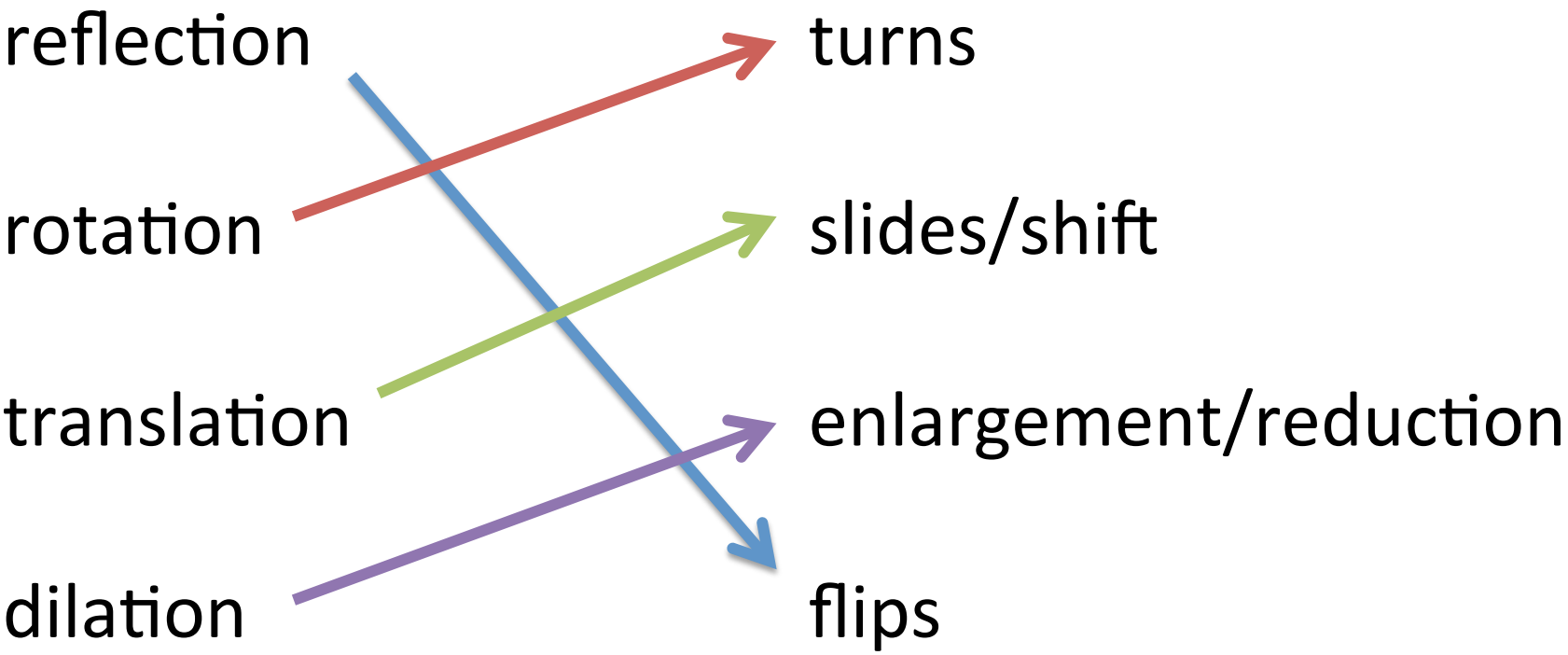
Objective

Students will be able to identify and draw reflected images and prove reflections are an isometry.

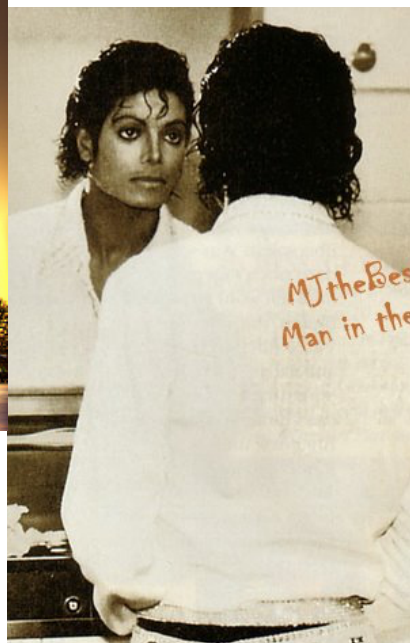
Transformations- Which is which?



