2023 Girls in STEAM Conference – Breakout Session Activity Supply list

Alka-Seltzer Rockets

- Film cannister
- Alka-Seltzer tablets
- Water
- Paper (optional)

Thaumatrope

- Paper
- Skewer
- Glue
- Scissors
- Markers or pencil crayons

Gummy greenhouse gases

- Gummy candy (Jujubes work best!)
- Toothpicks

DNA puzzle

- Print out

Farm arcade

- Print out
- Laptop/ computer device with Wi-Fi and internet

Greenhouse effect game

- Print out/ instructions

Stellarium

- Print out/instructions
- Laptop/ computer device
- Stellarium (downloadable app or online app version available)

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Alka-Seltzer Rockets

Description:

Learn about space exploration by creating your own rocket using Alka-Seltzer tablets!

What you need:

- Film cannister
- Alka Seltzer tablets
- Paper
- Markers (optional)
- Water

What to do:

1. Using paper, cut out small triangles to make fins, head and body for your rocket. Secure the film cannister with tape.
2. Break the Alka-Seltzer tablets into quarters! (This will allow you to do the experiment multiple times!)
3. Fill the Film-Cannister about a 1/3 full of water (room temperature)
4. Drop a 1/4 Alka-Seltzer tablet in and seal the film cannister.
5. Give your rocket a shake and then flip so the cap is facing down against a flat surface.
6. Stand back and watch your rocket fly! (**Be careful when launching the rocket, if it does not launch, wait for 30 seconds and then try again**).

Try this experiment again with hot water, and again with ice water. What works best?

Exploring the science:

The film cannister rocket is powered by Alka-Seltzer Tablets! These tablets are made up of citric acid (found in citrus fruits) and sodium bicarbonate (baking soda). When this touches water, it will start to bubble and release carbon dioxide! This will cause pressure to build inside of the film cannister, eventually making it fly!

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Thaumatrope

Description:

Create an optical illusion toy from the early 1800s. This early form of animation makes two drawings merge into one!

What you need:

- Paper
- Scissors
- Glue or tape
- Paper or cardstock
- Markers or pencil crayons
- Skewers

What to do:

1. Cut out two paper circles that are the same size.
2. Draw two different pictures in your circles. They must create a scene that goes together. (See attached example for ideas).
3. Tape or glue the skewer onto one of the circles (make sure the drawing is right side up!).
4. Glue the circles together making sure both drawings are right side up, the skewer should be in the middle.
5. When the glue is dry, spin the skewer between your hands to see the optical illusion.

Exploring the science:

Thaumatropes were created in the 1820s and became a popular optical illusion toy. Using "*persistence of vision"* thaumatropes create idea of movement by blending two pictures together to create one. Persistence of vision is the eye's ability to retain an image for about $1/20^{th}$ of a second after the object is gone. If you see more than 10 images per second, your brain puts them together as a series of moving images. For thaumatropes, the eye continues to see the two images on either side of the thaumatrope shortly after each has disappeared. As the thaumatrope spins, the series of quick flashes is interpreted as one continuous image. The first image used for thaumatropes was a bird and cage, when spun together the bird appears to be in its cage.

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Gummy Greenhouse Gases

Description:

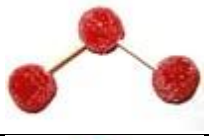
Meet and learn about the most prevalent greenhouse gases and their chemical structures while building edible models!

What you need:

- Gummy candies
- Toothpicks

What to do:

1. Choose which Greenhouse gas molecule you would like to recreate:

Name of greenhouse gas	Recipe	Shortcut (formula)	Gummy model
Ozone	3 oxygen atoms	O_3	
Nitrous oxide	2 nitrogen atoms and 1 oxygen atom	N_2O	
Carbon dioxide	1 carbon and 2 oxygen atoms	CO_2	
Water vapor	2 hydrogen atoms and 1 oxygen atom	H_2O	

2. Choose 3 gummies with colours depending on your greenhouse gas of choice:
    a. Ozone: grab all the same colour
    b. Otherwise: grab 2 of the same colour and 1 a different colour
3. Take a toothpick and break it in half
4. Following the examples on the board, construct your gummy model to represent the structure of your greenhouse gas.

5. Once finished, feel free to enjoy eating your gummy model! Bon appetit!

Exploring the science:

Greenhouse gases and the greenhouse effect allow our Earth to retain warmth and maintain temperatures that support life. If there were no greenhouse gases in our atmosphere, the Earth would have an average temperature of –20 °C! Brrrr!

Although we need greenhouse gases to stay warm on our planet, too many of these gas molecules in our atmosphere contributes to global warming and climate change which has a negative effect on the natural biological systems working together to sustain all life.

Many human activities, such as electricity and heat production (what you use to turn on your lights and warm your home), transportation, factory manufacturing, and agriculture are the largest greenhouse gas emitters. In order to combat climate change, we can make changes in our daily lives such as trying to waste no energy by turning electronics and lights off when not in use, use more reusable products, waste no food, and much more. New technologies are also needed, along with more scientists to help create them (such as yourself)!

Learn about the greenhouse effect in the Greenhouse Gas Effect Game.

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DNA Puzzle

By Dr. Kara Loos

Background information/terms to use as an explanation:

Genome:

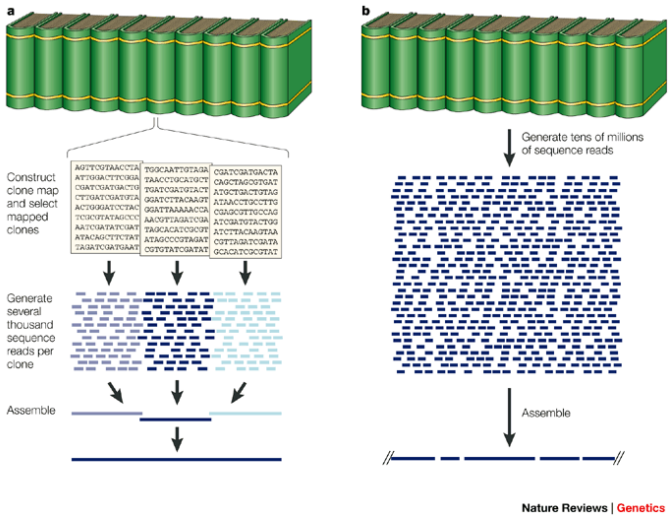
1. Explain how a genome is the genetic code to all living things and provides the template for each organism. The human genome has information in it that codes for eye colour, how tall someone will be, whether you'll have dimples, etc.
2. Use book analogy (detail level can vary depending on the age group): compare a genome to a book, but instead of using 26 letters of the alphabet, DNA only uses 4 letters: A, C, T, & G. The order of these letters spell out the genetic code. As in a book, DNA has "words", but they are only 3 letters long (codons). These "words" get put together to make "sentences", or genes. "Sentences" can then be put into "chapters" called chromosomes.

