STEM Connections

Helioseismology
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What is Helioseismology?

Every second there are thousands of 'Sunquakes' happening inside our Solar System's favourite star. These Sunquakes are much like Earthquakes and can travel from one side of the Sun to the other, bouncing off the inner surface as it travels. Different Sunquakes can travel to different depths, with some travelling all the way through the Sun's core, and others are confined to just below the solar surface. The field of Helioseismology (where Helio = Sun, seismology= the study of waves) aims to investigate these sunquakes and find out what they can teach us about the behaviour of the Sun under the surface; something we can't directly observe with normal telescope.

How to design your own sunquake

Suitable year groups: Year 4, Year 5, Year 6, Year 7, Year 8 and Year 9

Learning Objectives:

- To recognise the Sun as a source of power (KS2)
- To learn basic IT programming skills. (KS2)
- To understand how light travels and how intensity can change (KS3)
- To understand how size microwave move. (e.g. Earthquake) (KS3)

This idea will help develop the understanding of sunquakes and the interior of the Sun as well as basic programming skills.

We can visualise what these sunquakes look like using Turtlestitch. The visualisation shows the paths the sunquakes trace if you were to get a cross section of the sun, i.e. if you sliced it open down the middle. Although there are thousands happening every second, we're only going to design three.

For each of the 3 sunquakes you can choose values for Bounce, Curve, and Depth. We recommend choosing numbers between 1-15.

- **Bounce**: Number of bounces each sunquake does
- **Curve**: how curvy you want the sunquake to be. A larger number = a bigger curve
- **Depth**: How deep you want the sunquake to go into the Sun. A larger number goes deeper into the sun

Time estimated: 15 minutes

How to use the Turtlestich program

1. Open the Turtlestich program website
   here

2. In the middle section of the screen is where you can change the code. This is where you can change the number of bounces, how curvy it is and the depth of the sunquake

3. When you are ready to see your design, press the green flag on the right hand side and watch the sunquake going through the sun

4. You can make as many versions as you would like. You can also save a design to print out by clicking on the save button on the left hand side of the screen and choosing export to PNG.

5. Change your design. What happens if you use decimals? How could you create a symmetrical pattern?
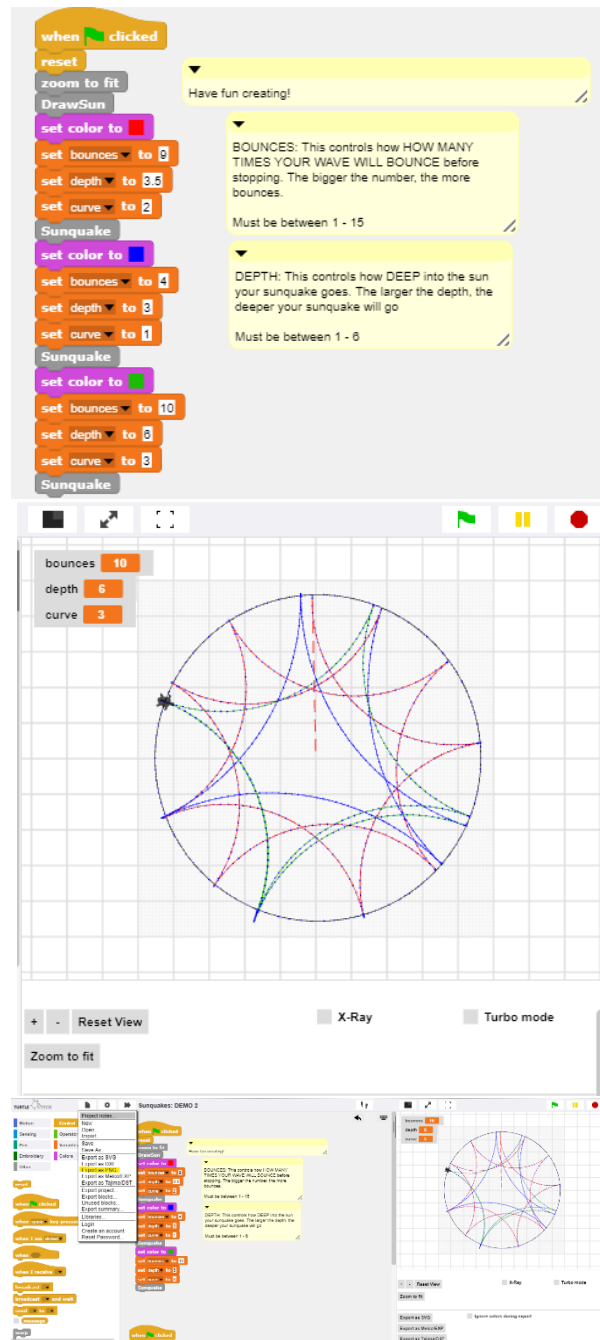
Ideas to explore the concept further

- See what happens if you make curve and depth the same, or multiples of each other.
- See what happens if you use integers vs. decimals.
- Can you make a star?