Transformations map a pre-image to an <u>image</u>

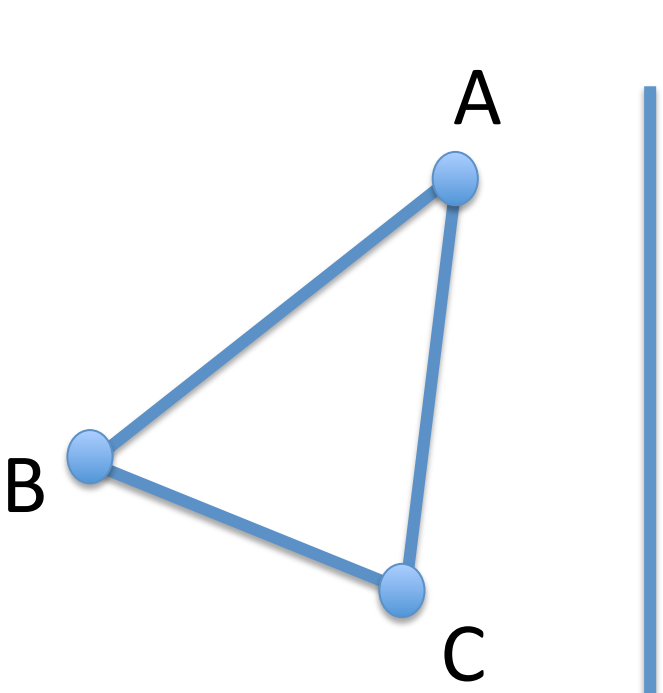
$$\Delta ABC \rightarrow \Delta A'B'C'$$

A <u>reflection</u> is a transformation representing a *flip* of a figure.



Draw an figure (something that is unique) on your patty paper and figure out how to reflect it

If I have the triangle ABC and a line, how could I reflect the object?



line of reflection (symmetry)

**create a perpendicular line through each vertex

Isometry

Isometry (congruence transformation): A transformation that preserves distance, angle measure, betweenness of points, and collinearity (congruence)

Are reflections isometric? Yes!

YOU ARE CONGRUENT TO YOUR OWN REFLECTION!

Homework

Create two figures and reflect them over the line of reflection using your compass and straightedge.

Finish your Construct an Art Project! project

Quiz over constructions, reflections, and translations on Friday

Objective

Students will be able to identify and draw reflected images.

Reflection Coordinate Plane Rules

Over the x-axis:	$(x, y) \rightarrow (x, -y)$
Over the y-axis:	$(x, y) \rightarrow (-x, y)$
Over the line y = x:	$(x, y) \rightarrow (y, x)$
Through the origin:	$(x, y) \rightarrow (-x, -y)$

Homework

Reflections Worksheet

Objective

Students will be able to identify and create translations using coordinates and by repeated reflections.

Quiz over constructions, reflections, and translations on Friday

Translation

A translation (slide/shift) is a transformation where all the points of a figure are moved the same distance in the same direction

Do you see any translations in the classroom?

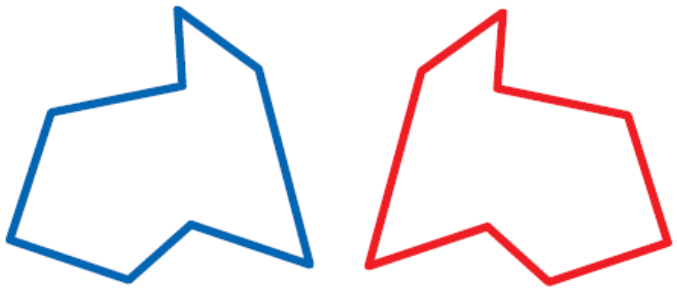
Is a translation an isometry?

Yes! The image is congruent to the pre-image

Examples

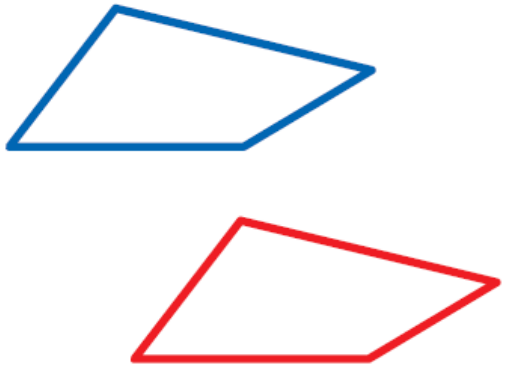
Tell whether each transformation appears to be a translation. Explain.