Here is a cool short video that illustrates the analogy:
https://www.futurelearn.com/info/courses/whole-genome-sequencing/0/steps/16773

Sequencing:

1. Explain that in order to "read" the genomic information from the "book" we have a lot of different sequencing technologies that allow us to "read" the information.
2. The sequencing technologies are not yet advance enough to "read" (sequence) the "whole book" (whole genome) from start to finish. We have to rip out all of the pages (chop up/fragments) from the book (the genome), then photocopy the pages (sequence the fragments) and try to put the copies back into a complete book (genome).

3. We can either do this with page numbers (reference genome to assemble with) or without page numbers (no reference), for which we'd have to rely on overlapping paragraphs (DNA segments).



Main challenge – why we need coding!

1. We're dealing with billions of pages to try and put back together for just one genome. When we sequence, we often have ~100 genomes mixed together. This is way too much to do manually and we use the field of bioinformatics to help us give genomic information.

Bioinformatics: Scientific sub-discipline that involves using computer technology to analyze biological data such as DNA.

2. One very recent example is COVID-19 variant lineage data. This is all done through whole genome sequencing and the lineage data is acquired through bioinformatics.
3. Changes in the genetic make-up (i.e. book) of pathogens (things that make us sick) can inform public health on vaccine development, outbreak control, treatment, etc.

Activity – Assemble your own genome!

Overall concept: Take a sentence and have it divided up onto 5-10 pieces of paper (with overlapping regions). You can make the sentence whatever you want. Overlap can be 1-3 words. You can split kids into groups and have them race to find out what the final genome message tells us.

Fun fact: Genes often have start codons that we see to indicate the start of the gene. Uppercase letters can be used as that same analogy when they're "assembling their genome". We also see stop codons which can be compared to the period at the end of a sentence.

Example:

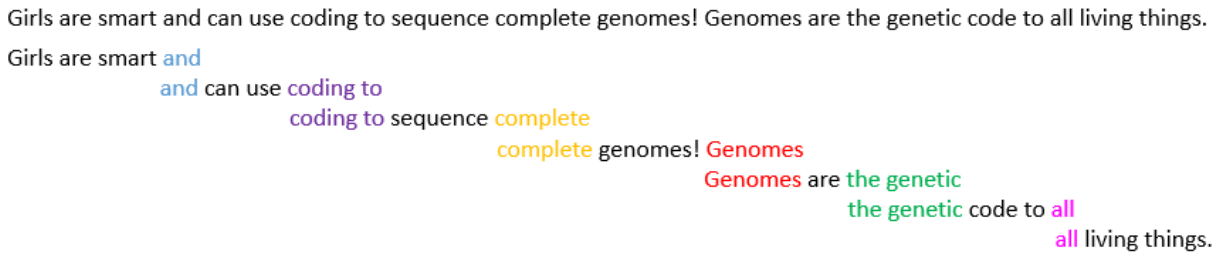
Sentence = Girls are smart and can use coding to sequence complete genomes! Genomes are the genetic code to all living things.

Pieces of paper given:

1. “Girls are smart and”
2. “and can use coding to”
3. “coding to sequence complete”
4. “complete genomes! Genomes”
5. “Genomes are the genetic”
6. “the genetic code to all”
7. “all living things.”

Note: Difficulty can increase/decrease based on the age. You can make it a longer paragraph or shorter and increase/decrease the amount of pieces to assemble. I’ve used different colours with the overlap regions for younger ages (e.g. age 7) to make it easier/quicker.

Final result:



Note: The classroom package contains six different word puzzles related to our six different mentor topics. Each puzzle is colored differently so they can be easily separated if needed. When you have them cut out, just make sure to give them a good mix up before getting a student/group to solve the puzzle. You can also have students make up their own sentences and puzzles and challenge one another!

Environmental scientists will
will be fundamental in finding
in finding solutions
solutions to greenhouse
greenhouse gas emissions and
and climate change
change by teaching
by teaching us new ways
ways to be more
be more resourceful and by
and by developing new
new technologies to reduce
to reduce our carbon footprint.
A genome is the
is the complete
complete set of DNA

of DNA in an
in an organism. Genes
Genes are segments of
of DNA that contain
contain instructions for
for building the molecules
the molecules that make
make the body work.
Constellations are groupings
groupings of stars
of stars that form
that form a pattern or
or image in the sky. Our
Our constellations come from
from Greco-Roman
Greco-Roman mythology,

mythology, depicting different

different characters and

and events in their myths.

Animation is the

the process in which

in which the illusion

illusion of movement

movement is created by

created by displaying one image

one image and then

and then repeatedly replacing

replacing that image with a

with a new image

new image that is similar

similar but slightly altered.

Agronomy is the science

the science that finds
finds ways to grow crops
grow crops more efficiently
efficiently and profitably while
while protecting the
the environment. Agronomy
Agronomy affects us all
us all through the food
food we eat and the
and the clothing we wear.
In modern clinical
clinical practice, physicians
physicians personally assess
assess patients through physical
physical and verbal examinations
examinations in order to

in order to diagnose, prognose,
prognose, treat, and
and prevent disease or
disease or injury using
using clinical judgement.

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Farm Arcade

Description:

Using code, create a game which mimics how a tractor cultivates food

What you need:

- Laptop/computer device
- Arcade.makecode.com

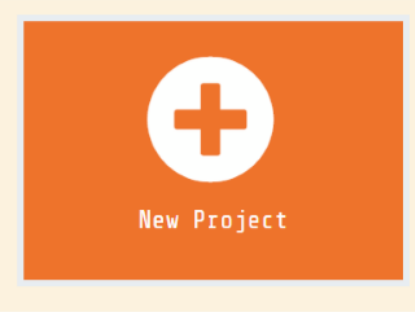
What to do:

Step 1

Go to arcade.makecode.com on the internet

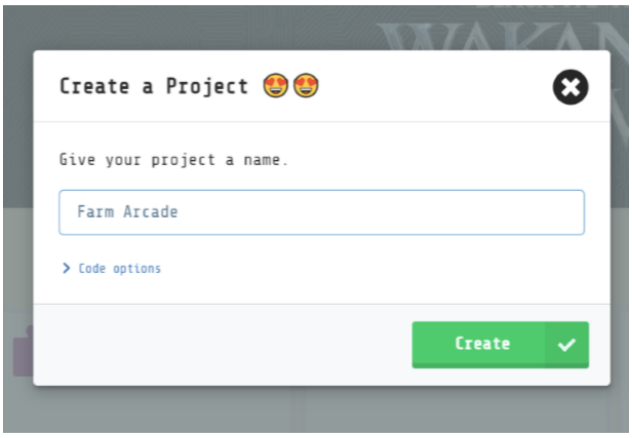
Step 2

Click on “new project”



