Girl Guides of Canada Guides du Canada
Instant Meeting

GGC Make A Difference Days

World Space Week

October 4 – 10, 2017

WORLD SPACE WEEK: BEYOND THE NIGHT SKY

This instant meeting, will bring girls closer to the stars and spark their interest in all the wonders of space exploration. Girls have always been fascinated by the night sky, which plays a strong role in the history of Guiding. However, there is so much more to our connection with space than as a backdrop to campfires or unit meetings. Space gives girls the opportunity to imagine the infinite possibilities of our universe and explore the unknown.

The Canadian space program has benefited from the courage and creativity that Guiding provides. Earning her astronomy badge as a Guide helped launch Dr. Julielynn Wong's science career. Today, she's renowned for her revolutionary work in creating blueprints for 3D printed medical equipment in space. Honorary Lifetime GGC member Dr. Roberta Bondar was Canada's first female astronaut. In February of 2017 she marked the 25th anniversary of her Discovery shuttle mission, where she spent eight days orbiting Earth as one of the first neurobiologists to conduct experiments in space. With women like Dr. Wong and Dr. Bondar leading the way, the universe is definitely ready for the contribution of GGC's creative, innovative, and courageous girls.

LET'S CONNECT
Share your photos!

Don't forget to share your exploration with us and others around the world using **#WSW2017** and tag us:

Girl Guides of Canada @girlguidesofcan @girlguidesofcanada

OBJECTIVE AND OUTCOMES

This instant meeting offers the opportunity to celebrate World Space Week 2017. It can be completed in one meeting.

Complete the **STARTER ACTIVITY** (page 4) and the **CLOSING ACTIVITY** (page 20) as well as two to three other activities. After completing this instant meeting, Guiders can choose to present core program badges for their branch found on girlguides.ca > Specialized programming > Make a Difference Days > World Space Week.

Look for the outdoor icon throughout this instant meeting. This icon identifies activities that can easily be done outdoors with little or no modification.

LEARNING OBJECTIVE:

- Girls will be inspired by space and space exploration and develop the confidence to share/promote what they've learned within their own community.

LEARNING OUTCOMES:

Girls will:

- Think critically about space exploration and ask questions about the universe.
- Collaborate and communicate while developing and testing hypotheses about space.
- Build their confidence to develop innovative ideas about space exploration.

BEGIN the instant meeting with this Starter Activity.

STARTER ACTIVITY: MORE THAN MEETS THE EYE

Go outside as a unit and have the girls look up into the sky. Give them a few minutes to observe before leading them in a discussion about space. You can ask:

- As you look up, what are you thinking about?
- When you look up into the sky, how does it make you feel?
- What do you wonder or imagine might be out there?
- What interests you most about space?
- If you could travel to space, where would you go? What would you do there?

Depending on the other activities you have chosen, you can either complete the rest of your meeting outside or return to your meeting space.

NOTE: Alternatively, share with your unit photos or videos of the night sky. National Geographic has some amazing time lapse videos at https://goo.gl/4mRgcj. If you have a projector you can even project them on the ceiling to create the illusion of sitting under the stars. Remind girls that all the stars and planets they are looking at are still there during the day, even though we can't see them.

CONTINUE your meeting by selecting two or three activities below.

LOOKING TO THE SKY

"I have loved the stars too fondly to be fearful of the night."
– "The Old Astronomer", poem by Sarah Williams

This series of will activities launch girls' exploration of space by starting with what they can see right from where they stand on Earth.

ACTIVITY 1: DISTANCE TO THE MOON

(*Modified from the World Space Week Heinlein Teacher Guide 2011. goo.gl/Pxzjvr*)

Most evenings, the biggest and brightest object in the night sky is the moon. Because it is so clearly visible, it seems closer than it actually is. In this activity, girls will form hypotheses – educated guesses – about the distance between the Earth and moon and then test out their theories.