A.



No; the figure appears to be flipped.

B.

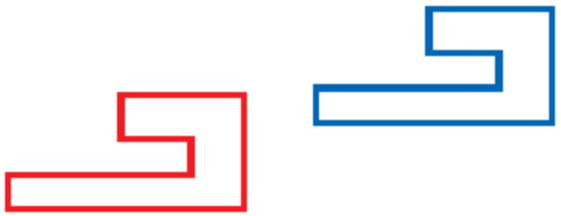


Yes; the figure appears to slide.

Examples Contin.

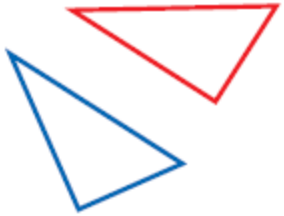
Tell whether each transformation appears to be a translation.

a.



Yes; all of the points have moved the same distance in the same direction.

b.



No; not all of the points have moved the same distance.

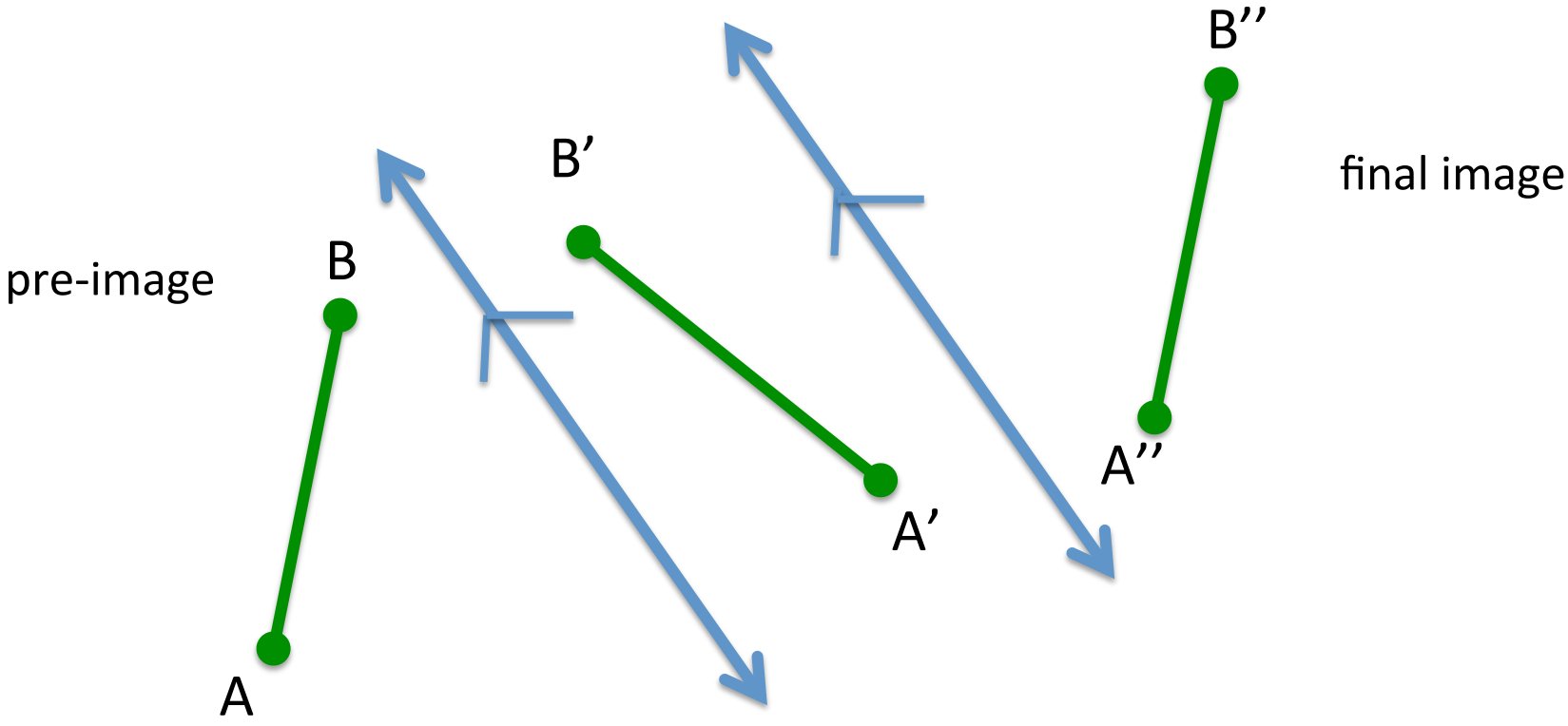
1) On a piece of patty paper, draw a unique image on the far left-hand side.