Step 3

Name your project then click “create”

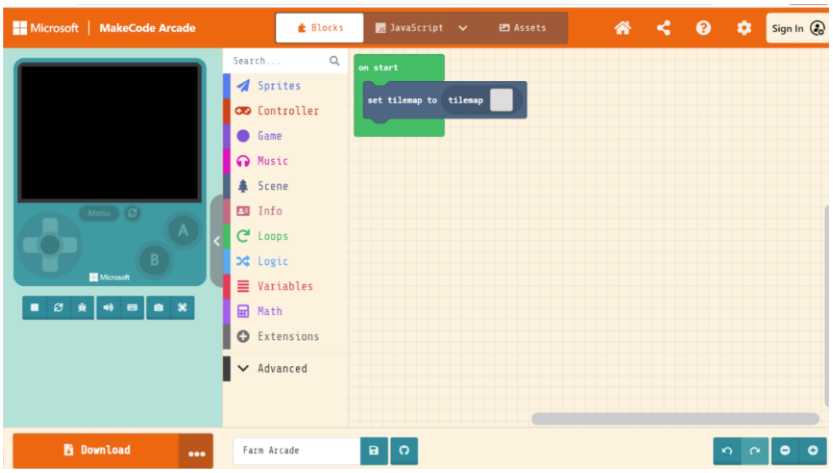


Step 4

Welcome to our workspace! We will be coding this game using a coding language called Blockly. Blockly uses color coded blocks to write our code.

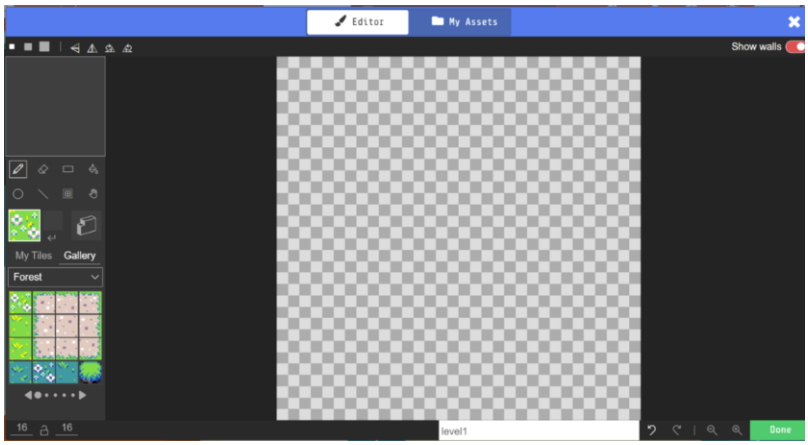
Next let's make our background using tile map

In scene select “set tilemap to tile map” and drag that block into the “on start”

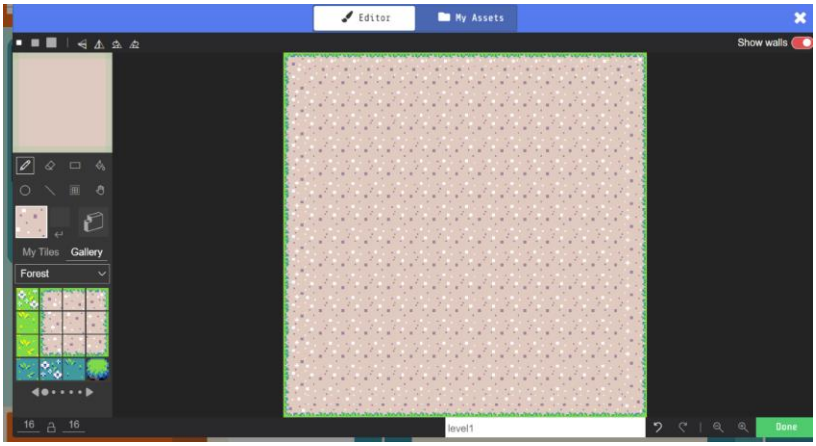


Step 5

Next let’s create the image to be displayed as our background by clicking on the gray square



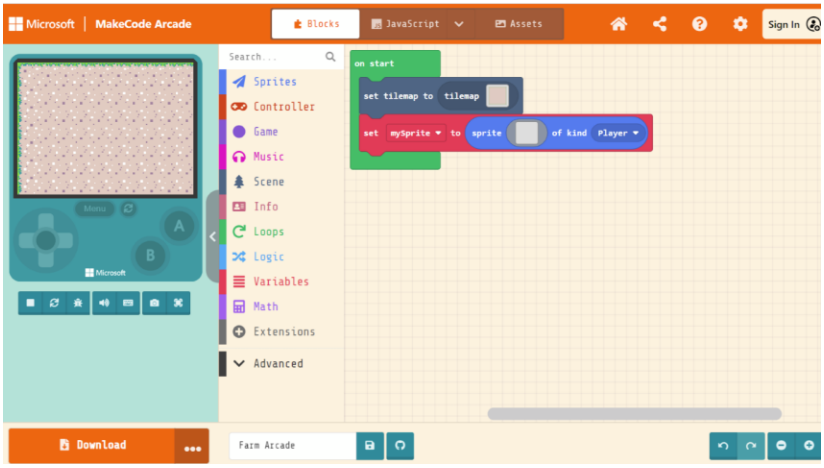
This will bring you to a space where you can design how you want your background to look using tiles. You can make your background look however you would like! And click “done” in the bottom right corner once you are satisfied with how it looks.



Step 6

Let’s create our sprite, also known as the character that we will be playing as

In Sprites select “set mySprite to sprite of kind Player”

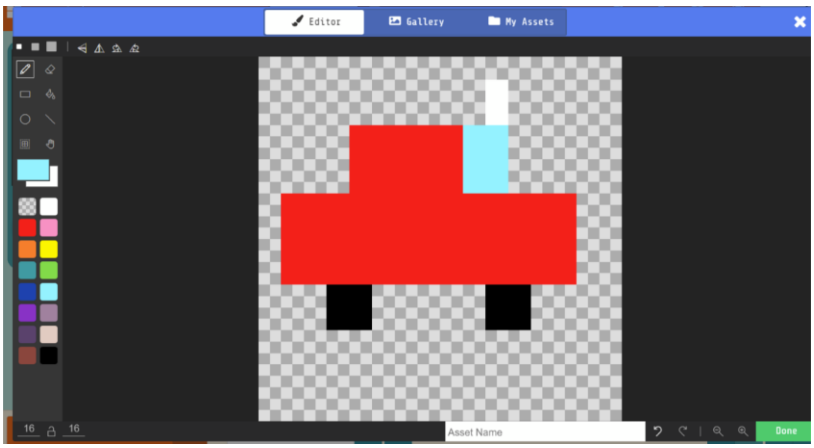


Step 7

Let's create our Sprite by selecting the gray box

Using the tools on the left, create a sprite which looks like a tractor!