MATERIALS (ONE PER GROUP OF UP TO FOUR):

- A blue or green balloon
- A white golf ball
- Approximately 15 m of string or yarn
- Two post-its or flags to act as markers

Organize the girls into groups of two to four and hand out all of the materials. Have the girls inflate their balloons so that they are about 60 cm around the middle. For younger girls, you may want to have the balloons already inflated. Explain that the moon is about 27% the size of Earth or the size of a golf ball compared to a balloon. Using their balloon and golf ball, the girls in each group should discuss how far apart the balloon and golf ball should be, and come up with a hypothesis to test. To show their hypothesis, they will put their balloon on the ground and place the golf ball where they think the moon might be. Once all the groups have completed this step, have them stick a post-it on the floor to mark where they placed their Earth and moon.

NOTE: Did you know that the moon is actually 384,400 km away from the Earth? That's about 10 times around the circumference of the Earth. When girls are making their models, they are using relative distance because they are figuring out about how far, or the estimated distance. Remind them that they are imagining that Earth is only the size of a balloon and the moon is only the size of a golf ball.

Now the girls will figure out the actual scaled distance between the moon and Earth. Using their balloon and the string, the girls will figure out the relative distance between Earth and the moon by wrapping the string

around the circumference of the balloon 10 times. At the end of the tenth wrap, they should cut the string and then place their balloon back on the spot they marked in their hypothesis. Next, have them stretch out the string so one end touches Earth and place their moon at the end of the outstretched string. This is an accurate, scaled model of the distance between the Earth and the moon. Once they've created their model, have them compare their hypothesized distance to the actual distance. How close did they come to predicting the relative distance?

Bring the girls back together and ask them about some of the challenges they had developing their hypothesis. Additional discussion questions could include:

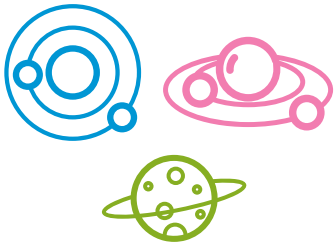
- When else might a hypothesis be useful when thinking about space?
- What types of hypotheses do you think scientists make before they travel to space?

ACTIVITY 2: PLANETARY DISTANCE

In this activity, each girl is going to create a wearable model using the planets in our solar system.

MATERIALS (PER GIRL):

- Eight different coloured beads
- String
- Clasp, keychain or hook
- Thirty-three other beads in black, white or clear



Start this activity by asking the girls to list all the planets they know of in our solar system. You can fill in the ones that they miss.

NOTE: There are eight planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. In 2008, it was decided by the scientific community that Pluto was not a planet.

Did you know there are three scientific criteria for planets to be classified as planets ? A planet needs to be:

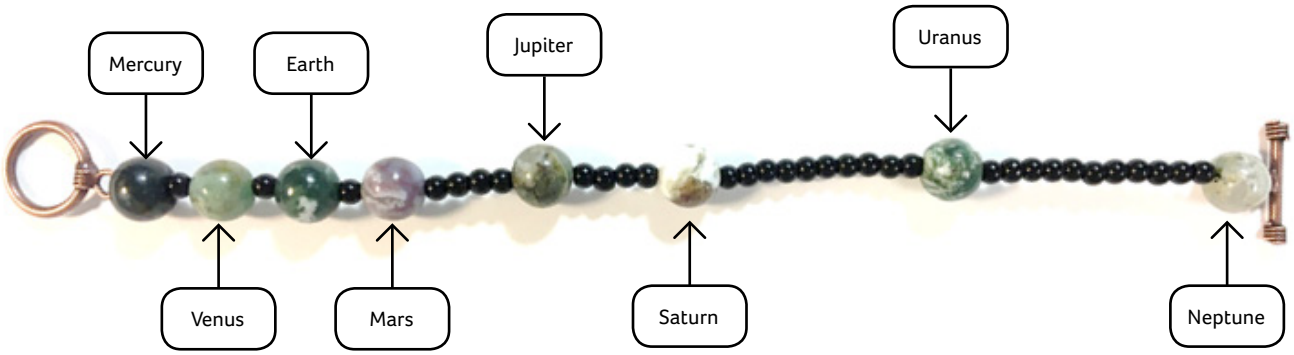
1. In orbit around the sun.
2. Have enough gravity to pull itself into a spherical shape.
3. Have "cleared the neighbourhood" of its orbit so it can travel on its path without being jostled by other objects in space. This is the main reason Pluto is no longer considered a planet!

