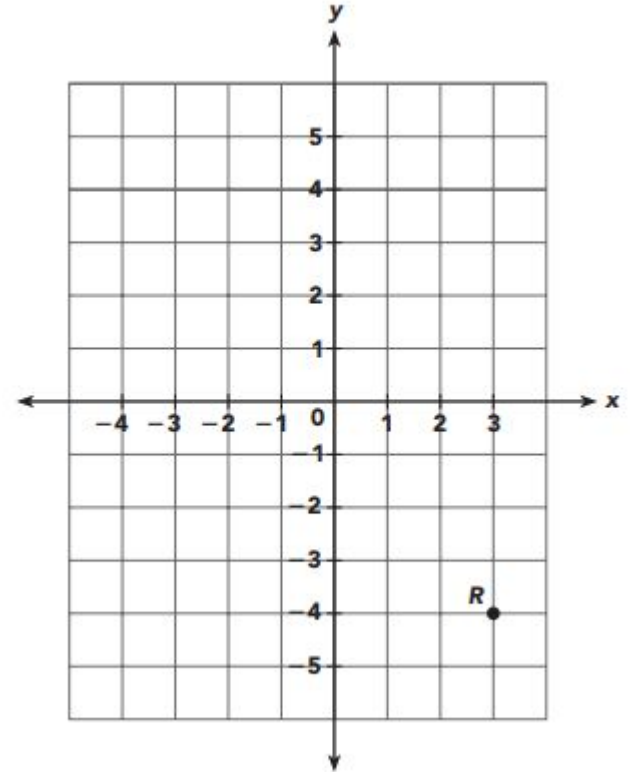
   Q (5, 0) is mapped onto Q' (,   )
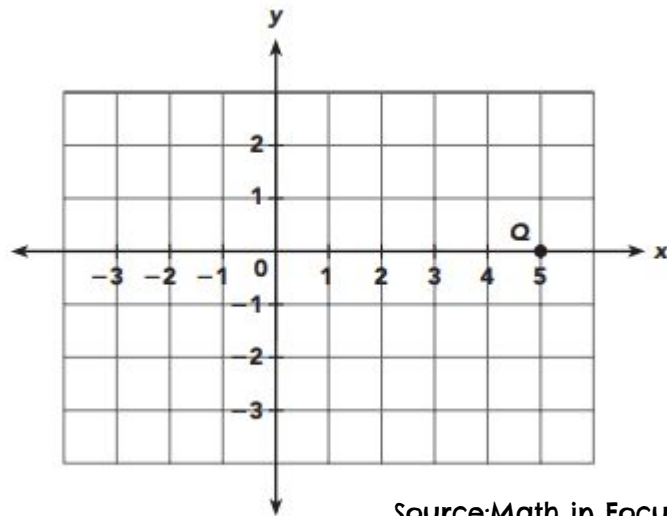
Independent Practice: Problem 2
Work through the following examples on a seperate piece of paper.

Draw the image under each translation

2. A point R (3, -4) is mapped to point R', as
described by a translation of **6** units to the
left and 8 units up. Write the coordinates
that represent the position of R'
on the coordinate plane.

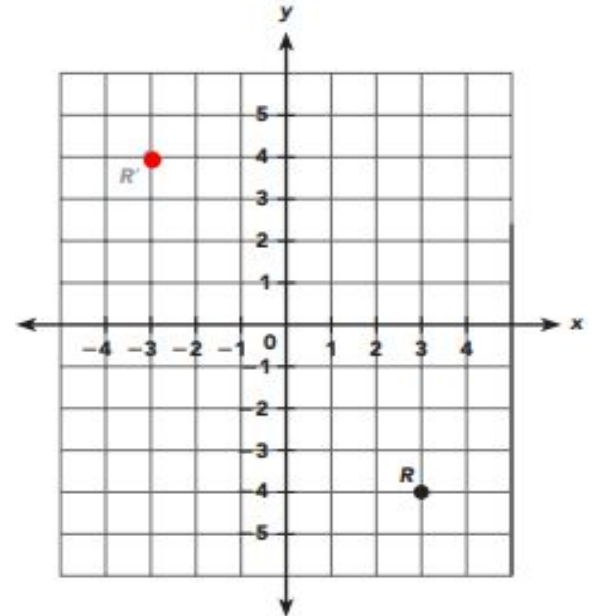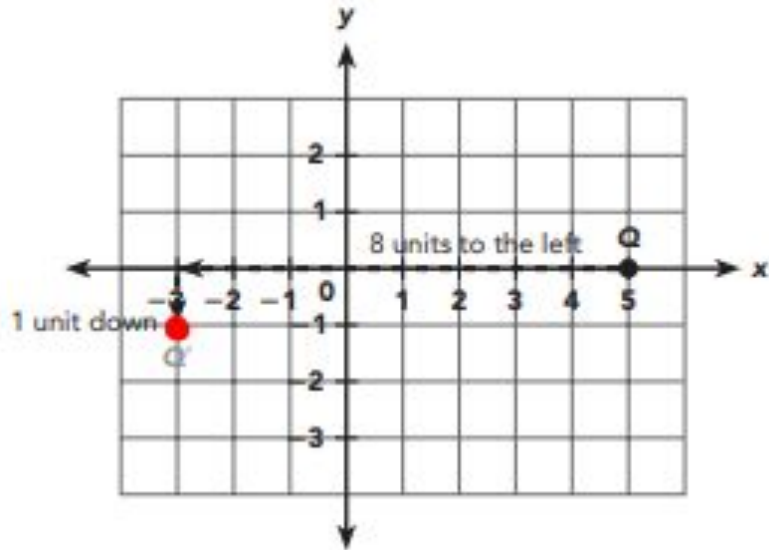R (3, -4) is mapped onto R' (,)

