

Unit 1

Lesson 1

Translations

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Lesson 1 – Introduction to Transformations and Translations

Introduction to Transformations and Translations

➤ **Congruent figures:** Same size and shape

✓ When two figures are congruent, you can move one figure on top of the other figure with

No overlap, fit over the other perfectly

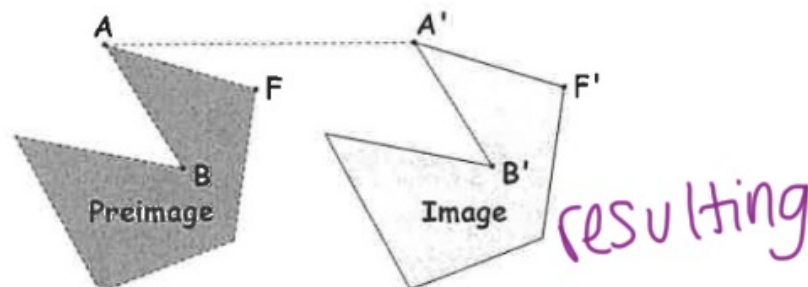
➤ **Transformation** of a geometric figure: change in its Size, orientation or location

➤ **Preimage** – Starting figure

✓ Notation: AFB

➤ **Image** – new or resulting figure

✓ Notation: $A'F'B'$

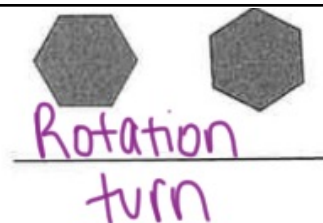
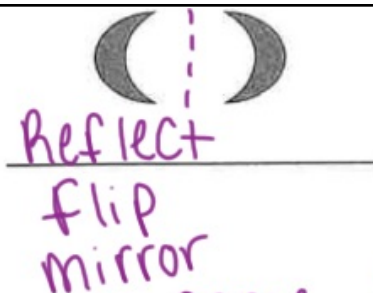


➤ **Isometry** – transformation in which preimage and image are the same size and Shape (also called: Rigid Motion)

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Examples:



➤ **Translation** – an isometry that maps all points the same distance and the same direction.

❖ **Two ways to describe a translation** (using example shown right):
 ✓ Always **be specific** when completing **any** type of description!!

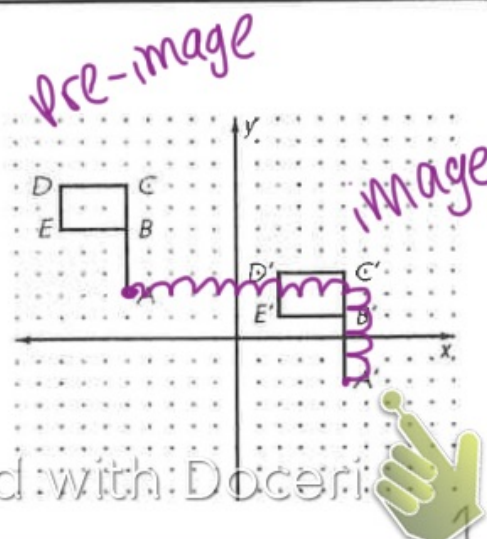
1) **Words:** Translation to the right 10 units and down 4 units.

2) **Algebraic rule** (motion rule): $T: (x, y) \rightarrow (x + 10, y - 4)$

✓ **Right and Up** are always (+)

✓ **Left and Down** are always (-)

R 10 D 4



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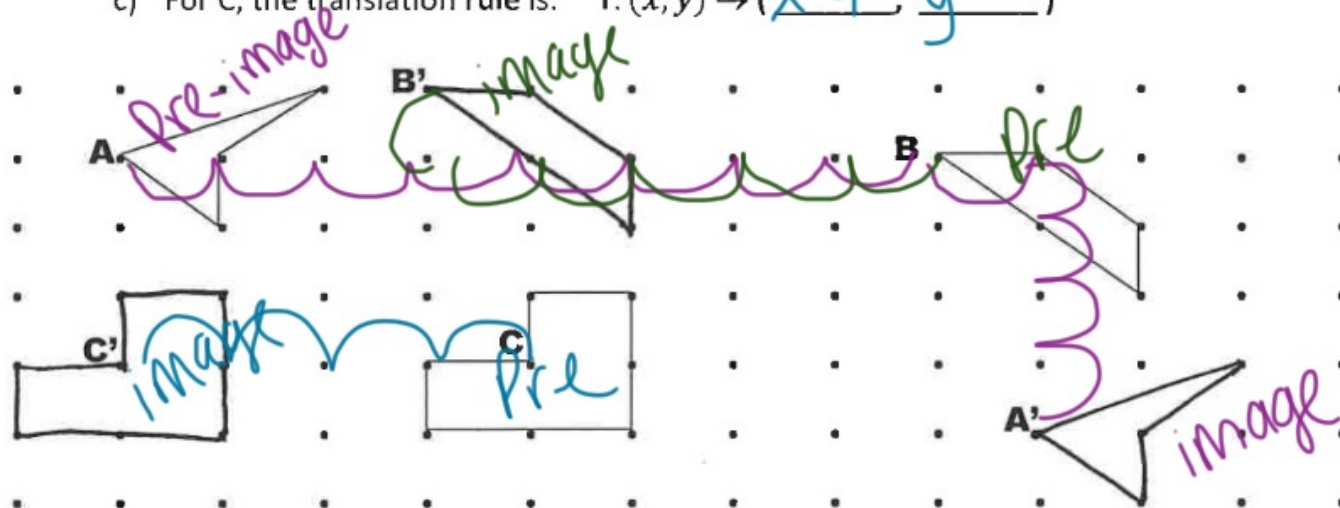