Have the girls start by tying on the clasp or making a knot with a loop at the end of their string. Have them string the first coloured bead on to represent Mercury. (This is the planet that's closest to the sun.) Then, string on one of the black, white, or clear beads after it. Use the information below to help the girls string the rest of their bracelet.

Distance between:

1. Mercury and Venus: 1 bead
2. Venus and Earth: 1 bead
3. Earth and Mars: 1 bead
4. Mars and Jupiter: 4 beads
5. Jupiter and Saturn: 4 beads
6. Saturn and Uranus: 10 beads
7. Uranus and Neptune: 11 beads

After the girls have strung Neptune onto their bracelet, they will tie off the end. They can finish their activity by laying out their model in a line to see the estimated distance of our entire planetary system. Remind them that the clasp/knot represents the sun. Have them share their ideas about how each planet's distance from the sun might impact that planet (e.g. temperature, seasons, etc.). You can also have them discuss how the distance between the planets could impact or limit space exploration (e.g. how Mars' nearness to Earth makes it easier to explore than Neptune.)

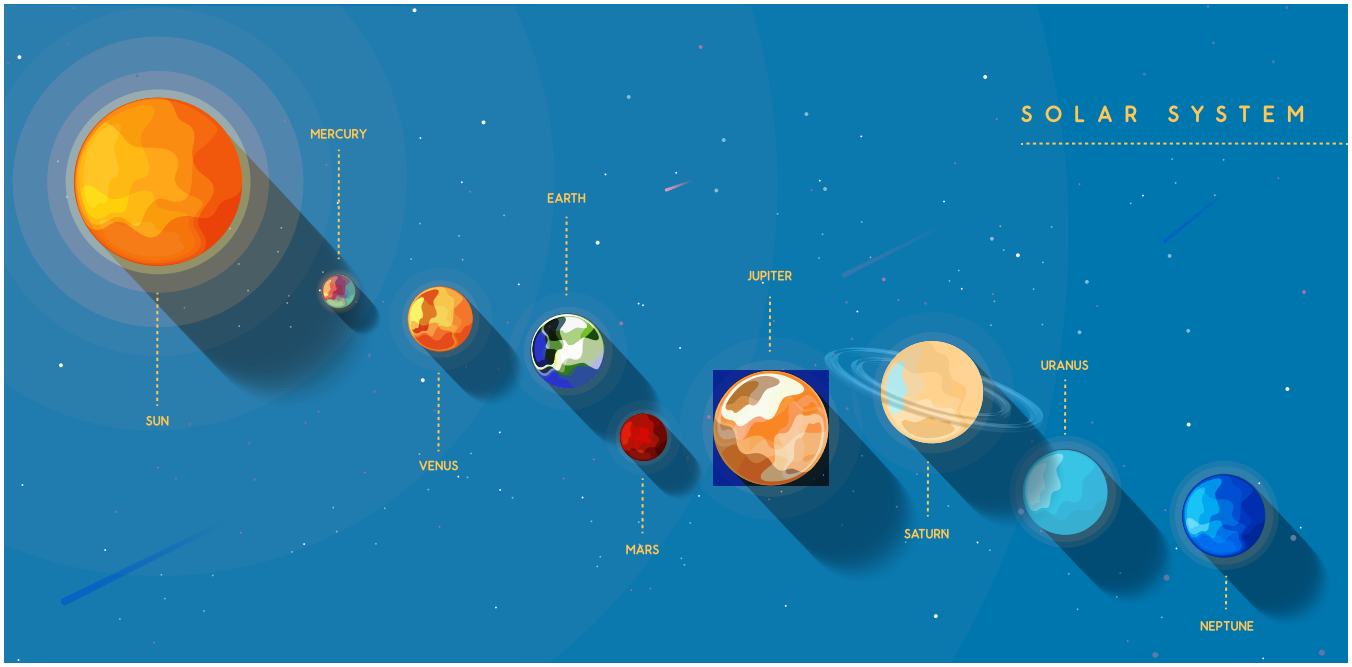


NOTE : To create longer or shorter pieces, you can change the number of beads in between. If you want to create something that can be worn as a necklace just double the number of beads listed.