Independent Practice Problems 1 & 2 Answer Key:
Once you have completed the problems, check your answers here.

Draw the image under each translation

1. Q (5, 0) is mapped onto Q' (-3,-1)   2. R (3, -4) is mapped onto R' (-3, 4)
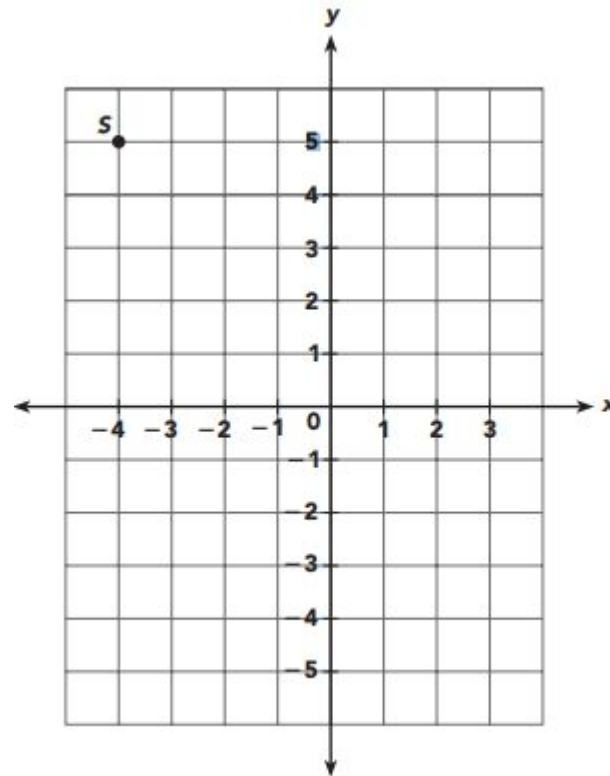
Work through the following examples on a seperate piece of paper.

Draw the image under each translation

3. A point S (-4, 5) is mapped to point S', as
   described by a translation
   of 5 units to the right
   and 4 units down.
   Write the coordinates of the
   position of S' on the coordinate plane.

   S (-4, 5) is mapped onto S' (,)
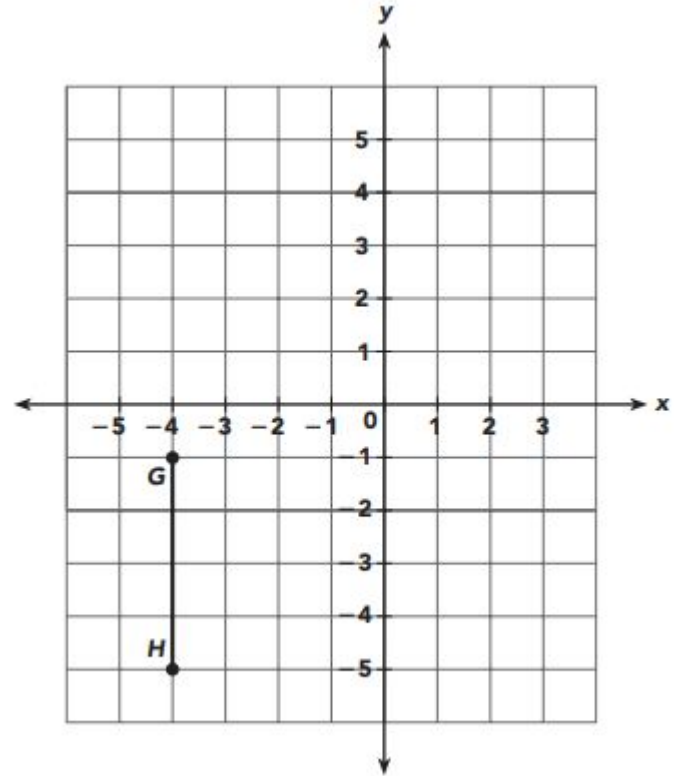
Independent Practice: Problem 4

Work through the following examples on a seperate piece of paper.