- 1) Use the dots to help you draw the image of the first figure so that A maps to A'.
- 2) Use the dots to help you draw the image of the second figure so that B maps to B'.
- 3) Use the dots to help you draw the image of the third figure so that C maps to C'.
- 4) Complete each of the following translation rules using your mappings from 1 – 3 above.

a) For A, the translation rule is: $T: (x, y) \rightarrow (x+9, y-4)$

b) For B, the translation rule is: $T: (x, y) \rightarrow (x-5, y+1)$

c) For C, the translation rule is: $T: (x, y) \rightarrow (x-4, y)$



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❖ **Example:** $\triangle GEO$ has coordinates $G(-2, 5)$, $E(-4, 1)$, $O(0, -2)$. A translation maps G to $G'(3, 1)$.

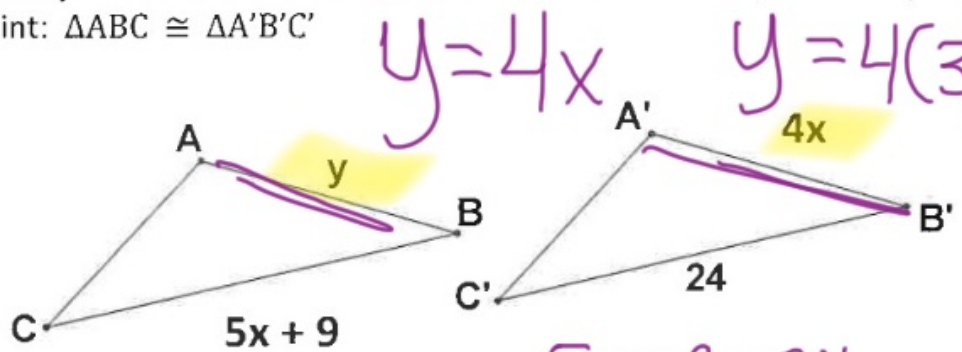
1. The translation rule is $T: (x, y) \rightarrow (x+5, y-4)$

2. Describe the transformation in words: translate right 5 down 4 $(-2, 5)$

3. Find the coordinates of: a) $E' (1, -3)$ b) $O' (5, -6)$

$(-2, 5)$
 $\downarrow (x+5, y-4)$
 $(3, 1)$

❖ **Example:** Given the translation from $\triangle ABC$ to $\triangle A'B'C'$, find the specified values for x and y .
 Hint: $\triangle ABC \cong \triangle A'B'C'$



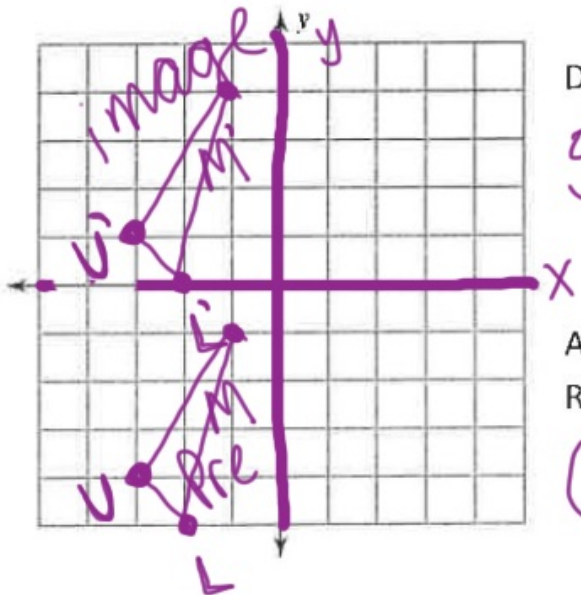
$y = 4x$ $y = 4(3) = 12$

$x =$	<u>3</u>
$y =$	<u>12</u>

$5x + 9 = 24$
 $-9 \quad -9$

$5x = 15$ $x = 3$

5) translation: 5 units up
 $U(-3, -4), M(-1, -1), L(-2, -5)$



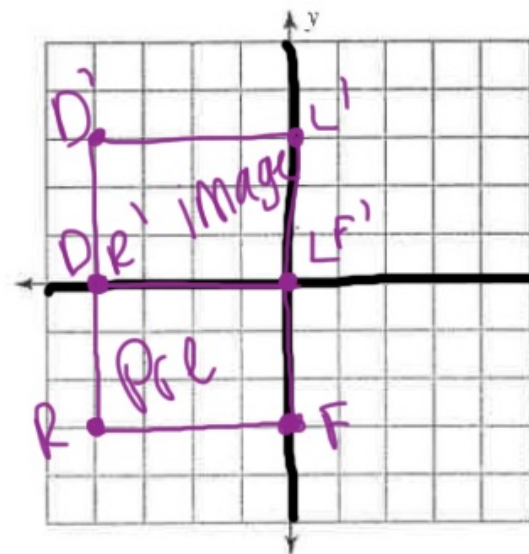
Description:

5 units up

Algebraic Rule:

$(x, y+5)$

6) $T(x, y) \rightarrow (x, y + 3)$
 $R(-4, -3), D(-4, 0), L(0, 0), F(0, -3)$



Description:

up 3

3

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9) Translation: $T(x, y) \rightarrow (x - 4, y + 4)$

$J(-1, -2), A(-1, 0), N(3, -3)$
 $-4 +4 \quad -4 +4 \quad -4 +4$

Vertices: $J'(-5, 2) A'(-5, 4) N'(-1, 1)$

Words: Left 4, up 4

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