The piece the girls make can be turned into anything! They can make bracelets, necklaces, zipper pulls, backpack decorations, or add it to their camp hat. Just replace the clasp with a key chain or hook and let the girls decide what to do with it.

EXTENSION:

You can have the girls use beads that match the colours of the planets or add rings using circular beads or shell beads around Saturn or Uranus to create a more accurate visual.



EXPLORATION

"Space: the final frontier." – Star Trek

This series of activities will give girls the chance to learn more about how scientists explore the universe.

ACTIVITY 3: CODE THE ROVER

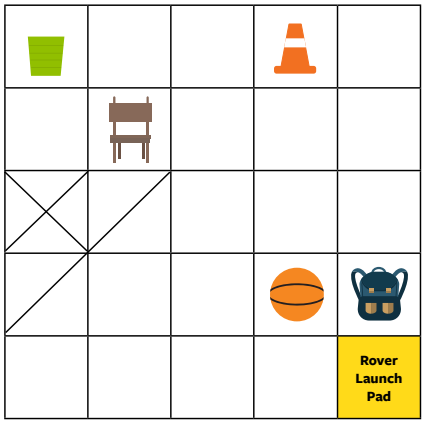
(*Modified from NASA's Code the Rover Game from goo.gl/s7hhtG*)

Code is a language that gives the instructions used in computer programs. The instructions for the four Mars rovers are coded by computer engineers at NASA (National Aeronautics and Space Administration) more than 75 million kilometres away! In this activity, girls will learn more about programming as they navigate using a rover.

MATERIALS:

- Large grid on the floor – use painter's tape or a square tiled-floor
- Five or more objects that can be placed in the grid as obstacles
- Tennis balls (one per pair of girls)
- Bucket
- Alternative – materials to make an obstacle course

Lay out a grid on the floor of your meeting space using painter's tape. It can be as large as the space allows and each square should be big enough for a girl to stand comfortably within it. When adding obstacles, you can use ones that the girls can move out of their way, such as cookie boxes, craft supplies, or garbage cans, and ones that are permanent, such as crossing out squares with tape. Set up a bucket where the course ends. The girls are not allowed to stand in a square if there is an obstacle in it.



Explain to the girls that robots called rovers are sent to Mars to gather information about the planet using electronic sensors. Scientists and computer engineers at NASA program the rover with a series of instructions for the tasks that they want completed, such as studying samples or taking photographs of the planet.

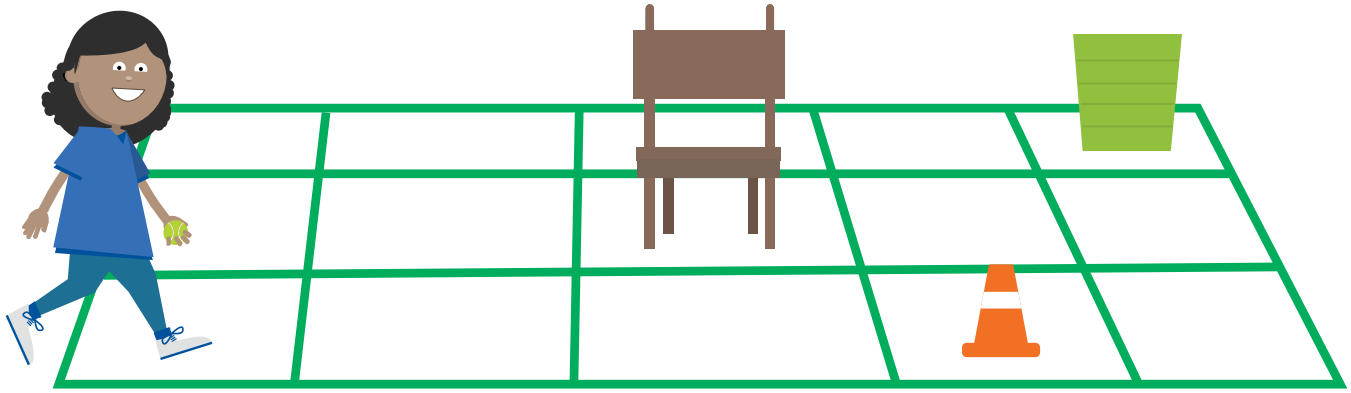
Group the girls into pairs and have them decide who will be the rover and who will be the programmer. Give each rover a tennis ball and explain they are going to be working with the programmer to get the ball into the bucket. The rover will start on the launch pad in the corner of the grid and the programmer will stand outside the grid to give the rover the instructions needed to get to the bucket. Explain to the rovers that they can only do what the programmer tells them to do. For instance, move right three squares or take two steps right then move up one space. For added variation, programmers can also tell rovers to move obstacles to other squares to mix up the course.

