You have to 'Planet'!

Can you help Venus and Spark complete their mission to Mars?

Glasgow CITY COUNCIL

British Space Agency

Your Mission

Welcome everyone to the British Space Agency. You have all been specially selected to help in this country's top space programme: Mission to Mars!

You are going to help Venus and her dog Spark prepare for space flight, travel across the universe and safely land on Mars. Without you they'll never make there and back so you will need to work at your very best.

No mission every happens without some orginisation and planning which is why this project is called '*You have to Planet*' (get it). You will need to use all the resources that you have in your classroom and may even want to get your parents and guardians involved.

Work your way though each task and help us win the space race to Mars!

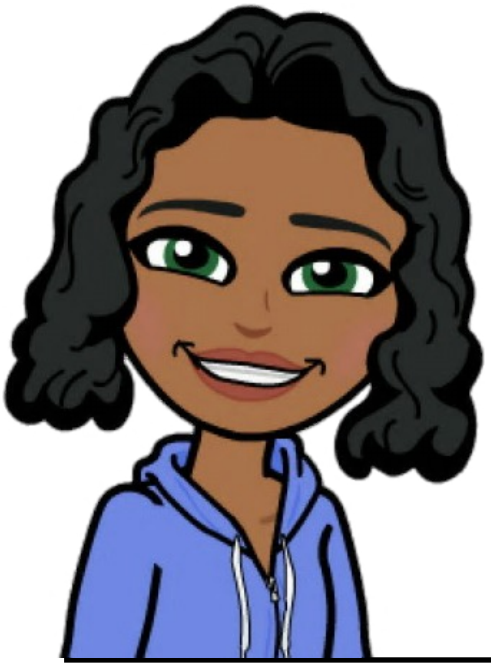
Good luck!!!!

Character Profiles

Name: *Venus*

Age: *25*

Things I love to do: *I love anything and everything to do with Space. I have always wanted to be an astronaut so I am really looking forward to the mission. I also love gardening and gowning my own healthy food*



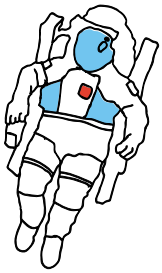
How did I get here: *I worked really hard at school and studied Physics, Art, P.E, Maths and English. I then went to college to study engineering and applied for the UK Space programme!*

Name: *Spark*

Age: *7*

Things I love to do: *Playing outside with Venus, eating dog biscuits and going on adventures!*

How did I get here: Venus takes me everywhere so of course I was going to follow her into space!



The Fake News Black hole

Previous Knowledge

This lesson builds on the First Level benchmarks of

- Recognises the difference between fact and opinion
- Discusses and expresses opinions about science topics in real-life contexts, including those featured in the media.

Lesson Aim

'Children should be able to identify the difference between fact and opinion, and share their view on scientific news articles.'

Lesson Outline

News (Topical Science; Reading – Understanding, Analysing and Evaluating)

- Use graffiti boards in groups for children to jot down anything they might have heard about STEM in the news (e.g. robots, health warnings, space exploration, construction of a new bridge, development of a new car, etc). Feedback to the class. Can any of them remember what they heard (e.g. eating bacon gives you cancer, robots are becoming sentient). How do they know if what they hear in the news is true or not? Discussion.
- Explain that we can apply our reading skills to help us work out what is true or not.
- In pairs, review the two news articles. Ask the children to highlight facts that could be checked in one colour, and more sensationalist language in another colour. Class discussion. Which article is more reliable? Have either of the article actually lied?
- How would you feel if you had only read one article and not the other?
- In groups or as a class, children can watch or read news reports relating to space and give their opinion on how reliable they think the source is. Encourage children to also share their opinion on the content of the articles. E.g. should so much money be spent on space exploration? Would they like to be a space tourist?
- Plenary – Three Little Things Children each decide on three things they have learned today and share with a partner.

Materials

- Exemplar articles
- A range of news articles relating to STEM, either in the paper or online (see Newsround website).
- Graffiti Boards
- Highlighters, pens/pencils

Experiences & Outcomes

I can report and comment on current scientific news items to develop my knowledge and understanding of topical science. **SCN 2-20b**

To help me develop an informed view, I can identify and explain the difference between fact and opinion, recognise when I am being influenced, and have assessed how useful and believable my sources are.
LIT 2-18a

Useful Websites

http://www.bbc.co.uk/newsround/38906931
BBC Newsround guide to spotting fake news.