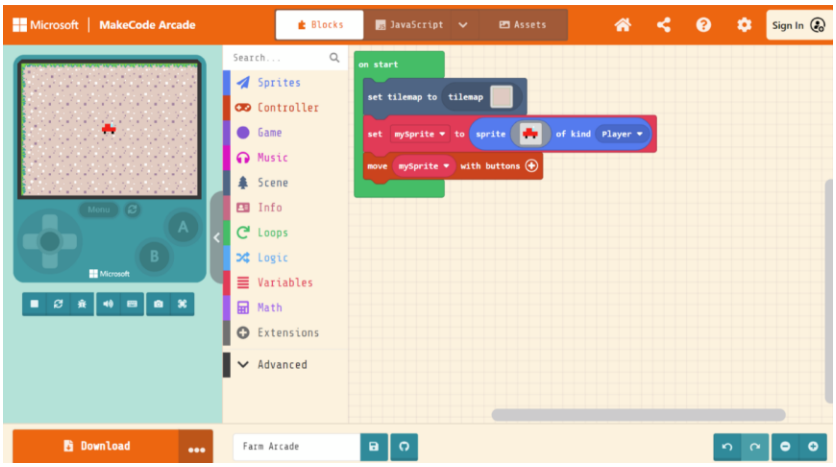
Once you as satisfied with how your tractor looks, click “done” in the bottom right corner



Step 8

Let's get our tractor moving!

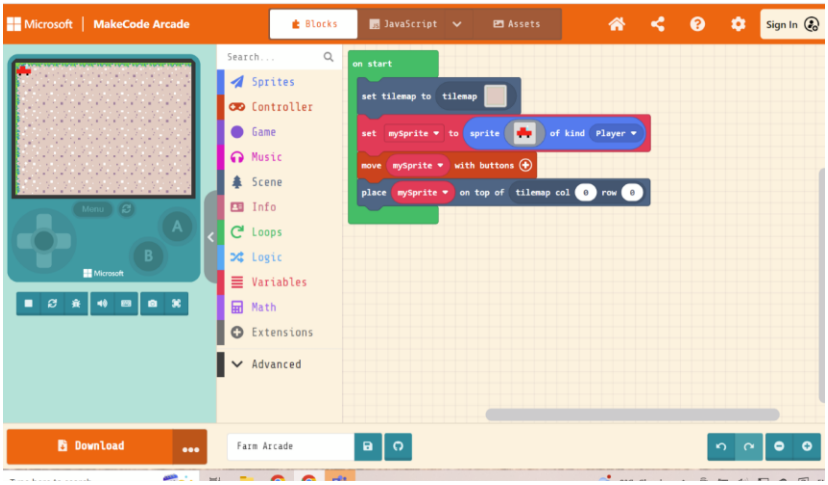
In Controller, select “move mySprite with buttons”



Step 9

Next, let's give our tractor a starting position

In Scene, select "place mySprite on top of tilemap col 0 row 0"



Step 10

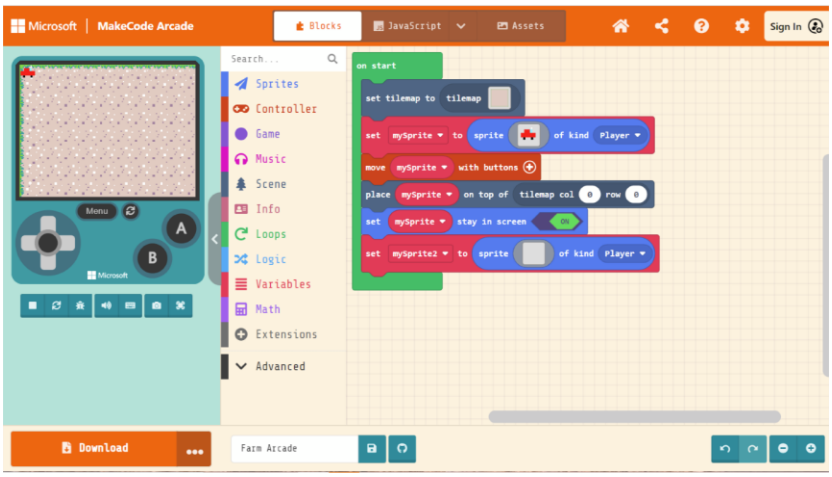
Let's get our tractor to stay within our screen

In Sprites select "set mySprite stay in screen on"

Step 11

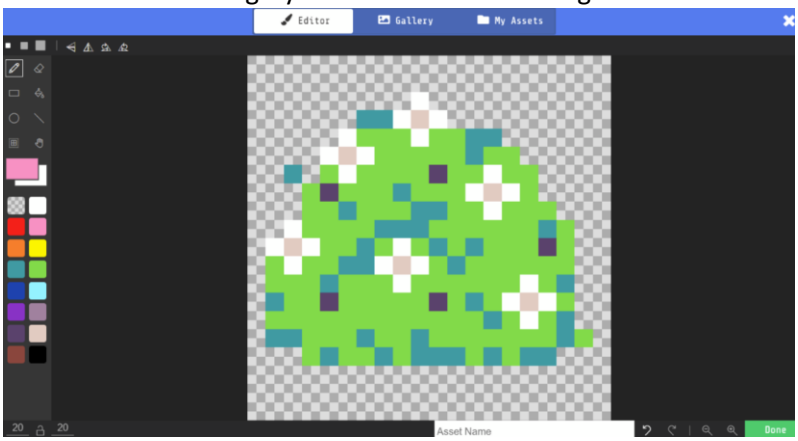
Let's give the tractor something to farm by creating another sprite

In Sprites select “set mySprite2 to sprite of kind player”



First let’s change where it says “player” to say “food”