Draw the image under each translation

4. The <u>vertical</u> line segment $\overline{GH}$ is moved
to $\overline{G'H'}$ by a translation of
6 units to the right
and 6 units up.
Write the corresponding
coordinates of $\overline{G'H'}$
on the coordinate plane.

G (,) is mapped onto G' (,)
H (,) is mapped onto H' (,)
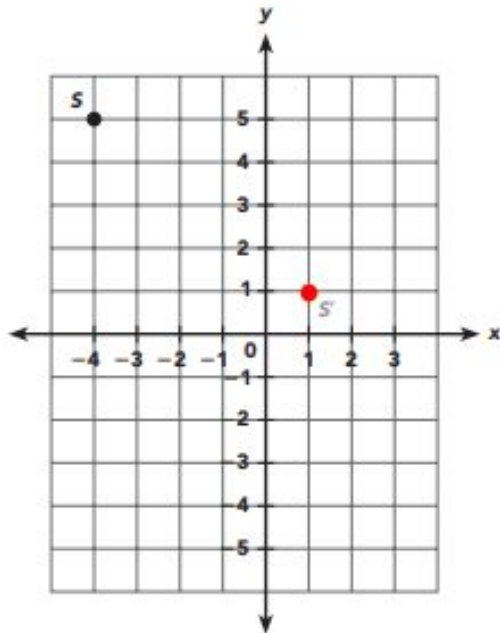
Independent Practice Problems 3 & 4 Answer Key:
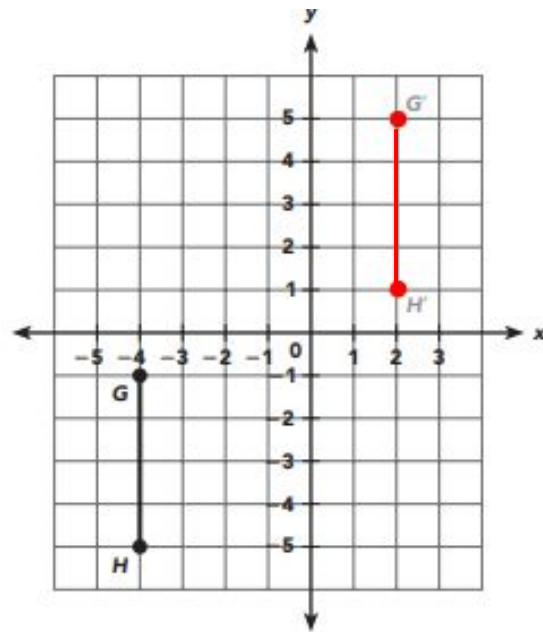Once you have completed the problems, check your answers here.

Draw the image under each translation

3. S (-4, 5) is mapped onto S' (1, 1)

4. G (-4, -1) is mapped onto G' (2, 5)
H (-4, -5) is mapped onto H' (2, 1)

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Independent Practice: Problem 5
Work through the following examples on a seperate piece of paper.

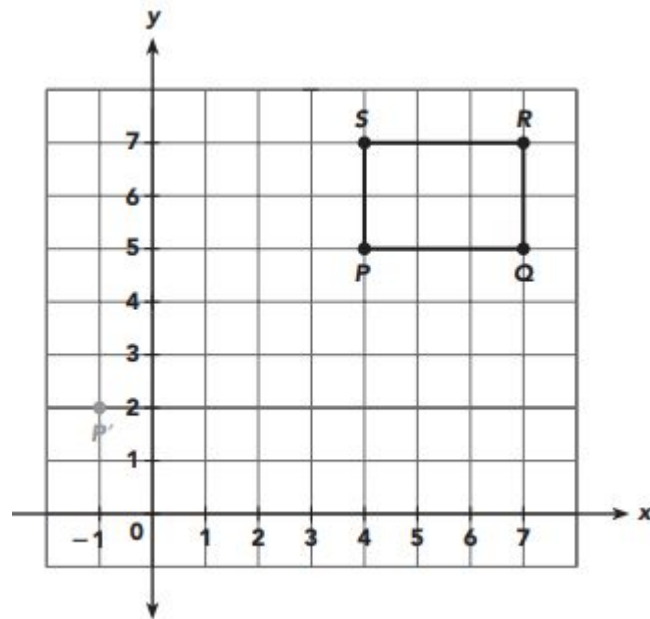## Draw the image under each translation

5. The diagram shows rectangle PQRS
   with vertices P (4, 5), Q (7, 5), R (7, 7),
   and S (4, 7). Rectangle P'Q'R'S' is the image
   of rectangle PQRS under the translation of
   5 units to the left and 3 units down.
   Draw rectangle P'Q'R'S' on the same
   coordinate plane.