NOTE: If you use a 5x5 grid, the girls should be able to travel the course relatively quickly, and when they take turns they can learn from those who went before them. However, if you have a larger unit, you may want to set up two grids.

After one rover from each group has successfully completed the obstacle course, pause the game and ask the girls to share some of their strategies. Once they have shared their ideas, switch girls and have them try the obstacle course again. Ideally, the second rover should experience greater success because of her experience and the feedback from the discussion. After they have completed the second run, bring them together and ask them to compare their experiences and discuss the importance of giving clear instructions. You can also ask them to imagine the challenges that the rover might face if there is not clear communication from Earth.

NOTE : To make this an added challenge for older girls, you can introduce the concept of technical difficulties into the activity. Instead of communicating in words, the girls can work together to create a code that is made up of sound effects like hums and beeps. They could also have the rover only hear every second or third word or have other girls make interfering noise, or have the programmer speak in a whisper for added variations.

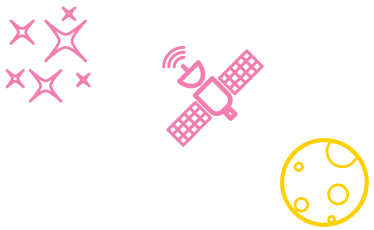
For those who are looking for more coding experiences, NASA has a version of the rover coding game the girls can check out: https://goo.gl/GgmjhF



ACTIVITY 4: PROBLEM SOLVING IN SPACE

In 2017, the film *Hidden Figures* profiled the amazing women were responsible who for making sure that NASA's new super computers made correct calculations by double checking all the problems themselves. In this activity, girls will put their own problem-solving skills to use.

MATERIALS (OPTIONAL):



- Pencil and paper
- Board or chart paper to display the problems
- Stations with a problem at each one
- Optional: Problem Images page 22

Organize the girls into groups of between three and six and give each group one problem. Explain that they are going to work together to solve the problem. The girls can approach the problems in a variety of ways, and the solutions provided are just the most efficient solutions, not the "right "ones. The important part is that they work together to find a solution. Encourage girls to use a variety of strategies such as drawing, acting the scenario out, or writing their solutions.

NOTE: You may need to remind girls at various points in their problem-solving process that there is more than one way to solve these problems and that there is more than one right answer. If they are struggling, you can give them a hint to help them come up with a strategy. The goal is to solve the problem in a way that makes sense to them, not to find a "right" answer.

There are a few ways to approach this activity: For younger girls, you may want to choose one problem, such as alien jump, and have them work in groups to solve it. For instance, you can read them the rules and have them act it out so they are solving it together instead of reading it. If they are trying all three problems, you can have a Guider with each group to help with reading. You may want to cut out the figures, or make grids to help the girls manually manipulate the characters to help them solve the problem.

Problem: Alien Jump (adapted from the *Jump the Chips* puzzle)

There are two types of aliens on Jupiter, gooey-groaners and star-steppers. There are three gooey-groaners and three star-steppers who are trying to cross a pit by jumping on asteroids. There are seven asteroids in total.

The gooey-groaners are lined up using the three stones to the left and the star-steppers are lined up using the three stones to right. There is one empty stone in between them. To cross the pit, they need to switch sides by following these rules:

- An alien can only move to an empty space if it is beside them.
- An alien cannot jump over two aliens or over an alien of the same type.
- An alien can jump over a different type of alien only if there is an empty space to land in.

How many moves do you need to change their positions?

