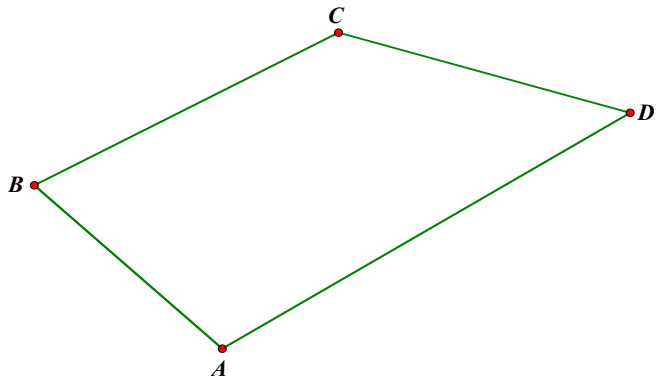
Coordinate Algebra
G.CO.2&5: Translations

Name: _____
Date: _____

Use the figure to answer the following questions.




a) Name the line segments that make up the figure.

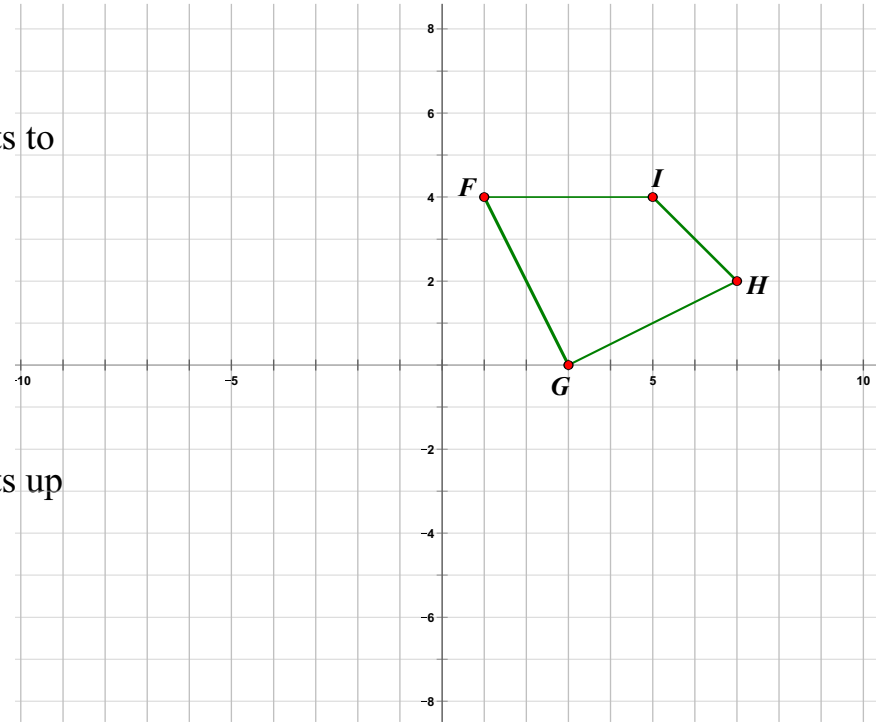
b) What are different names we can give this figure?

Vocabulary:
**Translation -** A transformation that _____ each point of a figure the same _____ in the same _____

Ex 1).

a. Translate quadrilateral FGHI 5 units to the left to form $F'G'H'I'$.

b. Translate quadrilateral FGHI 3 units up to form $F''G''H''I''$.




| | | |
|---|---|---|
| F | $F'$ | $F''$ |
| G | $G'$ | $G''$ |
| H | $H'$ | $H''$ |
| I | $I'$ | $I''$ |

Discussion:

1. When we translate a figure horizontally, what changes and what remains the same?

2. When we translate a figure vertically, what changes and what remains the same?

Ex 2).

The vertices of 4 quadrilaterals are given below…

| | | | |
|---|---|---|---|
| A (4,3) | $A'$ (7,3) | $A''$ (4,-7) | $A'''$ (3,5) |
| B (7,4) | $B'$ (10,4) | $B''$ (7,-6) | $B'''$ (6,6) |
| C (5,6) | $C'$ (8,6) | $C''$ (5,-4) | $C'''$ (4,8) |
| D (3,5) | $D$ (6,5) | $D''$ (3,-5) | $D'''$ (2,7) |

1. Describe the translation done to ABCD to produce $A'B'C'D'$.

2. Describe the translation done to ABCD to produce $A''B''C''D''$.

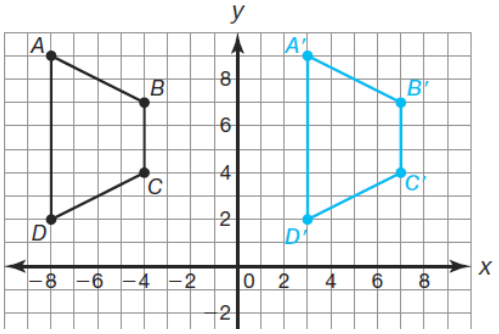
3. Describe the translation done to ABCD to produce $A'''B'''C'''D'''$.