   P (4, 5) is mapped onto P' (,).
   Q (7, 5) is mapped onto Q' (,).
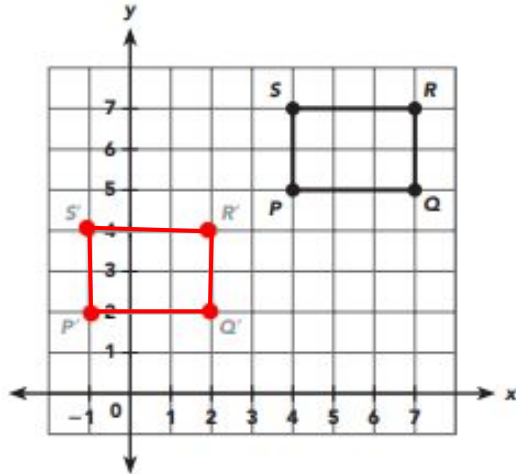   R (7, 7) is mapped onto R' (,).
   S (4, 7) is mapped onto S' (,).

Independent Practice Problem 5 Answer Key:
Once you have completed the problems, check your answers here.

Draw the image under each translation

5. P (4, 5) is mapped onto P' (-1, 2).
    Q (7, 5) is mapped onto Q' (2, 2).
    R (7, 7) is mapped onto R' (2, 4).
    S (4, 7) is mapped onto S' (-1, 4).

Independent Practice Problem 6:

Work through the following examples on a seperate piece of paper.

Draw the image under each translation

6. Hexagon UVWXY is translated
   3 units to the left and 4 units up.
   The vertices of the hexagon are
   U (0, -4), V (3, -4), W (4, -2), X (2, 0),
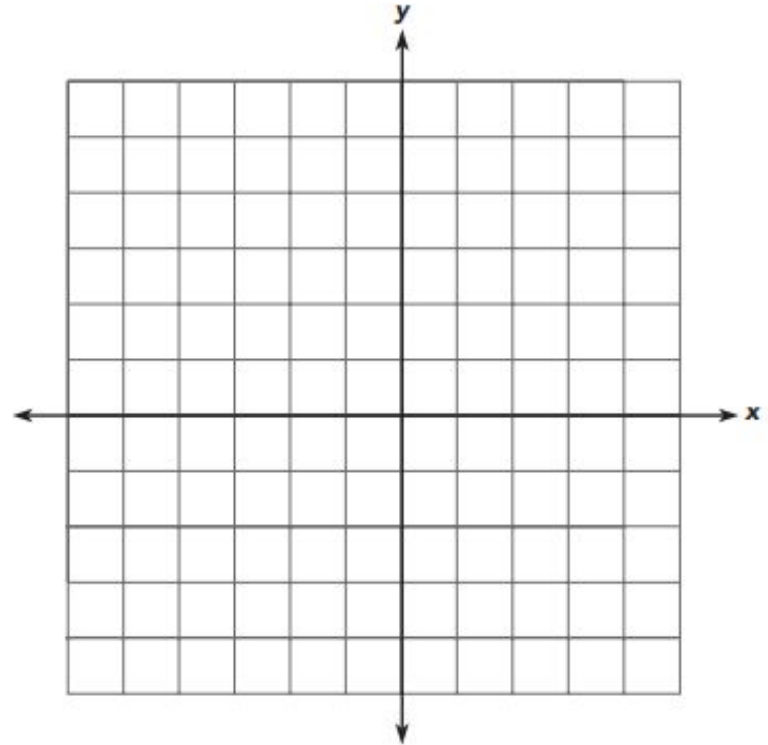   and Y (-1, -2). Draw UVWXY and U'V'W'X'Y'
   on the same coordinate plane.