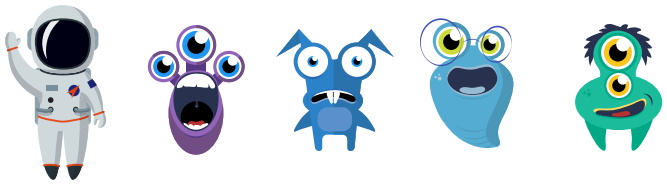
Possible solution: Fifteen moves is the minimum number needed to complete the puzzle. One strategy that girls can try if they are stuck is to look for ways that create an alternating gooey-groaner and star-stepper pattern. For a video explaining the solution, check out https://goo.gl/vI3VH1

Problem: Troublesome Transport (adapted from the Cross the River puzzle)

An astronaut has to transport aliens across an asteroid belt. She is transporting a squat-squiggler, a star-stepper, a gooey-groaner, and a wily-wiggler. She has a shuttle which can carry her and one of the creatures. If the astronaut isn't present:

- The squat-squiggler will eat the star-stepper and the gooey-groaner.
- The gooey-groaner will eat the wily-wiggler.
- The star-stepper will protect the wily-wiggler when they are together.

Help the astronaut cross the asteroid belt.



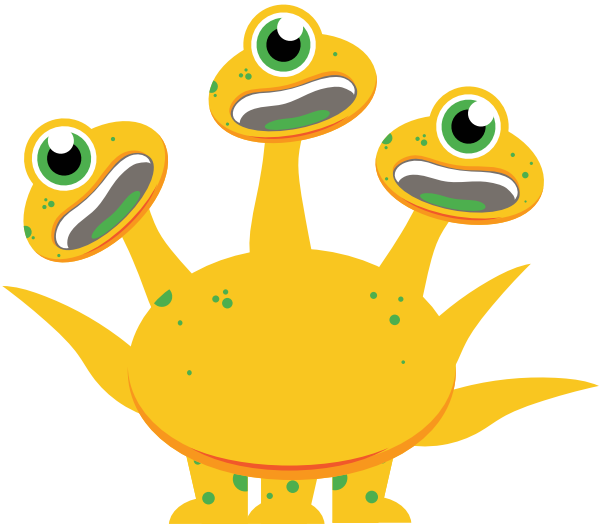
Possible solution: The first step is for girls to find a way to organize all the information they are given. Once they have done that, the solution may appear to be relatively straightforward. To safely transport all the aliens, the astronaut must first take the squat-squiggler, then the wily-wiggler, and the third one is either the star-stepper or gooey-groaner.

NOTE: For younger girls, you can change the problem to only three aliens. For example, the astronaut is transporting a squat-squiggler, a star-stepper, and a gooey-groaners. She has a shuttle which can carry her and one of the creatures. If the astronaut isn't there, the star-stepper will eat the gooey-groaners and the squat-squiggler will eat the star-stepper. How can she transport all three across the asteroid belt?

Possible Solution: She should take the star-stepper first because the squat-squiggler will not eat the gooey-groaners.

Problem: Defeat the Alien (adapted from the *Sword of Knowledge* puzzle – this is a challenging puzzle)

An alien has three heads and three tails. You can only defeat it by cutting off all its heads and tails. With one swipe you can cut off one head, two heads, one tail, or two tails.



But...

When you cut off one head, a new one grows in its place.
When you cut off one tail, two new tails replace it.
When you cut off two tails, one new head grows.
When you chop off two heads, nothing grows.

What order do you cut off the heads and tails to save the world from the alien?