Differentiation

Children can work in mixed ability pairs or individually,

Individual Pupils Needs (to be completed by class teacher)

Fact or Opinion? – Lesson 1

One Week Left to Live!

ONE WEEK LEFT TO LIVE!

An enormous asteroid the size of a city is hurtling towards the earth and will pass by next week - narrowly avoiding a collision, according to some scientists. Other scientists have warned that if it did hit the planet, it could mean the end of life as we know it. Whole continents could burst into flames, causing the sun to be blocked out. This would stop crops from growing, meaning that anyone lucky enough to not to die from the impact would probably starve to death. And don't even mention the mile high waves that could drown whole cities!

We asked some Glaswegians what they would do if they only had one week left to live.

"Well I certainly wouldn't waste time going to school! I'd get out to the park and see my friends, as well as spending some time with my dog Snowy." Michelle, 10

"I would spend my time eating all the cakes and junk food I wanted – if I only had a week to live I wouldn't need to worry about making healthy choices." Aziz, 17

"I'm desperate to know what happens in my favourite TV show, so I'd probably stay in and watch the box set while I had the chance." Luke, 12

Let's keep our fingers crossed that the asteroid doesn't make a stop at Planet Earth on its way through the Milky Way!

"Near-Earth" Asteroid to Pass Next Week

Scientists at NASA have reported that an asteroid, known as Florence, will pass the earth next week. Florence will sail by at a distance of 4.4million miles, which means NASA will classify it as a "near-earth" object.

This asteroid is note-worthy because of its size. It is estimated to measure 2.7 miles across, which is bigger than the asteroids normally spotted close to earth.

"While many known asteroids have passed by closer to Earth than Florence will on September 1, all of those were estimated to be smaller," said Paul Chodas, manager of NASA's Center for Near-Earth Object Studies (CNEOS) at the agency's Jet Propulsion Laboratory in Pasadena, California.

"Florence is the largest asteroid to pass by our planet this close since the NASA program to detect and track near-Earth asteroids began."

Water Rocket

Physics – Forces

Previous Knowledge

Pupils have so far started a blog about Venus and Sparks mission to Mars, discussed what 'fake news' is and even collaborated with other to make a list of essential items for their trip. Now it's time to create a launch them into space.

Lesson Aim

'By the end of this lesson pupils should be able to **discuss Newton's third law of motion and be able to design and launch their own rocket!**'

Lesson Outline

During this lesson pupils with become engineers to design and launch their own water rockets in teams. They should work in groups to make this task easier. A list of all materials needed can be found in the box to the right.

Applied physics is when you take a well known theory and test it using physical objects. This allows you to take notes and alter parts of the experiment to get the best result.

- Pupils should look at Newton's 3rd law of motion. They may have heard it before '*Every action has an equal and opposite reaction*'. Discuss how by pumping air into the bottle this creates pressure. When enough air particles are inside the bottle they look for a way to escape. They do this by pushing the water out of the bottle. The water is forced out the bottom of the bottle and the equal force to this launches the rocket into the air.

For a visual explanation watch this video by the Sci Guys!www.youtube.com/watch?V=ii6D1R6lXVA

- Have pupil split into groups and decorate their bottle with card and pens. Pupils must ensure that they do not create a hole in the bottle as this will prevent their rocket from launching.
- Pupils should also know that the bottle must be upside down. Therefore the bottom of the bottle becomes the top of the rocket. This is visible in the video suggested above.

This task can be made easier if you do the following:

1. Find a large open space outside to launch the rocket
2. Take a bucket of water out with you (this saves you having to constantly go back to the classroom)
3. Have a rain coat (teachers can get surprisingly wet)
4. Have an electric pump (your school may already have one for gym equipment)

Materials

- Empty 2 Litre bottle
- Card
- Sellotape
- Colouring Pens/Pencils
- Any extra craft materials
- Cork
- Bicycle Pump
- Water

Benchmarks

- *Explains energy transfers within a systems.*
- *Builds/simulates solutions to engineering problems.*
- *Collects, organises and displays data accurately in a variety of ways.*

Experiences & Outcomes

'*I can apply my knowledge and understanding of engineering disciplines and can develop/build solutions to given tasks*' TCH 3-12a

HOTS

Remembering, Understanding, Creating, Evaluating, Applying

Soft Skills

During this lesson pupils with develop the following:

- *Listening*
- *Communicating*

Differentiation

This task can be completed in groups and a video is available to give all pupils a visual aid.

