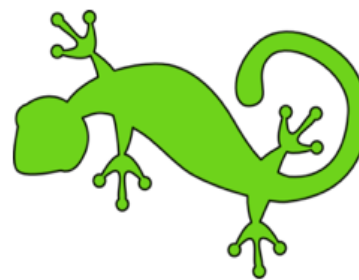


# Lesson 1 Leaping Lizards!



CC0 Shared by Tracy 04-140-2011  
<http://www.clker.com/clipart-green-gecko.html>

## A Develop Understanding Task

Animated films and cartoons are now usually produced using computer technology, rather than the hand-drawn images of the past. Computer animation requires both artistic talent and mathematical knowledge.

Sometimes animators want to move an image around the computer screen without distorting the size and shape of the image in any way. This is done using geometric transformations such as **translations (slides)**, **reflections (flips)**, and **rotations (turns)**, or perhaps some combination of these. These transformations need to be precisely defined, so there is no doubt about where the final image will end up on the screen.

Rigid  
Transformations

So where do you think the lizard shown on the grid on the following page will end up using the following transformations? (The original lizard was created by plotting the following anchor points on the coordinate grid, and then letting a computer program draw the lizard. The anchor points are always listed in this order: tip of nose, center of left front foot, belly, center of left rear foot, point of tail, center of rear right foot, back, center of front right foot.)

Original lizard anchor points:

$\{(12,12), (15,12), (17,12), (19,10), (19,14), (20,13), (17,15), (14,16)\}$   
Nose

Each statement below describes a transformation of the original lizard. Do the following for each of the statements:

- plot the anchor points for the lizard in its new location
- connect the **pre-image** and **image** anchor points with line segments, or circular arcs, whichever best illustrates the relationship between them  
*before after*

① **Lazy Lizard**

**Translate** the original lizard so the point at the tip of its nose is located at (24, 20), making the lizard appear to be sunbathing on the rock.

② **Lunging Lizard**

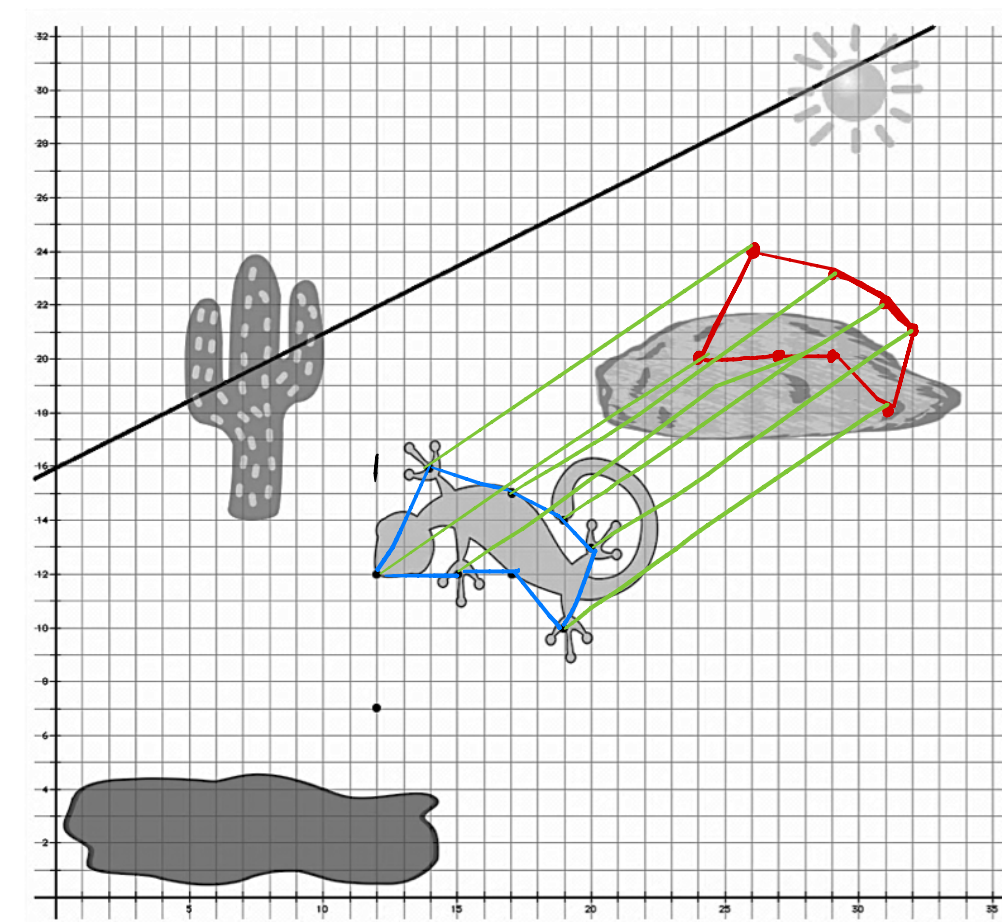
Rotate the lizard  $90^\circ$  about point  $A(12, 7)$  so it looks like the lizard is diving into the puddle of mud. *Counterclockwise*