2) Fold the patty paper and trace the image's reflection.

3) Fold the patty paper again, and trace a second reflection.

Reflect (haha) on what you notice as a result of the final image.

If given a pair of two parallel lines, what do you notice about the pre-image and the final image?

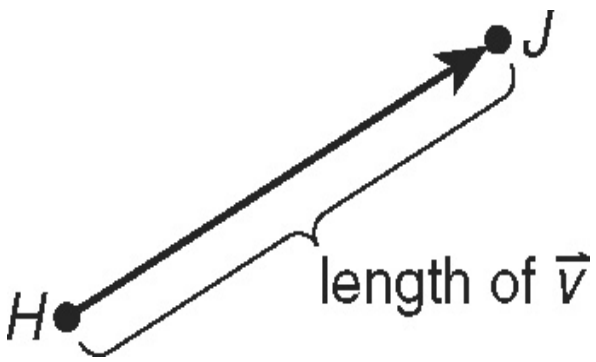


Theorem: If an object is reflected over a line, and again over a line that is parallel, then the result is a translation.

Two flips over parallel lines result in a slide

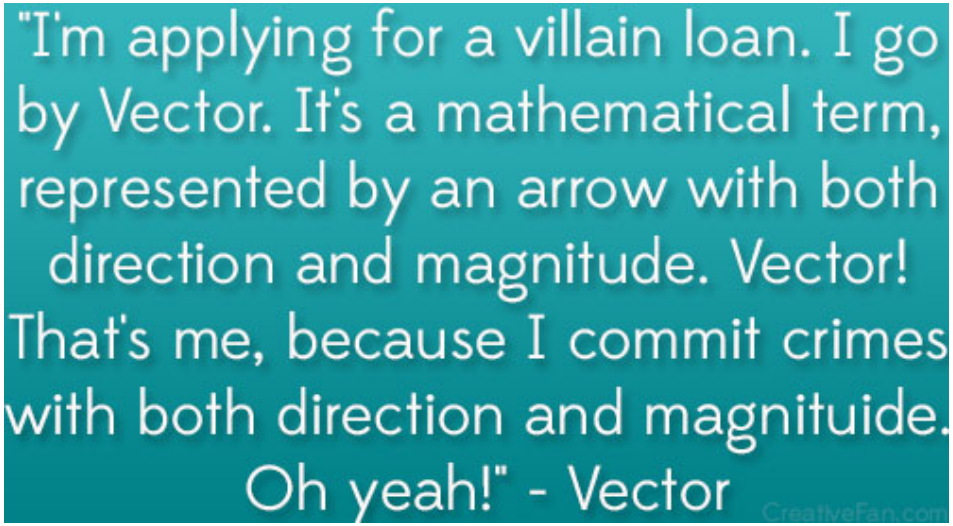
Vectors

A vector is a quantity that has both LENGTH and DIRECTION.