Individual Pupils Needs (to be completed by class teacher)

The Solar System

Physics

Previous Knowledge

Pupils may know some facts about space and will be able to name some of the planets however they may not know why some planets cannot support life. This lesson pupils will look at why travel to space, the different planets and their properties. They will then make a paper mache solar system.

Lesson Aim

'By the end of this lesson pupils should have a basic understanding of how the solar system and planets were created, why the sun is important and how far some planets are from the sun in relation to Earth'

Lesson Outline

During this lesson pupils will learn about how our solar system was created and why some planets are more suitable for life than others. They will then create a Papier mâché model of our solar system in teams to hang in the classroom.

- So far the class have helped Venus and Spark get into space and test out everything their rocket can do. When they look outside the window they can see our whole solar system but how did this start? Show the class the video at this link: It will tell them how our universe began.
- Have a class discussion about why they think some planets are not suitable for life. A clue is that it is all to do with heat and light!

Once you've had the class discussion let the class watch this video: www.youtube.com/watch?V=6FB0rDSR_rc

- Split the class into groups and give each group a balloon, glue and some tissue paper. Give each group a planet to make. Put a diagram up on the board to help them with the colour and size.
- Take each of the papier mâché planets into the gym hall and place the sun in the centre of the room.
- Place the planets around the sun in order of what is closest to what is furthest away
- Now use a ruler and a scale to give a more accurate representation of how far away some planets are from the sun.

Materials

- Compter/projector
- Balloons
- Tissue Paper
- Water/PVA Glue
- Large open space
- ruler

Benchmarks

- *Reports collaboratively on the key features of the planets including size, distance from the sun, length of day, year, temperature, materials for which they are made and the number of moons.*

Experiences & Outcomes

'By observing and researching features of our solar system, I can use simple models to communicate my understanding of size, scale, time and relative motion within it.' SCN 2-06a

HOTS

Remembering, Understanding, Creating, Evaluating

Differentiation

Parts of this task can be done in groups.

Soft Skills

During this lesson pupils with develop the following:

- *Listening*

Individual Pupils Needs (to be completed by class teacher)

Non- Fiction Writing

Media and Research

Previous Knowledge

Knowledge of fact and opinion from previous lesson Planet names

Lesson Aim

'The children will use a variety of media to collect and organise relevant information for future use.'

Lesson Outline

1. Introduction to connect the learning from previous lesson revisiting the differences between fact and opinion and identifying the relevant information that could be used.

2. Big Questions identified (what, where, when, how, why)

3. Planning page for recording information collected from research. Discuss suitable headings, title, big question(s),search engine used, website accessed, relevant information.

4. Using the smartboard teach accessing a search engine (log on, search engine and suitable phrases/words to use)

5. Children to use search engine(s)and/or nonfiction texts to collect and record information using concise phrases/words

6. Ask children to report back how search is progression and suggest suitable sites/texts

7. Children to complete planning page to identify research completed and relevant information to be used.

8. Plenary – children to re-visit Big Questions and suggested answers

Materials

- Big Questions
- Search engines – Google
- Variety of non-fiction texts (science)
- Planning page – questions/recording sites used/supporting evidence Class/child login details

Experiences and Outcomes

By considering the type of text I am creating, I can select ideas and relevant information, organise these in an appropriate way for my purpose and use suitable vocabulary for my audience. LIT 2.26a

I recognise the need to acknowledge my sources and can do this appropriately. LIT 2-25a

Differentiation

Planning page printed with headings

Search engines listed/Suggested/suitable texts

Phrases/words completed with support

Scribe if necessary

Useful Websites

https://solarsystem.nasa.gov/kids/index.cfm

www.kidsastronomy.com/solar_system.htm

www.planetsforkids.org

Individual Pupils Needs (to be completed by class teacher)