   U (0, -4) is mapped onto U' (,).
   V (3, -4) is mapped onto V' (,).
   W (4, -2) is mapped onto W' (,).
   X (2, 0) is mapped onto X' (,).
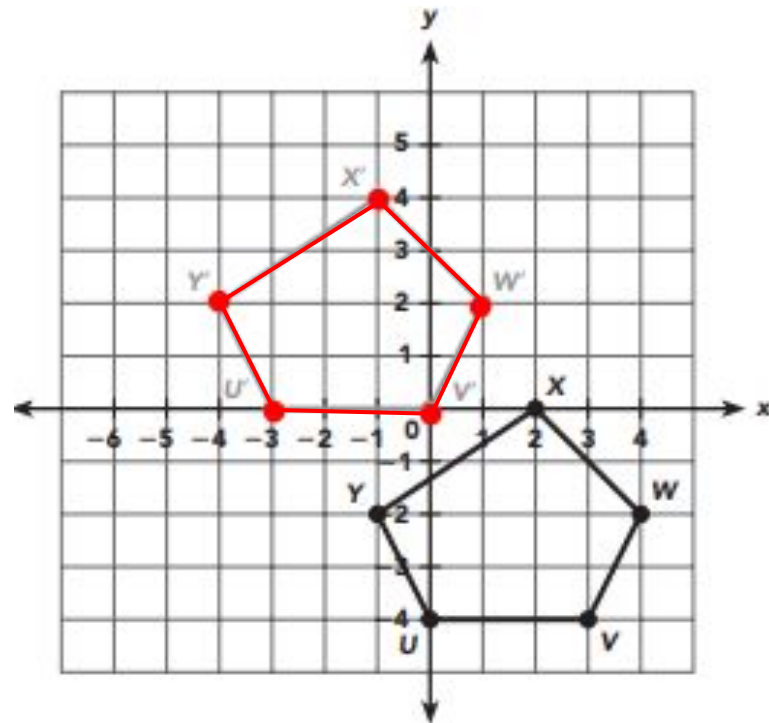   Y (-1, -2) is mapped onto Y' (,).

Independent Practice Problem 6 Answer Key:
Once you have completed the problems, check your answers here.

<u>Draw the image under each translation</u>

6. U (0, -4) is mapped onto U' (-3, 0).
    V (3, -4) is mapped onto V' (0, 0).
    W (4, -2) is mapped onto W' (1, 2).
    X (2, 0) is mapped onto X' (-1, 4).
    Y (-1, -2) is mapped onto Y' (4, 2).

Independent Practice Problem 7:

Work through the following examples on a seperate piece of paper.

<u>Draw the image under each translation</u>

7. A triangle has coordinates
   E (-1, 2), F (3, 6), and G (2, 9).
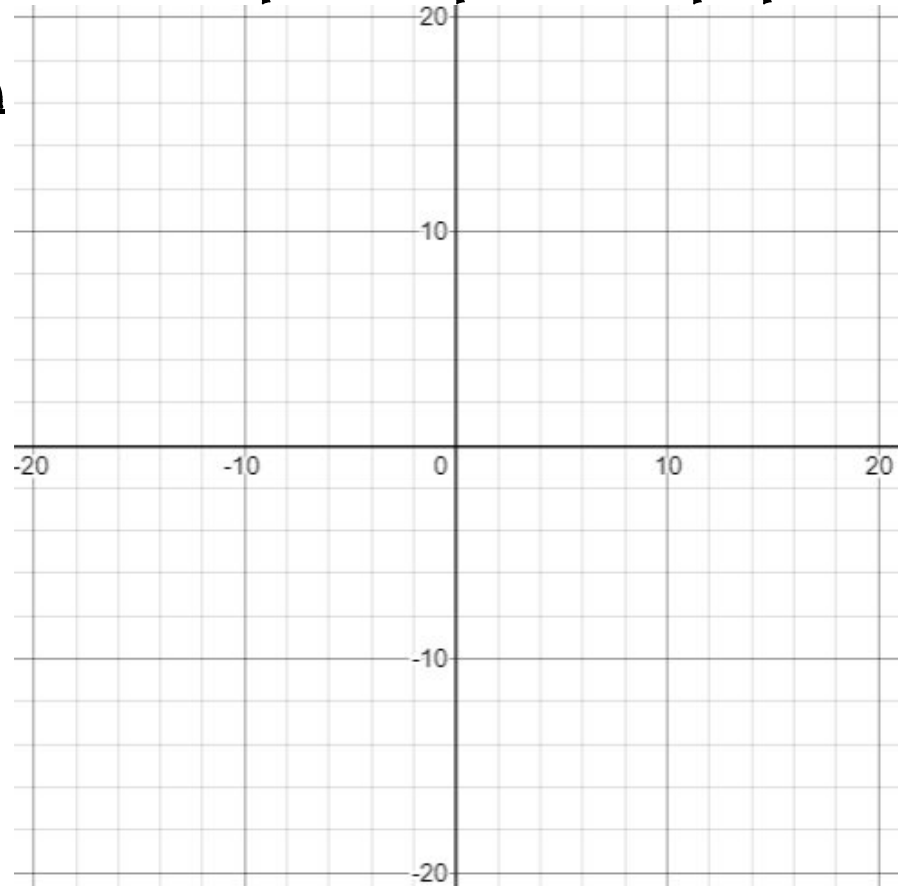   It is moved under the translation
   4 units to the right and 5 units up.
   Find the coordinates of the image
   triangle E'F'G'. Then state the new
   coordinates for any point (x, y)
   under this translation.