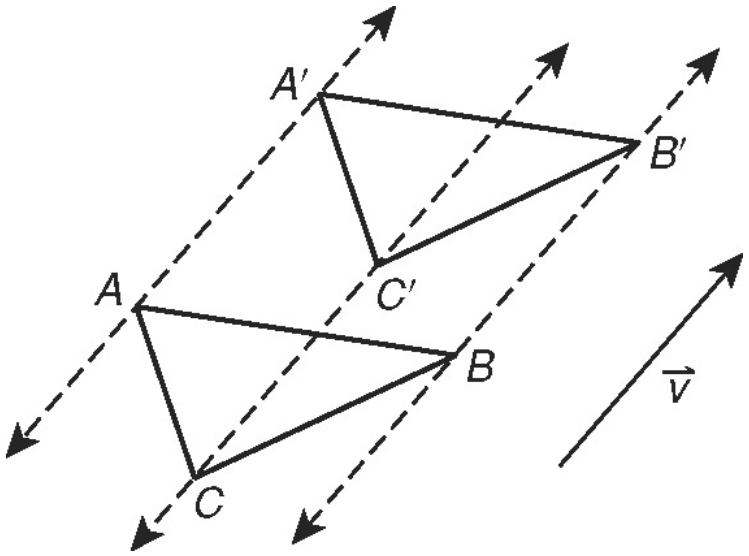


terminal point

initial point



Translation - a transformation along a vector such that each segment joining a point and its image has the same length as the vector and is parallel to the vector.



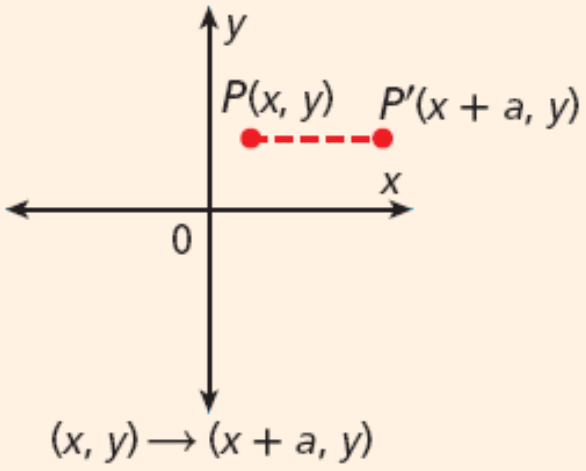
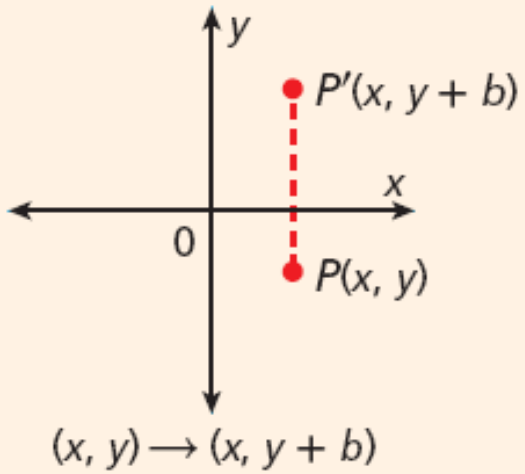
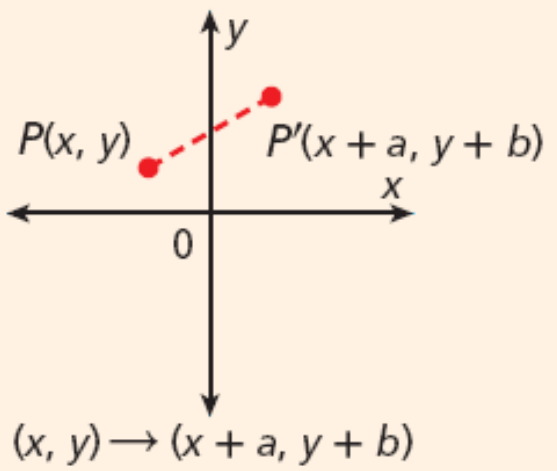
$\overline{AA'}, \overline{BB'}$ and $\overline{CC'}$ have the same length as $\vec{v}$ and are parallel to $\vec{v}$.

A vector in the coordinate plane can be written as $\langle a, b \rangle$.

- a is the horizontal change (from initial point to the terminal point).

- b is the vertical change (from the initial point to the terminal point).

Translations in the Coordinate Plane

HORIZONTAL TRANSLATION ALONG VECTOR $\langle a, 0 \rangle$	VERTICAL TRANSLATION ALONG VECTOR $\langle 0, b \rangle$	GENERAL TRANSLATION ALONG VECTOR $\langle a, b \rangle$
		
$(x, y) \rightarrow (x + a, y)$	$(x, y) \rightarrow (x, y + b)$	$(x, y) \rightarrow (x + a, y + b)$