Note Taking

Research

Title:

Big Questions:

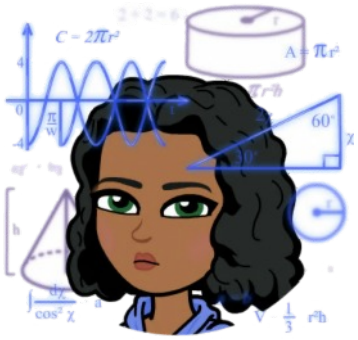
Search engine used:

Useful Websites

Relevant Information

Mars Landing Pod

Physics



Previous Knowledge

So far pupils have helped Venus and Spark travel into space and learn all about the Solar System. It is now time for them to land on Mars but they need a little help. To safely land on Mars without getting hurt so pupils will have to create a 'landing pod' for Venus and Spark. This will put pupils problem solving and critical thinking skills to the test and ask them to come up with some creative solutions!

Lesson Plan

'The aim of the lesson is for pupils to use their problem solving and critical thinking skills to engineer a landing pod for Venus and Spark'

Lesson Outline

For this lesson pupils will be using cardboard and other basic craft materials to create a landing pod for Venus and Spark. Some suggested materials for this lesson have been suggested in the box to the right but you may use whatever is available. Once complete an egg should be placed inside and then the landing pod should be dropped from a measured height. The best landing pod should be able to protect the egg even when dropped from a height of over 2 meters.

- Discuss with pupils the story they have created for Venus and Spark so far. Tell them that it is now time for the character to land on Mars.
- Split the class into groups of 2 - 4 and had out a variety of craft materials.
- Explain to pupils that they are to use the materials to create a landing pod that will protect an egg when dropped from heights of over 1 meter.
- Pupils are allowed to use a variety of the materials provided for this. The aim is that in the class will have a mixture of solutions by the end.
- If pupils want to test their landing pods prior to the final test let them. This encourages problem solving and critical thinking during the task.
- Set pupils to task and then stop 10 minutes before the end to have time to test the pupils designs.

Materials

- Cardboard
- Colouring pens/pencils
- Cotton Wool
- Straws
- Glue
- Sellotape
- Tissue Paper

Benchmarks

- *Builds/simulates solutions to engineering problems*
- *Describes practical applications of magnetic, electrostatic and gravitational forces.*

Experiences & Outcomes

'I *can extend my knowledge and understanding of engineering disciplines to create a solution*' TCH 2 -12a

'I have collaborated in investigations to compare magnetic, electrostatic and gravitational forces and have explored their practical applications' SCN 2-08a

HOTS

Remembering, Understanding, Creating, Evaluating

Differentiation

This task should be completed individually by each pupil.

Soft Skills

During this lesson pupils will develop the following:

- *Listening*
- *Communicating*

Individual Pupils Needs (to be completed by class teacher)

Space Gardening

Biology

Previous Knowledge

Pupils have so far managed to get Venus and Spark through space and safely landed on the planet Mars. They now have to look at how to create a sustainable environment for people to live on Mars. This involves growing plants. Pupils should know the basics about growing plants already (sun and water).

Lesson Aim

'By the end of the lesson pupils should **understand what fair testing is** and why it is is a crucial part of any science experiment.'

Lesson Outline

For this lesson pupils will become biologists and conduct a series of experiments while trying to grow plants. You can grow whatever is at your disposal i.e. flowers, grass etc.

Discuss that what Fair Testing is (conducting the same experiment in the same condition but changing one element) as this is the only way to achieve true and reliable results.

- Discuss with pupils that an important part of space exploration is finding new plants that can grow food and plants. For this lesson pupils will work in groups and try to grow 3 separately potted plants.
- They will add a different to each of the pots of soil and monitor what plant grows quickest.
- For the first plant pupils should use regular soil in the pot. They should plant the seeds about 2cm below the surface and keep the pot next to the window. They should water the plant each day.
- For the second plant pupils should mix in the contents of a bag of green tea and some crushed egg shells. They should again plant the seeds about 2cm from the surface, keep the pot next to the window and water daily.
- For the third plant pupils follow the same process as plant 1. Use ordinary soil, plant the seeds 2cm below the surface and keep the pot next to the window. However, when watering the plant pupils should add some Persil Bio (or any other Bio detergent). One cap of this should be diluted with 2 litres of water.