   E (-1, 2) is mapped onto E' (,)
   F (3,6) is mapped onto F' (,)
   G (2, 9) is mapped onto G' (,)
   (x, y) would be mapped onto (,)

Independent Practice Problem 7 Answer Key:
Once you have completed the problems, check your answers here.

Draw the image under each translation

7. E (-1, 2) is mapped onto E' (3, 7)
    F (3,6) is mapped onto F' (7, 11)
    G (2, 9) is mapped onto G' (6, 14)
    (x, y) would be mapped onto (x+4, y+5)

Independent Practice Problem 8:

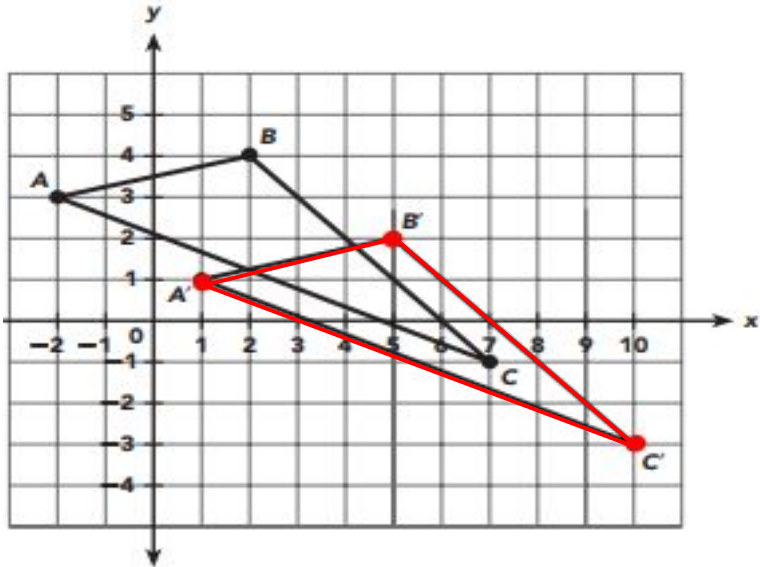Work through the following examples on a seperate piece of paper.

Draw the image under each translation

8. An object on the floor of a warehouse has a triangular base. Peter moved the object from its position at ABC under a translation that moves each point (x, y) to (x+3, y-2). Given A(-2, 3), B(2, 4), and C(7, -1), find the coordinates of A', B', and C'. Draw ABC and A'B'C' on the coordinate plane.

A (-2, 3) is mapped onto A' (,)
B (2, 4) is mapped onto B' (,)
C (7, -1) is mapped onto C' (,)
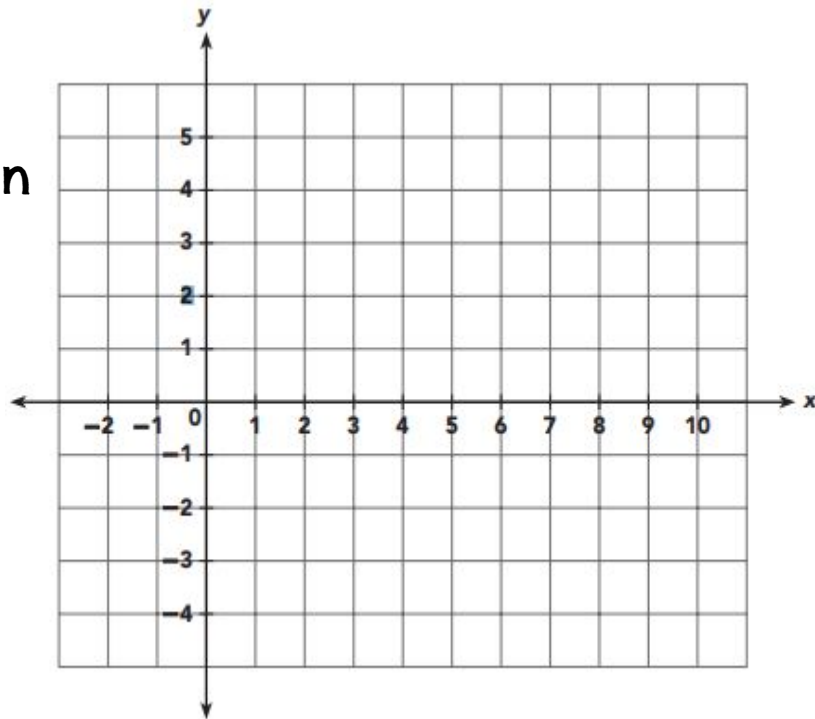
Draw the image under each translation