We can define a translation as a function that takes all the points of figure (inputs) and adds or subtracts a _____, k, to the x and/or y coordinates to produce new coordinates (outputs).

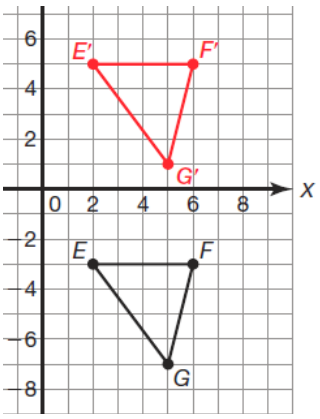
Inputs (x, y) → Outputs (x ± c, y ± k)

| **Translation** | **x** | **y** |
|---|---|---|
| **Up k units** | | |
| **Down k units** | | |
| **Left k units** | | |
| **Right k units** | | |

Ex 1). Write a function to represent the translation of quadrilateral ABCD to $A'B'C'D'$.



Ex 2). Write a function to represent the translation of triangle EFG to $E'F'G'$ .




Ex 3). The vertices of quadrilateral *DEFG* are *D* (-9, 7), *E* (-12, 2), *F* (-3, 2), and *G* (0, 7). Determine the vertex coordinates of $D'E'F'G'$ if parallelogram *DEFG* is translated 14 units down.

Ex 4). Determine the vertex coordinates of quadrilateral $D''E''F''G''$ if parallelogram *DEFG* is translated 8 units to the right.

Coordinate Algebra _____

Assignment: Translations _____

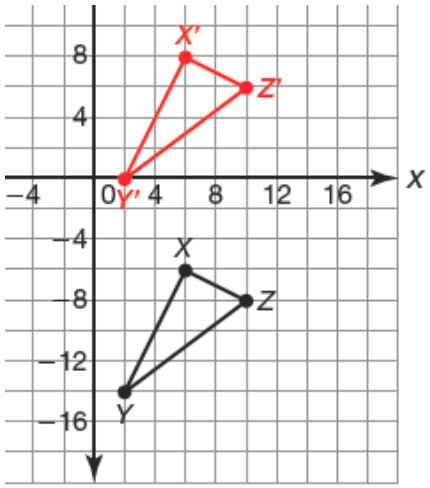
***The coordinates of the vertices for quadrilateral ABCD is given in the table below. Use the coordinates to answer #1-2.***

| **Quadrilateral ABCD** | **Quadrilateral** $A'B'C'D'$ | **Quadrilateral** $A''B''C''D''$ |
|---|---|---|
| A (3,9) | $A'$ | $A''$ |
| B (3,4) | $B'$ | $B''$ |
| C (11,4) | $C'$ | $C''$ |
| D (11,10) | $D'$ | $D''$ |

1. Quadrilateral *ABCD* is translated 15 units to the left to form quadrilateral $A'B'C'D'$. Give the coordinates of the vertices of $A'B'C'D'$ in the table above.

2. Quadrilateral *ABCD* is translated 7 units to the right and 6 units up to form quadrilateral $A''B''C''D''$. Give the coordinates of the vertices of $A''B''C''D''$ in the table above.

3. Write a function to represent the translation from triangle XYZ to triangle $X'Y'Z'$.




4. The vertices of quadrilateral *WXYZ* are *W* (-10, 8), *X* (-2, -1), *Y* (0, 0), and *Z* (3, 7). The vertices of quadrilateral $W'X'Y'Z'$ are $W'$ (-5, 0), $X'$ (3, -9), $Y'$ (5, -8), and $Z'$ (8, -1). Describe the translation done to quadrilateral WXYZ to produce $W'X'Y'Z'$.

5. The vertices of triangle *RST* are *R* (0, 3), *S* (2, 7), and *T* (3, -1). The vertices of triangle $R'S'T'$ are $R'$ (-5, 6), $S'$ (-3, 10), and $T'$ (-2, 2). Describe the translation done to triangle RST to produce $R'S'T'$.