Pupils should monitor the progress of each of the plants and see what ones grow fastest. Do the contents of the soil increase the rate of growth?

Please ask pupils to take notes of this over the course of the week. As this will help them write up their official Lab Report!

Materials

- 3 plant pots for a group of 4 pupils
- Seeds
- Persil Bio (or any other Bio detergent)
- Eggs Shells
- Green Tea Bags
- Soil
- Window Ledge
- Water
- Pen/Paper (for notes)

Benchmarks

- *Collaborates with others to present a reasoned argument, based on evidence, of the risks and benefits of using fertilisers, demonstrating understanding of the underlying scientific concepts*

Experiences & Outcomes

'I have collaborated in the design of an investigation into the effects of fertilisers on the growth of plants. I can express the informed view of the risks and benefits of their use' SCN 2-03a

HOTS

Remembering, Understanding, Creating, Evaluating

Differentiation

This task should be completed individually by each

Soft Skills

During this lesson pupils with develop the following:

- *Listening*
- *Communicating*

Individual Pupils Needs (to be completed by class teacher)

News Article

Non-Fiction Writing

Previous Knowledge

Children will have had some experience of writing a report. They will be using notes from the previous lesson and reflecting on themes from lesson one.

Lesson Aim

Children will be able to use their notes to write a factual news article.

Lesson Outline

- Using cuttings from newspapers/online news sources, discuss the layout of newspaper articles. Point out features such as headlines, sub-headings and inserted fact boxes.
- Work in pairs to plan the content of the article (have planning frames available). Use notes made during research lesson to create factually correct boxes; the main body of the article could be about Venus and Spark's journey.
- Review plans with another pair – have they included enough facts? Discuss language – how will they make sure that their article isn't fake news?
- Either individually or in pairs, write the article. Have writing frames available.
- Collate articles to form either a class or collection of group newspapers; class can decide on format. Can be done electronically or on paper.

Materials

- Examples of articles
- Planning template (if using)
- Writing frame (if using)
- Laptops (if using)

Experiences & Outcomes

By considering the type of text I am creating, I can select ideas and relevant information, organise these in an appropriate way for my purpose and use suitable vocabulary for my audience. **LIT 2-26a**

I can convey information, describe events, explain processes and combine ideas in different ways. **LIT 2-28a**

I can use my notes and other types of writing to help me understand information and ideas, explore problems, make decisions, generate and develop ideas or create new text. I recognise the need to acknowledge my sources and can do this appropriately. **LIT 2-25a**

Useful Websites

http://www.telegraph.co.uk/news/science/12044388/Tim-Peake-15-amazing-facts-about-the-astronauts-journey-to-the-International-Space-Station.html

Article includes fact boxes, timelines and other diagrams.

www.teachingkidsnews.com

www.sciencedaily.com

www.dogonews.com

Differentiation

Children can work in mixed ability pairs or individually, as appropriate.

Writing and planning frames can be made available, either on paper or electronically, as appropriate.

Individual Pupils Needs (to be completed by class teacher)

Planning the Article

Non-Fiction Writing

Ideas for headlines

Paragraph 1

Sub-heading:

Notes:

Paragraph 2

Sub-heading:

Notes:

Fact Box

Title:

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Picture to illustrate your article!

News Article

Non-Fiction Writing

(Insert Headline here)

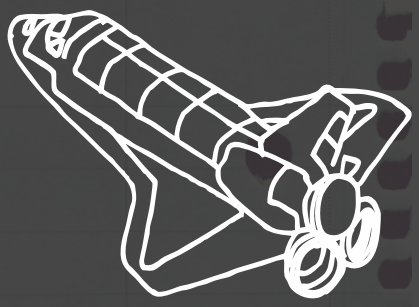
Sub-heading 1

Sub-heading 2

Top ten space facts!

Amazing work!

Has completed the Glasgow City Council Space resource and Venus and Spark to Mars and back.



Glasgow City Council

STEM Glasgow and the Leaders of Learning

Space Resource - Non Fiction Writing/Science/Numeracy