8. A (-2, 3) is mapped onto A' (1, 1)
    B (2, 4) is mapped onto B' (5, 2)
    C (7, -1) is mapped onto C' (10, -3)

Independent Practice Problem 9:
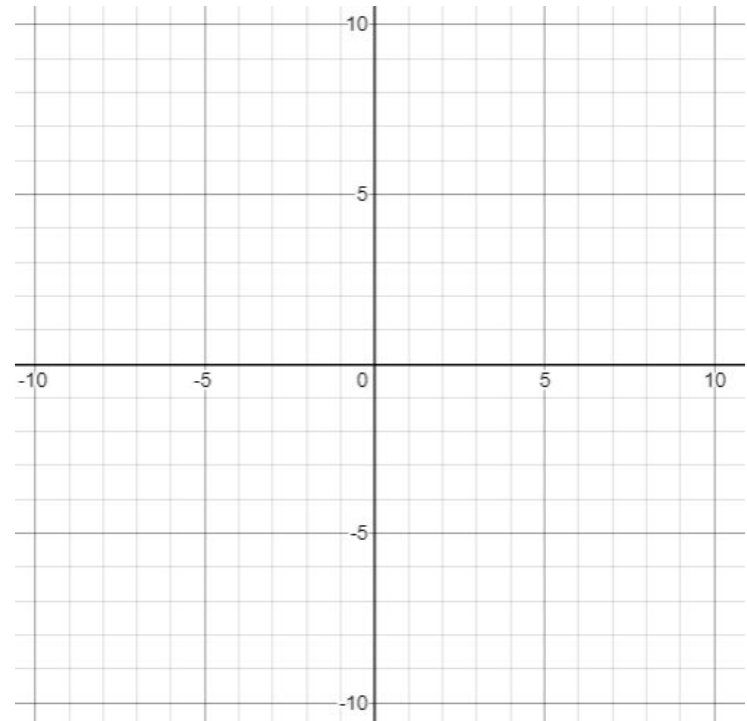Work through the following examples on a seperate piece of paper.

Find the coordinates of the vertices of each figure after the given transformation.

9. The figure Z(-4, -3) V(-2, -4) I(-2, -2) is moved by a translation right 3 units and up 4 units to the points Z'V'I'. Use the coordinate grid to map ZVI to Z'V'I' and write the corresponding coordinates for Z'V'I'.

   Z(-4, -3) is mapped onto Z' (,   )
   V(-2, -4) is mapped onto V' (,)
   I(-2, -2) is mapped onto I' (,   )

Independent Practice Problem 10:
Work through the following examples on a seperate piece of paper.

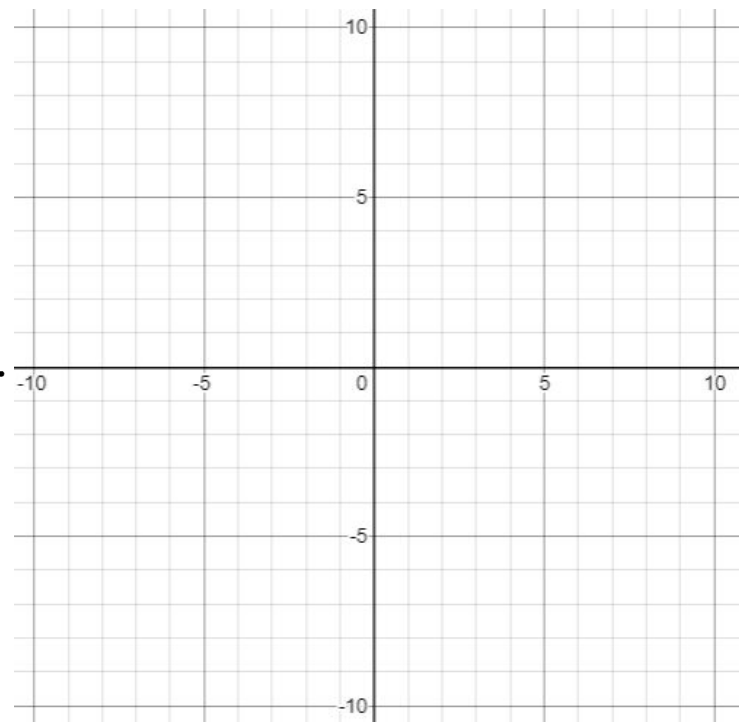**Find the coordinates of the vertices of each figure after the given transformation.**

10. The figure D(-4, 1) A(-2, 5) S(-1, 4) N(-1, 2)
    is moved by a translation two units down
    to the image D'A'S'N'. Use the coordinate
    grid to map DASN to D'A'S'N' and write
    the corresponding coordinates for D'A'S'N'.