Next let’s select the gray box to add in something for our tractor to cultivate



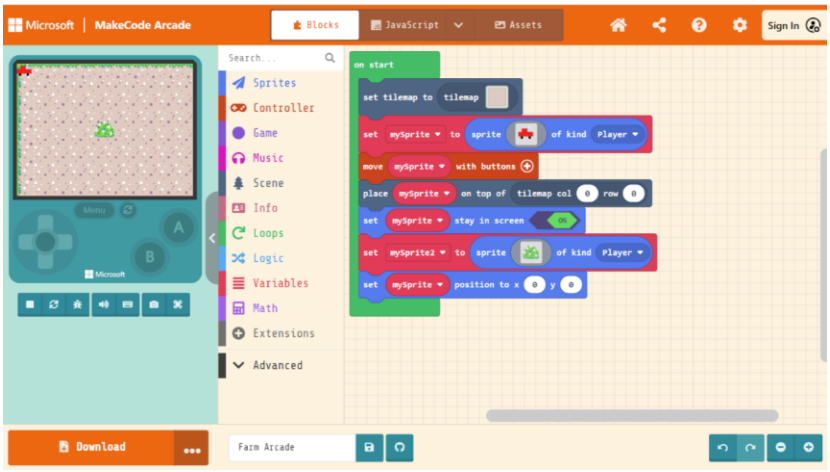
Once you have your cultivating item, select “done” in the bottom right corner

(Pro tip: in Gallery, there are premade sprites ready to use!)

Step 12

Giving our food sprite a location

In Sprites, select “set mySprite position to x 0 y 0”

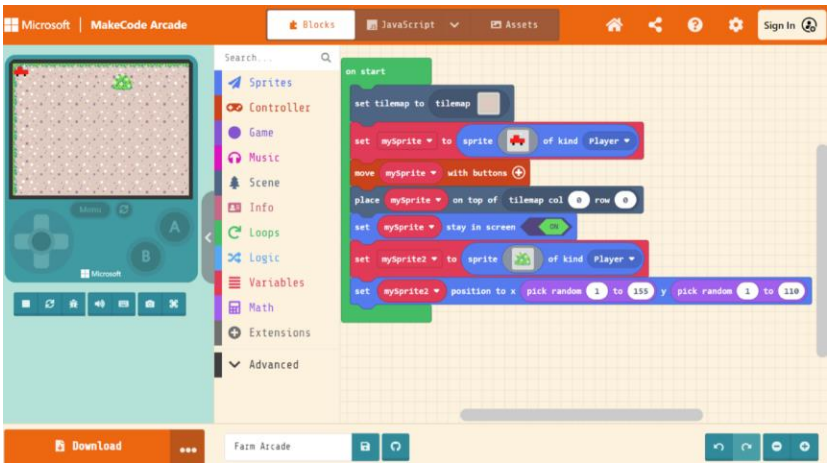


Step 13

Let’s change where it says “mySprite” to say “mySprite2” and replace the x 0 y 0

In Math select “pick random 0 to 10” and replace that block with both x 0 and y 0

Change x to “pick random 1 to 155” and y to “pick random 1 to 110” (this will allow our food sprite to spawn randomly on our screen)

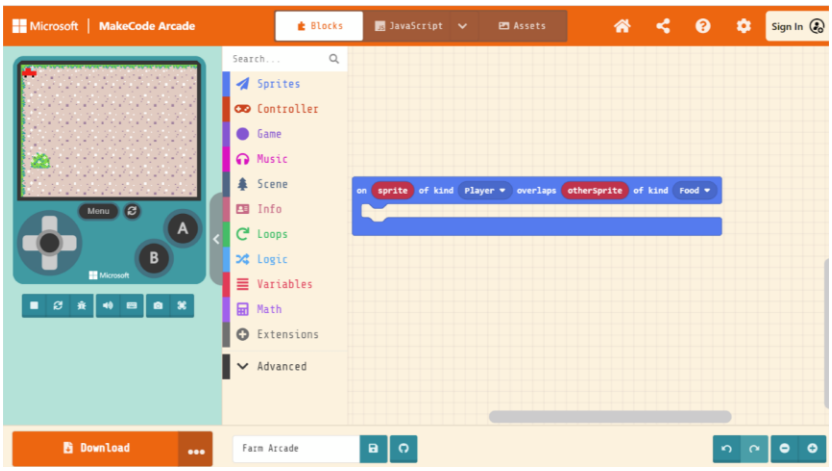


Step 14

Next, let's create a reaction for when our tractor and food collide

In Sprites, select "on sprite of kind Player overlaps otherSprite of kind Player" and make sure this code is separated from the code in our "on start"

Change this block to say "on sprite of kind Player overlaps otherSprite of kind Food" since we have Food as our other sprite

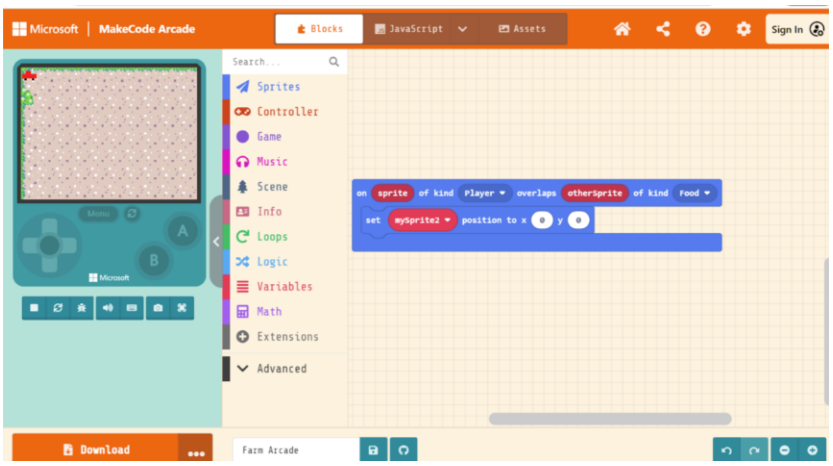


Step 15

Adding the collision

In Sprites, select "set mySprite position to x 0 y 0"

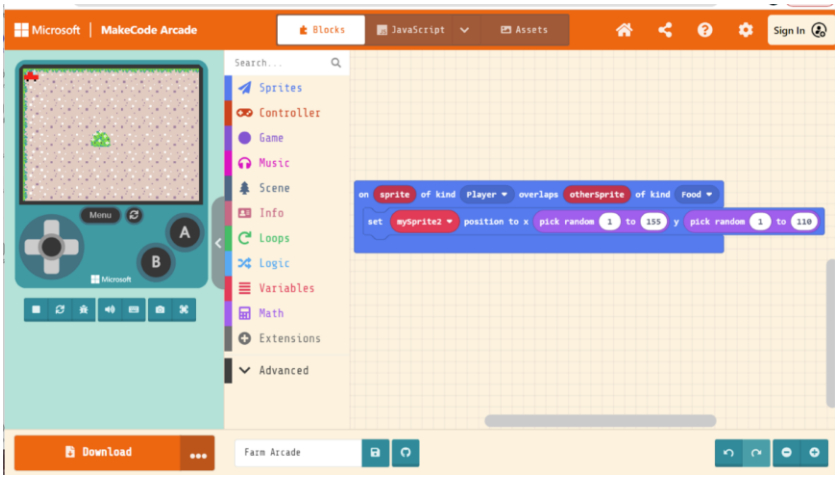
Make sure we change "mySprite" to say "mySprite2" as we want our mySprite2 to spawn



Step 16

In Math, select “pick random 0 to 10” and replace both x 0 and y 0 with this block

Make sure we change x to “pick random 1 to 155” and y to “pick random 1 to 110”



Step 17

Congratulations! You have successfully made a Farm Arcade game!