(x, y) → (x ± h, y ± k) where h and k are horizontal and vertical shifts

**If movement is left, then h is negative. If movement is down, then k is negative.

Example

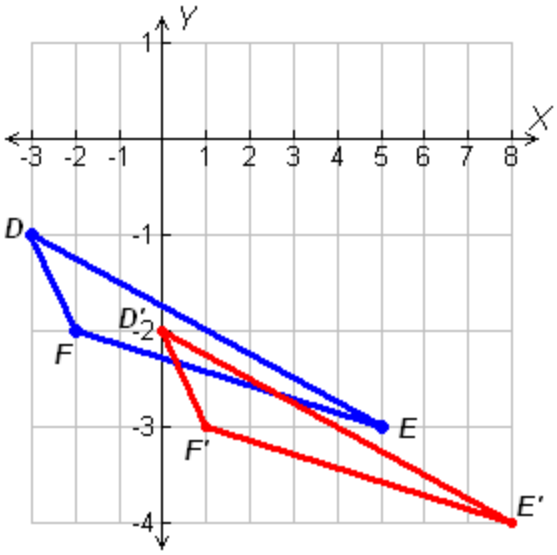
Translate the triangle with vertices $D(-3, -1)$, $E(5, -3)$, and $F(-2, -2)$ along the vector $\langle 3, -1 \rangle$.

The image of (x, y) is $(x + 3, y - 1)$.

$D(-3, -1) \rightarrow D'(-3 + 3, -1 - 1)$
$= D'(0, -2)$

$E(5, -3) \rightarrow E'(5 + 3, -3 - 1)$
$= E'(8, -4)$

$F(-2, -2) \rightarrow F'(-2 + 3, -2 - 1)$
$= F'(1, -3)$



Graph the preimage and the image.

Homework

Translations Worksheet

Objective

Students will be able to succeed on their quiz over constructions, reflections, and translations.

Students will be able to identify and create dilations using coordinates.

Where have you heard the word DILATE before? What are some examples of dilation in our world?

Dilations

Dilations

Dilations

Dilations

Dilations

Dilations change the size of the figure, either making it LARGER or smaller

The *scale factor* (change in size) is larger if $|c| > 1$ and smaller if $|c| < 1$

Are dilations isometric? No!

Point of Projection

Dilations multiply the distance from the point of projection (point of dilation) by the scale factor.

From the origin dilated by a factor of "c":
$(x, y) \rightarrow (cx, cy)$

From non-origin by factor of "c": count slope from point to projection point, multiply by "c", count from projection point

Homework

Finish Dilations Worksheet

Objective

Students will be able to identify and create rotations using coordinates.

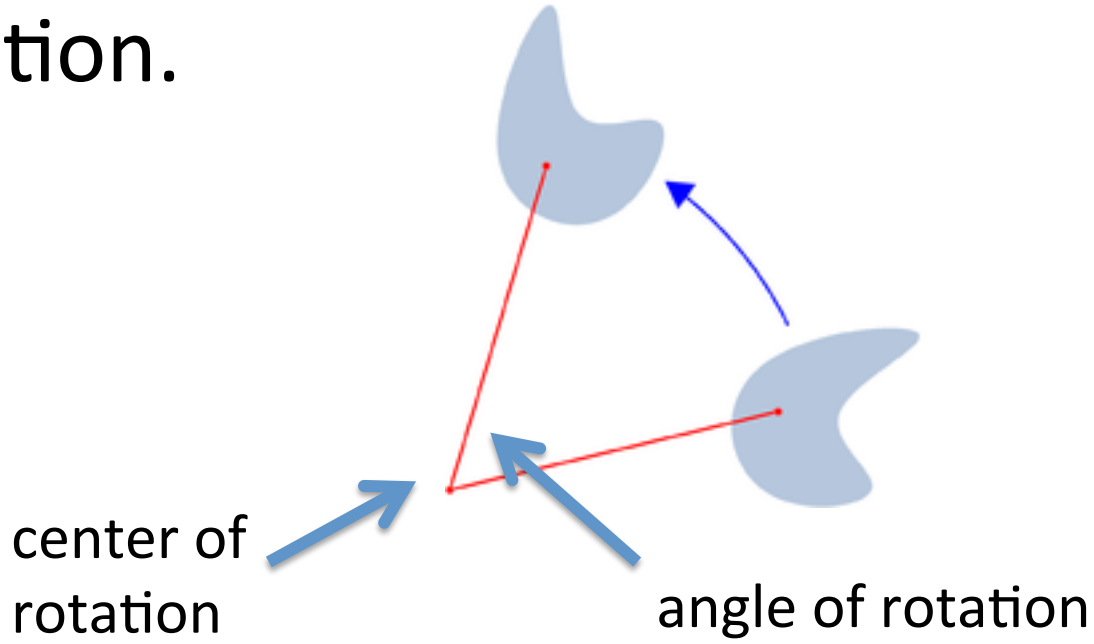
Rotation

What does rotation mean?