Possible Solution: One way that works includes the following steps:

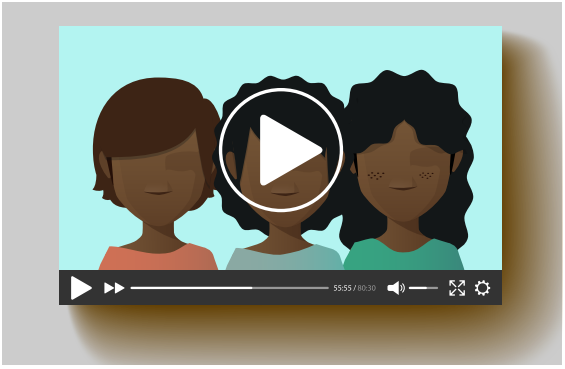
1. Cut 1 tail (now: 3 heads, 4 tails)
2. Cut 1 tail (now: 3 heads, 5 tails)
3. Cut 1 tail (now: 3 heads, 6 tails)
4. Cut 2 tails (now: 4 heads, 4 tails)
5. Cut 2 tails (now: 5 heads, 2 tails)
6. Cut 2 tails (now: 6 heads, 0 tails)
7. Cut 2 heads (now: 4 heads)
8. Cut 2 heads (now: 2 heads)
9. Cut 2 heads – Slain!

If you would like to include more (or different) logic puzzles, check out the SNAP Math Fair website http://www.mathfair.com/ or Galileo.org https://goo.gl/M7rVF9 .

After the girls have had a chance to solve the problems, ask them to share their solutions and strategies. There are many different approaches to these problems and there is no "right" answer, just more efficient solutions. If time permits, girls can test each other's strategies to see if this helps them reach the solution more efficiently. You can also ask them to think about and share how they may use their problem-solving skills in other areas of their life.

EXTENSION:

Host a *Hidden Figures* movie night and share with girls the other amazing women working with NASA and the Canadian Space Agency (CSA). For younger girls, you can choose a movie such as *Home* and have them share their ideas about what they would do if an alien crash landed in their backyard.



For more information about some of the brilliant women working with the space program both in the past and present, check out:

- Humans of the CSA: https://goo.gl/miEBhE
- Biography for Katherine Johnson: https://goo.gl/rQAW6H
- Roberta Bondar juggling Girl Guide cookies in space: https://goo.gl/9Xo8Fv
- Biography of Julie Payette: https://goo.gl/d9UIzT
- Women who made it to the top 32 of the recent Canadian astronaut recruitment: https://goo.gl/6VW4Vb

ACTIVITY 5: LIFE ON A SPACE STATION

(Modified from "Moving and Working in Space" from the Canadian Space Agency.)

Astronauts face many challenges when they are living on the International Space Station (ISS). In this activity, girls will experience some of the physical difficulties that astronauts face.

STATION 1: WEIGHTLESSNESS
MATERIALS:

- Small super bouncy balls
- Open-space with a hard floor

Astronauts on the ISS often have items react in unexpected ways when they are working – they may float away or bounce when they are touched like a rubber ball. At this station, girls will try to play catch with a super bouncy ball to demonstrate what it's like trying to work in weightlessness. Organize the girls into groups of three or four and have them form a triangle or square. Give each group a ball and have them bounce the ball to each other. The girls can throw the ball so it is a challenge to catch or add a creative twist to their bounce such as by jumping or bouncing it in between their legs. They can also add several bouncing balls at a time and try to keep track of the one that's theirs.

STATION 2: SPACE SUIT
MATERIALS:

- Oven mitts
- Jar or container with a twist lid
- Optional: screw driver, screw and a piece of wood

Astronauts frequently have to leave the ISS to work in outer space while wearing bulky protective suits. At this station, girls will experience the difficulty of working in spacesuits. Have the girls put on the oven mitts and try to open a container with a tightly closed lid. To make it even more challenging, this station can also include a task to drive a screw into a piece of wood, try to put on their shoes, or tie a reef knot.

STATION 3: WORKING ON A TETHER
MATERIALS:

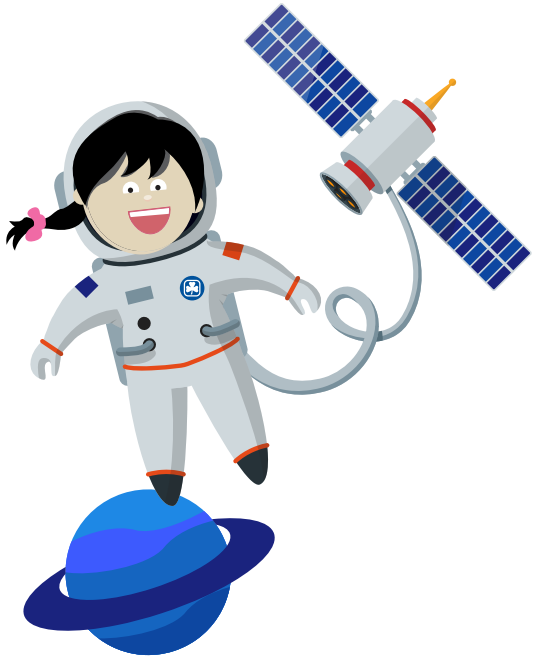
- Long rope or string
- Multiple carabiners or devices to hook girls to rope
- Items for the girls to complete their tasks (see task list below)