Now, try it out and make sure your code works, don’t be afraid to ask for help from your colleagues

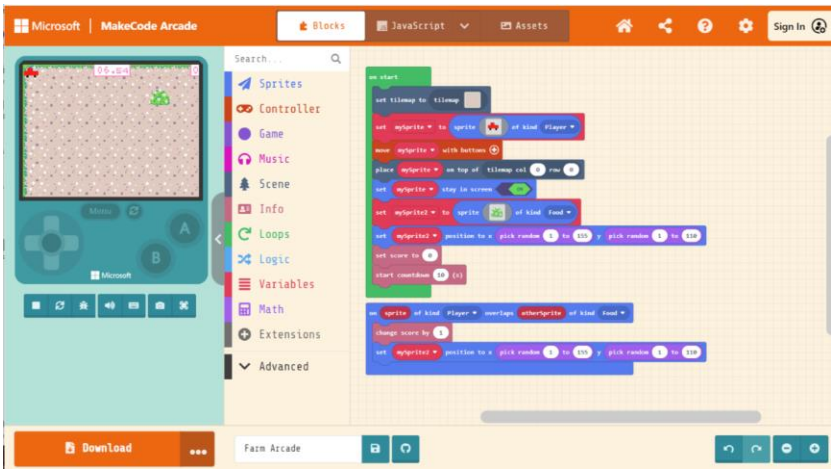
Step 18

Add some pizzaz!

Let's add a score and timer

In Info select “set score to 0” and “start countdown 10 (s)” and put those blocks into the “on start” section of our code

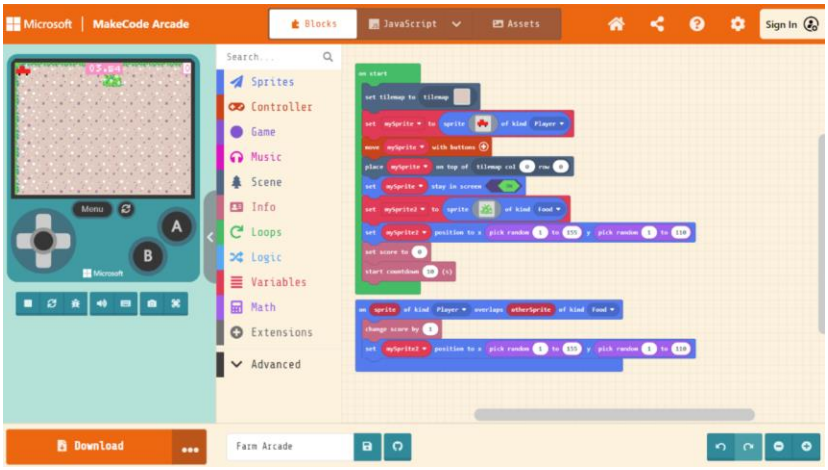
In Info select “change score by 1” and put that block into our second section of our code



Step 19

Challenge yourself to add more Food items for our tractor to collect as well as other ways to make your game more exciting!

The full completed code:



Exploring the science:

With the help of improving technologies, farming can use that technology to assist in some manual tasks. Through technology, many Candian farmers are finding ways to improve production. Today's agriculture uses sophisticated technologies such as robots, temperature and moisture sensors, aerial images and GPS technologies to allow businesses to be more profitable, efficient and environmentally friendly.

Girls in STEAM 2023

Greenhouse Effect Game

Description:

A physical game where participants learn about the greenhouse effect by simulating it.

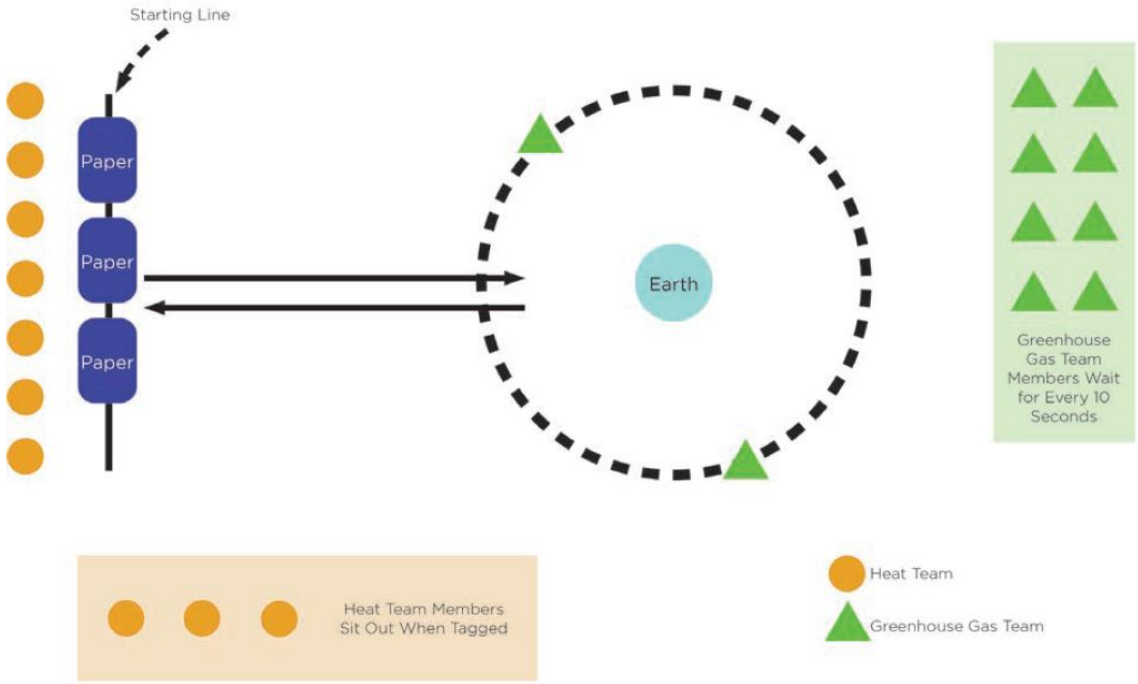
What you need:

- A large space where 25 participants can run around
- 12-25 participants
- Masking tape/Electrical tape
- Scrap/recycling paper cut into 100 smaller pieces (can have participants each cut a sheet of recycling paper)
- Timer

What to do:

<u>Set-up</u>

1. Have participants each cut up a piece of recycling paper (will need ~ 100 pieces total)
2. Holding hands, have everyone form the largest circle that they can without letting their hands go.
3. Release hands and have everyone take two big steps back.
4. Mark a circle on the ground/floor around (just outside) the circle of people using tape
5. Create a Starting Line Area (for Heat Team) 3-5 meters (10 to 15 feet) from the circle.
6. Place the scrap paper in 3 piles on the Starting Line for the Heat Team. You can use something safe to hold them down or put them in bags/buckets. IMPORTANT: Do not use objects that could hurt someone if they fell on them.
7. Divide all the players into two teams
8. Make a circle of 1 meter across in the middle of the large circle.
9. Tell everyone the small circle represents the earth and the large circle represents the atmosphere while the starting line represents the sun. See below:



Game Play

1. Start by making Team A the "Heat Team" and Team B the "Greenhouse Gas Team".
2. The Greenhouse Gas Team should pick their two fastest players to start on the circle. For the entire game any player on the Greenhouse Gas Team MUST keep both feet on the circle. The rest of the Greenhouse Gas Team waits on the side until it is their turn.
3. The Heat Team starts behind the starting line.
4. The Heat players:
    a. Grab a card from one of the three piles behind the starting line.
    b. Run into the circle and touch the earth with one foot.
    c. Return to the starting line area and give that card to the facilitator.
    d. Pick up a new card and repeat this as often as possible.
5. The Greenhouse Gas Team must run around on the circle and try to tag the Heat Team:
    a. The Greenhouse Gas Team can only tag a heat player AFTER they have entered the circle and are trying to escape back out.
    b. The Greenhouse Gas Team MUST keep both feet on the circle at all times and can move around the circle moving to the left, or to the right.
6. If a Heat player is tagged, they must give their card to the Greenhouse Gas Player that tagged them and then sit out [see drawing on page 2].
7. Demonstration: ask one player of each team to demonstrate the rules and clarify any questions.
8. At the start of game, there are 2 Greenhouse Gas players.
9. Every 10 seconds you will add a Greenhouse Gas player to the circle. Note: be strict with the timing.
10. The game ends after 3 minutes.

11. At the end of 3 minutes add up the TOTAL number of cards that the Heat Team retrieved and gave to the facilitator. This is their score.
12. Have the teams switch roles and play for 3 minutes again.
13. Whichever team gets the most cards wins.

Exploring the science:

In the game, the heat team run from the sun, through the atmosphere, to the earth. They tap the earth and then run back out through the atmosphere. However, sometimes the heat team gets caught by the greenhouse gas team and can't escape the Earth's atmosphere.

This game represents exactly what happens when heat from the Sun enters the Earth's atmosphere. Some of the sun's rays will pass through the atmosphere and hit the Earth. Of those that reach the Earth, some will be reflected back out into space, while some are caught and trapped in the atmosphere by greenhouse gases. The trapping of heat in the atmosphere by these gases is called the Greenhouse Effect because it is similar to what happens in a greenhouse; the sun's rays enter the greenhouse through the glass and become trapped inside, keeping the greenhouse warmer than outside.

Interested in exploring earth processes such as this? Consider becoming an environmental scientist! These scientists will be fundamental in finding solutions to greenhouse gas emissions and climate change.

Credit for this game goes to games@climatecentre.org

Girls in STEAM 2023

Stellarium

Description:

Learn about not only the largest objects in our Solar System, but about some of the things thousands of light-years away as well!

What you need:

- Laptop/ computer device
- Stellarium (downloadable app or online app versions available)
- Projector (optional)

What to do:

1. Launch Stellarium and hook the laptop up to the projector. Make sure you are familiar with the commands for Stellarium

The commands:

TIME:

- **J** – slow down time
- **K** – normal speed
- **L** – speed up time
- **8** – return to current time & date

MOVEMENT:

- **←↑→↓** - move around the sky
- **Ctrl ↑ & Ctrl ↓** - zoom
- **Left Click** – select object
- **Right Click** – clear selection

TOOLS:

- **G** – ground
- **A** – atmosphere

- **D** – deep sky objects
- **F11** – full screen
- **F1** – help window
- **F2** – Configuration window
- **F3/Ctrl F** – Search window
- **F4** – view window (star lore location)
- **F5** – time window
- **F6** – observer location window
- **Ctrl Q** – quit Stellarium
- **C** – Constellations (lines)
- **V** – Constellations (names)
- **R** – Constellations (art)
- **B** – Constellations (boundaries)

2. ***Hit A & G to remove the atmosphere & ground.***

3. ***C, V & R will make the constellation names, outlines & drawings appear.***

The stars in our night sky are stationary (this means they don't move) while the Earth rotates, giving the appearance that they rise and set across our sky! At different times of the year, we can see different stars and constellations, depending on where we are in our orbit.

What's a constellation? These are groupings of stars that form a pattern or image in the sky! Our constellations (Western constellations) come from Greco-Roman mythology, depicting different characters and events in their myths. These are also where our zodiac signs come from! At one time, it was believed that the planets and the zodiac signs corresponded to the organs in the human body!

4. ***Hit C, V & R to make the constellations disappear.***

5. ***Hit F4 & search Sun. Use [ ] keys to zoom in and out.***

<u>The Sun:</u>

Our Sun is roughly 93 million miles from Earth, though it only takes roughly 8 minutes to reach the surface of our planet! (Light moves at 3.0×10^8 m/s! - that is 299, 792,458m/s!)

The Sun is the closest star to us and our neighboring planets by ~4.3 light years. (Alpha Centauri is the next closest star)

The Sun is roughly 5,500°C on the surface of the star but is an estimated 15,000,000° in its center.

It is 4.6 billion years old, the same age as our Universe, and is big enough to fit one million Earths inside of it.

The Sun is mostly made up of hydrogen and helium and appears white to our eyes, though this is due to all the colors of the spectrum of light mixing.

6. ***Hit F4 & search Mercury. Use [ ] keys to zoom in and out.***

Mercury:

The closest planet to the Sun (and the smallest planet in the Solar system), Mercury is able to be seen by the naked eye from Earth!

Named after the Messenger to the Gods (Hermes in Greek Mythology and Mercury in Roman Mythology), this could be because of how fast this planet moves!

This planet makes a full orbit around the Sun every 88 days (moving at nearly 47km/s!), the shortest orbiting period of any planet in our Solar System.