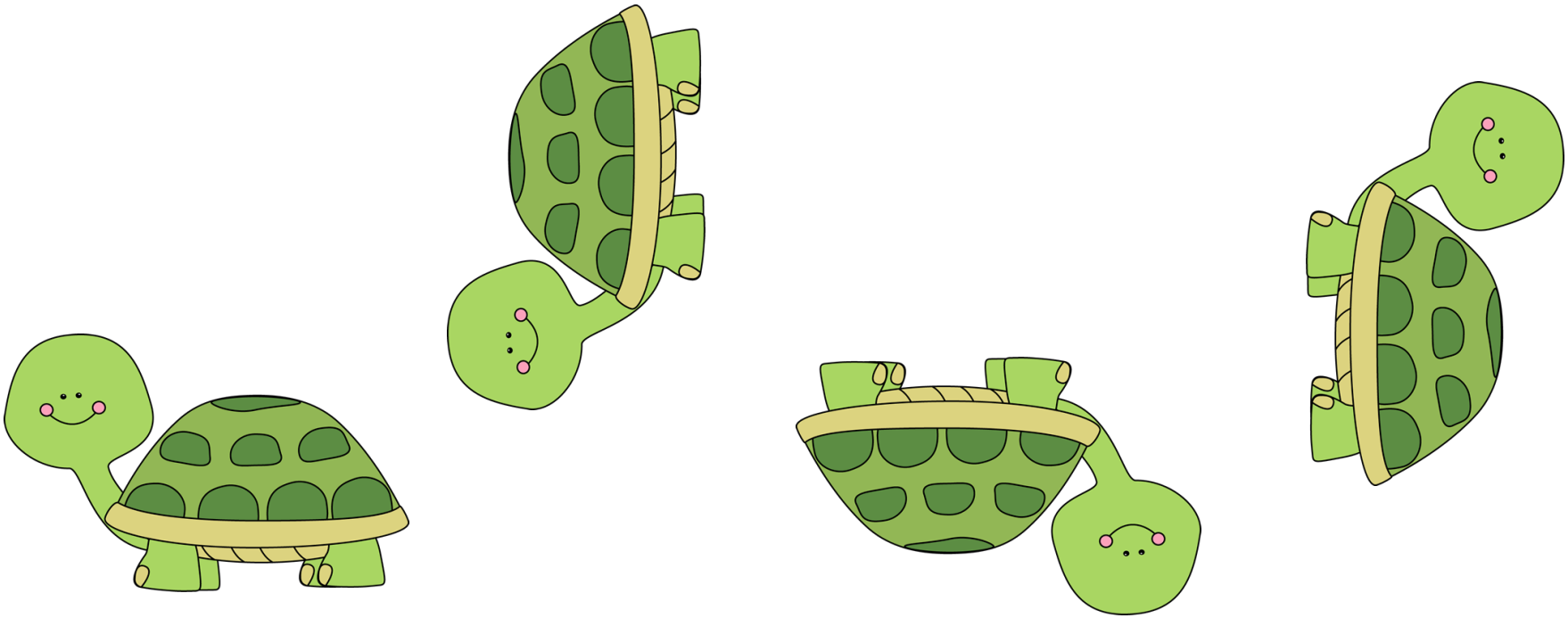
Where have you seen rotations in every day life?

Rotations

A rotation is a transformation that is a *turn* through a specified angle about a point. That point is called the center of rotation.



Rotations



Are rotations isometric?

Yes!

Rotations on a Coordinate Plane

With a partner, discover coordinate rules for rotations by looking at TED's eyes.

Coordinate plane rules:

Counter-clockwise:	*Clockwise:*	*Rule:*
90°	*-270°*	***(x, y) → (–y, x)***
180°	*-180°*	***(x, y) → (–x, –y)***
270°	*-90°*	***(x, y) → (y, –x)***

Homework

Rotations Worksheet