**Let's Get Away Lizard**

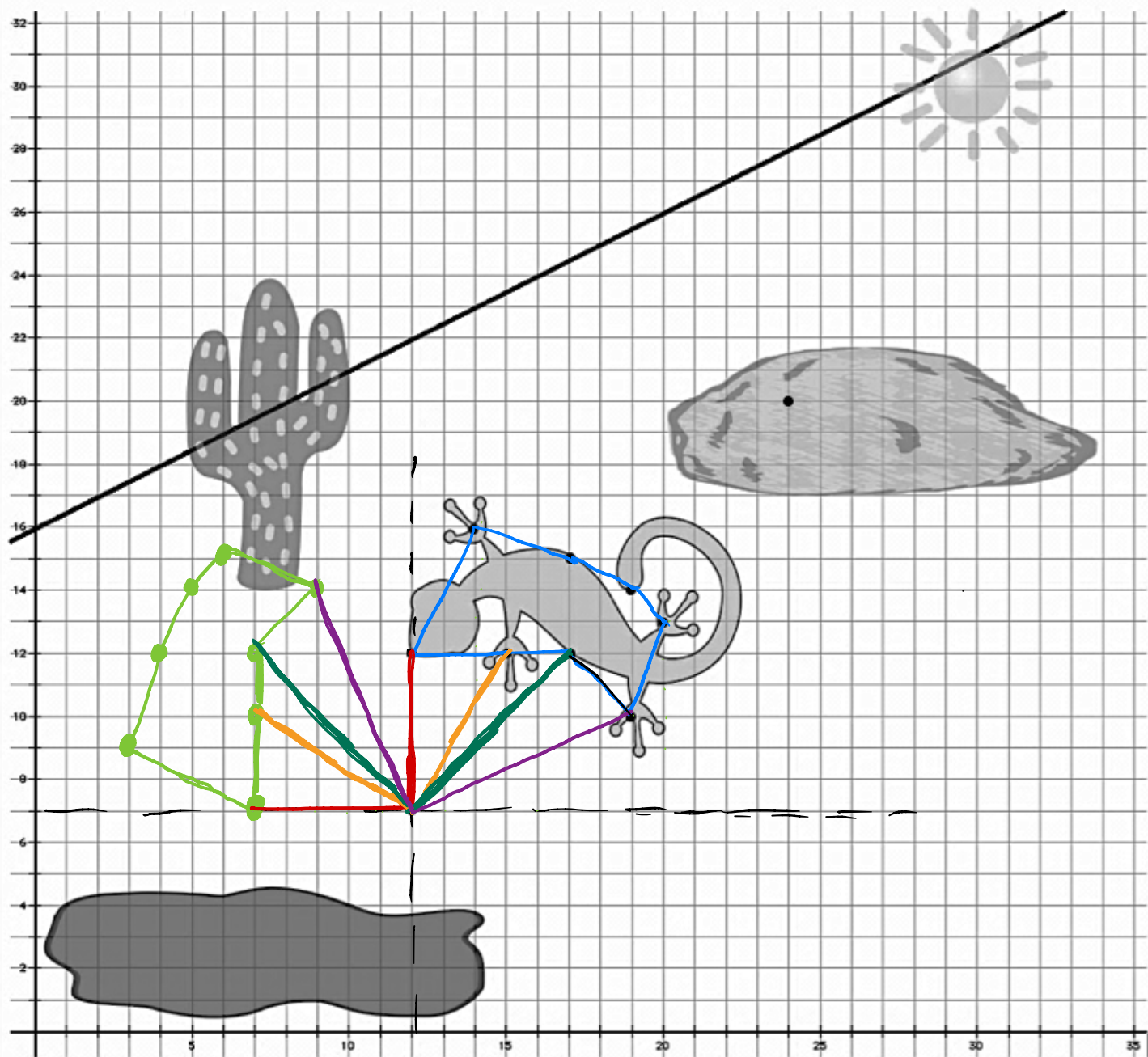
③ Reflect the lizard over the line  $x = 23$ , making the lizard appear to be turning around to run away from a predator!