7. ***Hit F4 & search Venus. Use [ ] keys to zoom in and out.***

Venus:

The second planet from the Sun, and Earth's closest neighbor and named after the Roman Goddess of love and beauty (anyone else think of a razor commercial?)

It is not only the hottest but also the brightest planet in the sky. It is the second brightest natural object in the sky, second to the sun.

One day on Venus is longer than a year on the same planet due to its incredibly slow axial rotation. (It takes 243 Earth days to complete one rotation (or day) but only 225 Earth days to complete its orbit around the sun (a year). It also rotates clockwise in its axis, whereas most other planets rotate counter-clockwise.)

8. ***Hit F4 & search Moon. Use [ ] keys to zoom in and out.***

Earth:

The third planet from the Sun and our home planet.

Only planet known to have life and liquid water (surface is 71% covered in water)

The only planet to have significant geological activity (plate movement, earthquakes, volcanoes)

The Earth's rotation is gradually slowing down, by about 17miliseconds/year, and in about 140million years our day will have increased from 24hours to 25hours.

9. ***Hit F4 & search Mars. Use [ ] keys to zoom in and out.***

Mars:

The fourth planet from the Sun, named after the Roman God of War - 1.5 AU from the Sun!

Mars is roughly half the size of the Earth (diameter is 6,791km, while Earth's diameter is 12,755km).

It would take more than 6 Mars to fill the volume of our home planet Earth!

Mars has a much less dense atmosphere than Earth: made up of 96% carbon dioxide, less than 2% argon, less than 2% nitrogen & ~1% other gasses.

Due to its thin atmosphere and distance from the Sun, the average surface temperature of Mars is -63 C, though it can reach as low as -140 C!

Called the Red Planet, this is due to its solid red surface. This is due to the high iron content of the rocks oxidizing. Mars is also home to craters, volcanoes, valleys, deserts and polar ice caps.

10. ***Hit F4 & search Ceres. Use [ ] keys to zoom in and out.***

Asteroid Belt:

Though there are thousands of objects in the asteroid belt, almost half of the mass of the belt is made up of 4 things:

Ceres - a dwarf planet, takes roughly 4.6 Earth years to orbit the Sun, though it completes one rotation around its axis every 9 hours.

The Asteroid Belt was first discovered in 1801, with Ceres the first object observed!

Objects in the Asteroid Belt are made of rock & metal, with all of them irregularly shaped. The size of objects in the belt range from as small as a dust particle, to almost 1000km wide (Ceres!)

The Asteroid Belt is referred to as the "main belt" to distinguish it from the other groups of asteroids!

11. ***Hit F4 & search Jupiter. Use [ ] keys to zoom in and out.***

Jupiter:

The fifth planet from the Sun, the first gas giant planet and the largest planet in the Solar System!

2.5x the mass of all other planets combined!

1,321 Earths could fit within Jupiter!

Named after the Roman King of the Gods because it is so large

Jupiter rests 5.2 AU away from the Sun, with a diameter of 139,822km!

Jupiter rotates on its axis very quickly (roughly a 10 hour day). This causes serious storms on its surface - the most well-known of these storms is the Great Red Spot!

This is a hurricane-like storm that is larger than 3 Earths that has persisted for over 400 years.

12. ***Hit F4 & search Saturn. Use [ ] keys to zoom in and out.***

Saturn:

Called the Ringed Planet, Saturn is the sixth planet from the Sun, this is also the second largest planet in the Solar System (also a gas giant!)

Saturn has a surface area that is 83 x larger than the Earth

This planet is mostly composed of hydrogen and helium - from what we know, the surface is gasses and a liquid core further down.

Saturn's upper atmosphere is roughly -175C

Saturn is oblate: this means that the equatorial diameter of the planet is larger than the polar diameter. This gives the visual effect that Saturn has been slightly squished!

Saturn's rings: though their origins are unknown, the rings of Saturn are composed of ice and rock. These rings are approximately 115,000km wide but only 20m thick!

13. ***Hit F4 & search Uranus. Use [ ] keys to zoom in and out.***

Uranus:

The seventh planet of the Sun & the first of the ice giants!

Ice Giant: a planet that has a solid surface made of frozen compounds

Uranus sits at 19.8 AU from our Sun (equivalent to 2.8 billion km!)

To make a single revolution around the Sun, Uranus takes 84 Earth years. Though this planet rotates slowly, the surface activity is much faster, with the wind speeds reaching as high as 900km/h!

Its atmosphere is mostly made up of hydrogen, helium and ices, such as water, ammonia & methane - this is a thick and calm atmosphere. These chemicals give Uranus a featureless and blue-green color (with an interior of ice & rock)

Uranus has 27 known moons!

14. ***Hit F4 & search Neptune. Use [ ] keys to zoom in and out.***

Neptune:

The eighth and farthest planet from our Sun!

Named after the Roman God of the Sea due to its blue color!

Close to 30 AU from the Sun, Neptune is 30x farther from the Sun than the Earth is!

Similar to the Great Red Spot, Neptune has its very own Great Dark Spot! This storm is roughly the size of Earth and has been raging for years. There is even a second spot called the Small Dark Spot that is roughly the size of our moon.

Neptune's outer atmosphere is one of the coldest places in our Solar System, reaching temperatures as low as -218C regularly!

Neptune has 14 moons, the largest of which is named Triton.

15. ***Hit F4 & search Pluto. Use [ ] keys to zoom in and out.***

Kuiper Belt Objects (Pluto):

Kuiper Belt: The region of the Solar System beyond Neptune - believed to contain comets, asteroids & other small bodies made up (largely) of ice.

This is also where Pluto is found! Why isn't Pluto considered a planet anymore?

Pluto is classified as a dwarf planet

Planets: celestial objects that are large enough to become rounded by their gravitational orbit around the Sun & clear its celestial neighborhood - this means it will absorb any close debris!

Plutonian Year - 248 Earth years

Plutonian Day - 153 Earth hours (equivalent to 6 days!)

Pluto has 5 moons! The largest, Charon, is so large that Pluto and Charon orbit each other like a double planet (binary system)

Exploring the science:

In many cultures, the stars were a reliable way to navigate the world. In Western culture, this is called celestial navigation, while in Polynesian culture, this is the art and traditional practice Wayfinding!

Can we see the stars all the time? No! Why is that?

We might not be able to see the stars all the time, but they are always there! One of the reasons we can't see the stars during the daytime is because of the Sun! We are also unable to see all the stars in our night sky even without the glare of the Sun due to our atmosphere (the envelope of gasses that surround the Earth). Another reason we can't see the stars all the time is due to light pollution!

Also check out the Girls in STEAM website for a link to a pre-recorded Stellarium journey that explores beyond our own solar system!