    D(-4, 1) is mapped onto D' (,)
    A(-2, 5) is mapped onto A' (,)
    S(-1, 4) is mapped onto S' (,)
    N(-1, 2) is mapped onto N' (,)

Independent Practice Problems 9 & 10 Answer Key:
Once you have completed the problems, check your answers here.

## Find the coordinates of the vertices of each figure after the given transformation.

9. Z(-4, -3) is mapped onto Z' (-1, 1)
   V(-2, -4) is mapped onto V' (1, 2)
   I(-2, -2) is mapped onto I' (1, 0)

10. D(-4, 1) is mapped onto D' (-4, -1)
   A(-2, 5) is mapped onto A' (-2, 3)
   S(-1, 4) is mapped onto S' (-1, 2)
   N(-1, 2) is mapped onto N' (-1, 0)
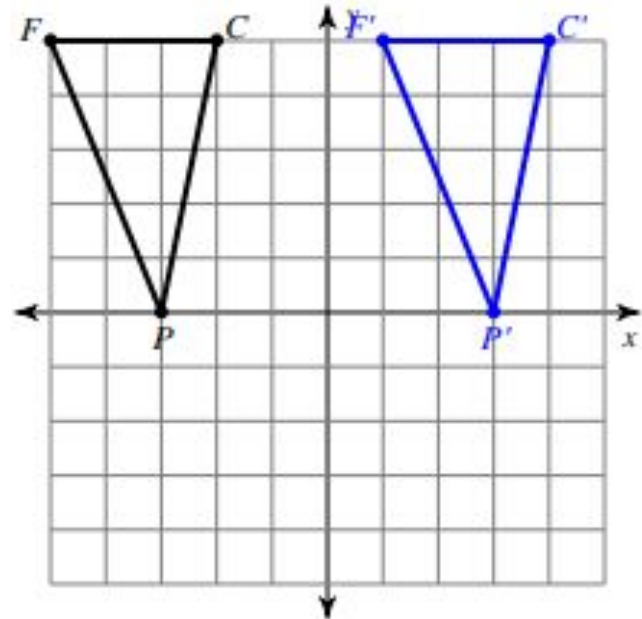
Independent Practice Problems 11 & 12:
Work through the following examples on a seperate piece of paper.

Write a rule to describe each transformation.

11. QUIM is mapped onto Q'U'I'M'
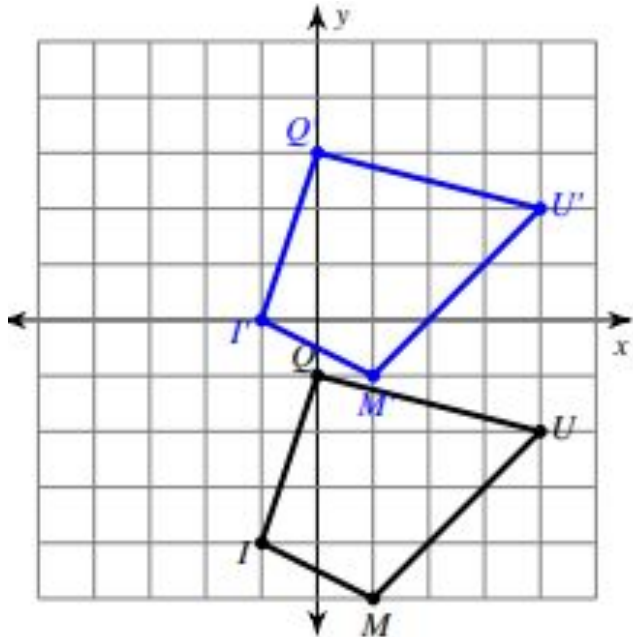
12. FCP is mapped onto F'C'P'

Independent Practice Problems 11 & 12 Answer Key:
Once you have completed the problems, check your answers here.

Write a rule to describe each transformation.

11. (x,y) is mapped onto (x, y+4)

The image undergoes the translation of moving up four.

12. (x,y) is mapped onto (x+6, y)

The image undergoes the translation of moving right six.

Additional Practice:
Choose from the links below for additional practice and to check your understanding!

[Kuta Practice Worksheet with Answer Key](#)

[Math Games: Graph the Translation](#)

[Math Playground: Shape Mod (Challenge Activity)](#)

[Printable Graph Paper](#)