**Leaping Lizard**

Reflect the lizard about given line  $y = \frac{1}{2}x + 16$  so it looks like the lizard is doing a back flip over the cactus.



# Rotation $90^\circ$ CCW



- Concentric circles with  $(12, 7)$  at center
- Use compass to connect corresponding points.

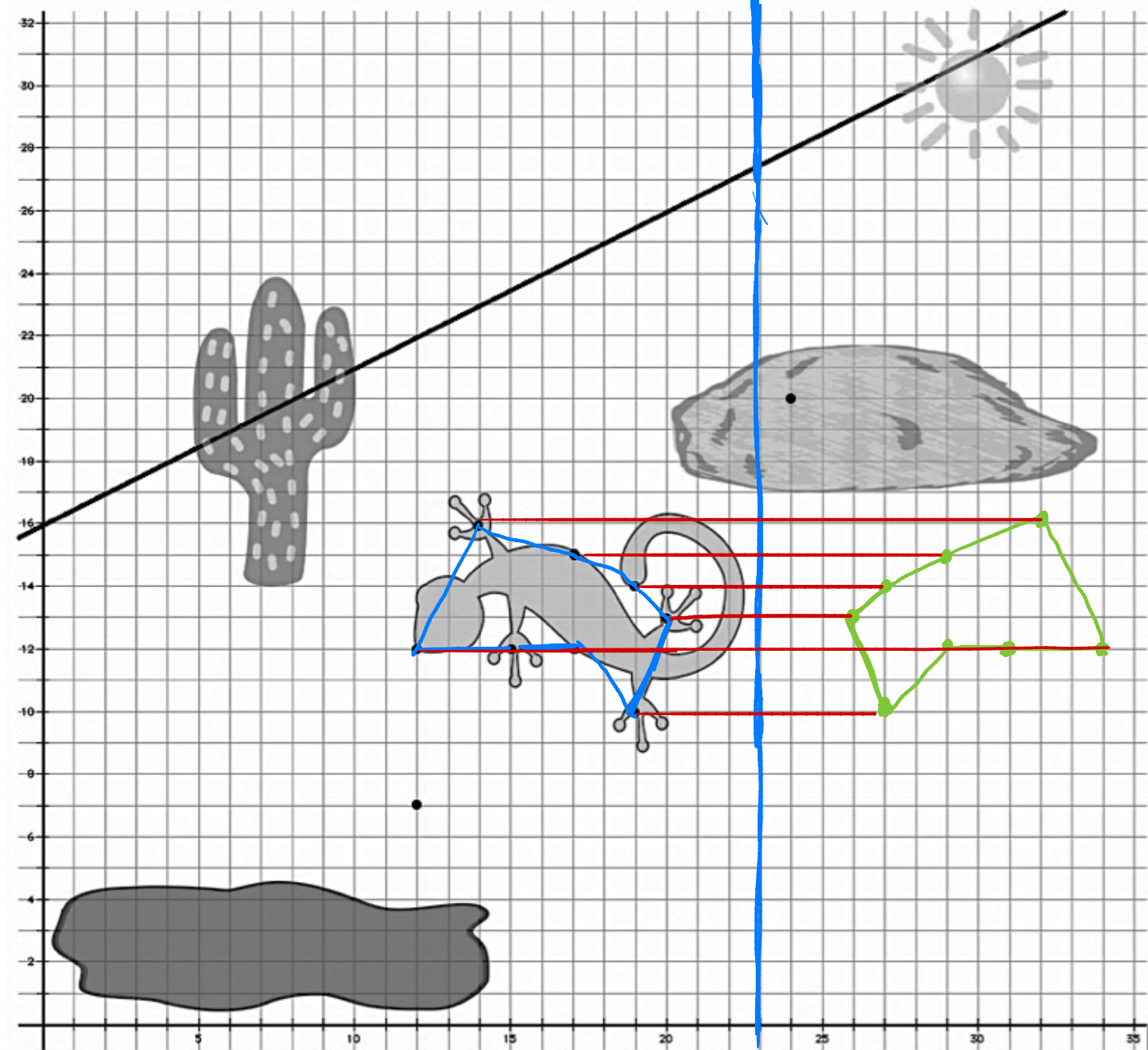
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Reflect over line  $x = 23$



Lines connecting corresponding points are parallel and perpendicular  $\perp$  to the line of reflection.

