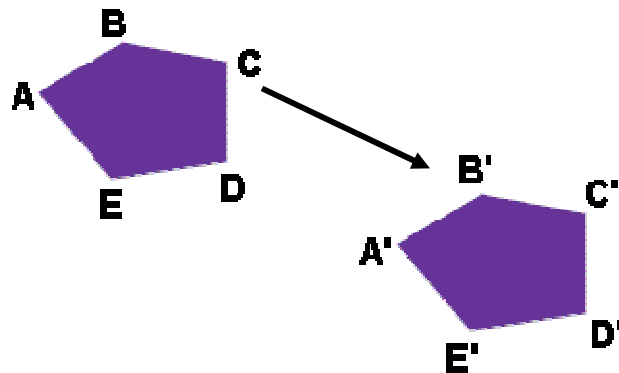


## Translations (Slides)

Translation = Slide

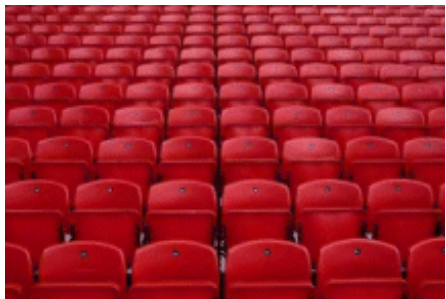


A translation moves an object without changing its size or shape and without turning it or flipping it.

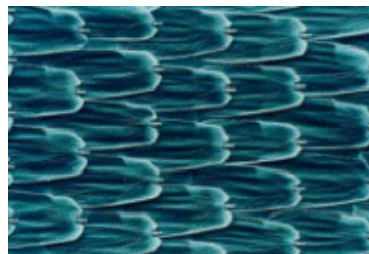


## Translation Examples

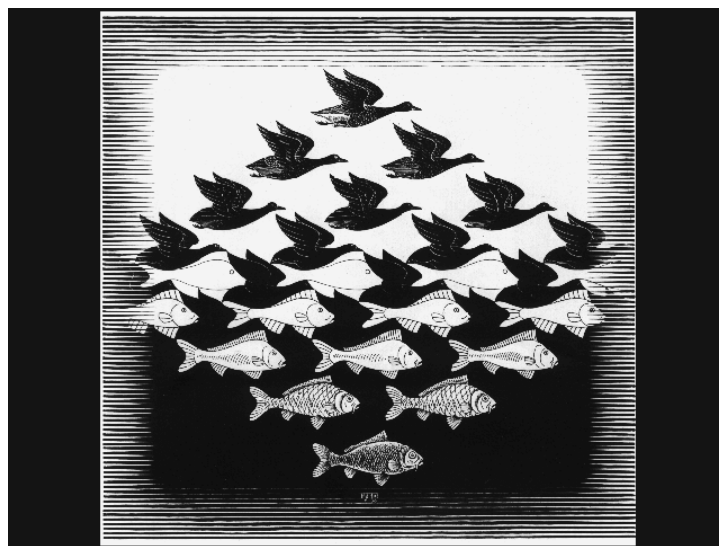
- Seats in an auditorium
  - Notice: same size & shape (isometry)



- Scales of a butterfly under the microscope
  - Notice: face the same way
    - orientation preserved
    - direct isometry)



M.C. Escher: Is this a translation?



## Notation:

Example: slide: 7 units to the left and 3 units down

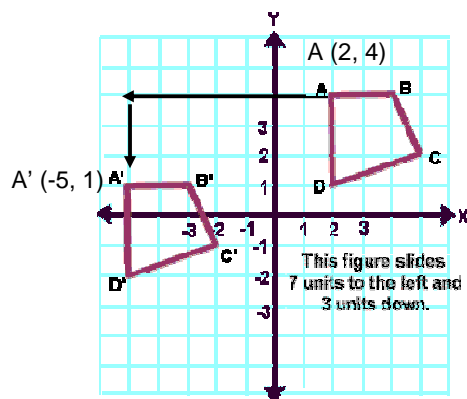
$$T_{(x,y)}$$
$$T_{(-7,-3)}$$

$$(x, y) \rightarrow (x - 7, y - 3)$$

$$A(2, 4) \rightarrow A'(2 - 7, 4 - 3)$$

$$A(2, 4) \rightarrow A'(-5, 1)$$

$$T_{a,b}(x, y) = (x + a, y + b)$$



## Practice:

True or False: Under the translation  $(x, y) \rightarrow (x + 3, y + 2)$  the point (2,5) will become (5,7).

**True!**

Under the translation,  $T_{(-1,2)}$  what does the point (-2,3) become?

**(-3,5)**

## Classic Regents Question

What is the image of point  $(-3, 4)$  under the translation that shifts  $(x,y)$  to  $(x - 3, y + 2)$ ?

(1)  $(0,6)$

(3)  $(-6,8)$

(2)  $(6,6)$

(4)  $(-6,6)$

## Classic Mrs. Delaney Question:

The image of point  $(-2,3)$  under translation  $T$  is  $(3,-1)$ . What is the image of point  $(4,2)$  under the same translation?

$$T_{a,b}(x,y) \rightarrow (x+a, y+b)$$

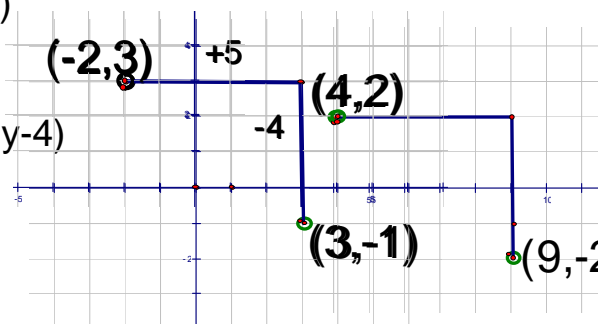
$$T_{a,b}(-2,3) \rightarrow (3, -1)$$

$$x: 3 - (-2) = +5$$

$$y: -1 - 3 = -4$$

$$T_{5,-4}(4,2) \rightarrow (x+5, y-4)$$

$$T_{5,-4}(4,2) \rightarrow (9,-2)$$



## More Practice!

A logo was created using two rectangles where rectangle  $A'B'C'D'$  was the translation of rectangle  $ABCD$ . The table of translations is shown below.

Rectangle ABCD	Rectangle A'B'C'D'
A (2,4)	A' (5,3)
B	B' (-3,3)
C (-6,-1)	C' (-3,-2)
D (2,-1)	

- a. Find the coordinates of point  $B$ .

$(-6,4)$

- b. Find the coordinates of point  $D'$ .

$(-3,5)$

- c. Describe the translation used in designing this logo.

$$T_{(3,-1)} (x,y) \rightarrow (x+3, y-1)$$