

## Scratch 20 – orbits

5/6/21

Today's task starts with a template file. Log in to Scratch on your account then search for "Hays orbit 2019". Remix this project in your account, name it "Scratch 20 orbit".

Click the green flag, check out what happens: the earth appears to rotate in place and a small black moon rotates around it. The earth is just one sprite with several different costumes. The moon is just a black dot.

Duplicate the moon. **In the copy** (Moon2) edit the green flag script so it looks like this:



That is **four** changes:

- 1) Change **radius** to 30
- 2) Change **size** to 20%
- 3) Change the two "Earth"s in the blue areas to "Moon1". Sometimes Scratch changes the "y position" pop-up menu to x-position when you change the "of Earth" to "of Moon1". Easy to fix.
- 4) Change **angle** by 6

These changes tell this new moon to be smaller, closer, faster, and to orbit Moon1 instead of the earth. Press the green flag, see what happens. If you did it correctly, the new moon orbits the first moon. The most common problem is that sometimes Scratch changes the "y position" blue block to x-position when you change the "of Earth" to "of Moon1". Make sure the left one is set to x-position and the right one to y-position.

You can keep making new "moons" by duplicating the first moon. You can change their colors, change what they even are (in costumes), change which object they orbit, etc. If you create a new sprite just copy over the code from the first moon and it should work fine.

- The "radius" variable is the radius in pixels, or how far away a sprite is from the center of the item it is orbiting
- The "angle" variable controls how fast the object orbits (larger number is faster, negative number orbits opposite direction).
- The "go to x/go to y" line controls what item a sprite orbits. Be sure to set both the x and y positions to the same sprite (for example Earth, or Moon1, etc.).

If you're curious, these objects are using polar coordinates to set their orbits.  $x = radius * \cos(angle)$  and  $y = radius * \sin(angle)$ . We cover polar coordinates in Trig at Analy.

See next page for requirements for today's assignment.

Your task for today is to make a cool solar system by doing the following:

- Set a cool background
- Make at least 8 things orbit the earth and/or a moon
- At least one item orbits an item that is already orbiting the earth (so you'll have at least one moon of a moon so to speak)
- All of your items have different costumes than the boring black moon we started with
- Each orbiting item orbits at a different speed
- Orbits don't overlap each other
- At least one item orbits in the opposite direction