Astronauts are often tethered to their workspaces on the ISS so they don't float away while they are trying to complete a task. At this station the girls will try to navigate a physical challenge while being tethered. Hang a long rope across the meeting space using chairs, or tape or Guiders. The rope does not have to stay taut but should be anchored. Clip a group of no more than six girls to the rope using the carabiners. Have the girls start in the middle of the rope and give each girl a task or item.

Tasks could include:

- Move a bean bag from one end of the rope to the other.
- Stack a pile of boxes that are scattered within reach of the rope.
- Roll a ball into a bucket without it escaping the reach of the rope.
- Bounce a balloon over the heads of three other girls who are tethered.

Explain to the girls that their job is to complete the task, and that they can use any means to do so – except unclip themselves. Ideally, they should realize on their own that they can easily complete all the tasks they were given if they work together.



Once the girls have had the chance to try all the stations, bring them together and have them share some of the challenges they experienced. Have them share some of the empathy they may have experienced for astronauts and their unique living environment.

ACTIVITY 6: ROCKET LAUNCH

Rockets are used to help give shuttles and satellites the boost they need to leave the atmosphere and reach outer space. In this activity, girls will experiment with propulsion and create their own rockets. Part of the challenge of this activity will be for girls to design a rocket that is both fast and can travel a far distance.

MATERIALS:

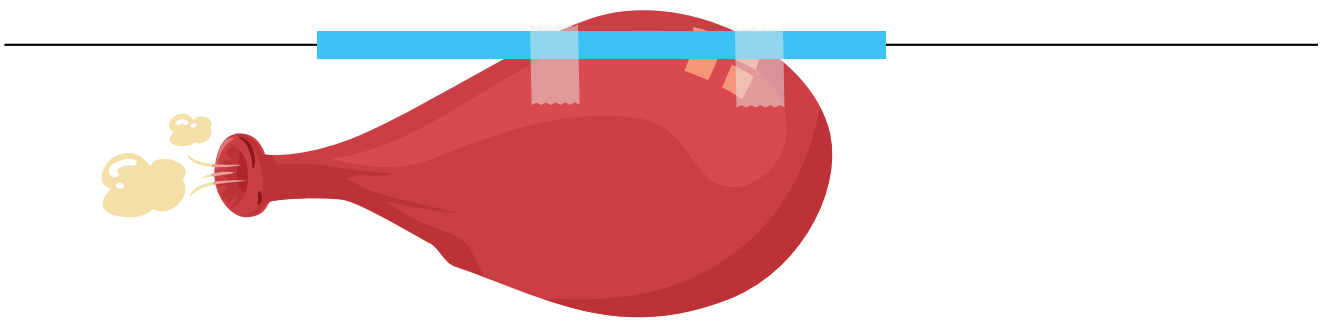
- Balloons – different sizes, shapes and materials – such as latex, non-latex, helium quality, and Mylar
- Straws – different sizes, lengths, widths
- Masking tape or painter's tape
- Several pieces of string, each 9 m long – use different types of string so that girls can experiment with textures, e.g. fishing line, ribbon, yarn, nylon, etc.
- Optional: Balloon pump

Explain to the girls that they are going to step into the shoes of a rocket scientist for this activity. The job of a rocket scientist is to find the most efficient and effective rocket designs. One way to achieve this is by building models and testing them on Earth. Girls can either work together or independently on these models.

> **TIP:** Some girls may have sensitivities or allergies to latex.

To build the rocket, the girls need to tape their straw to the balloon. Once they have built their rocket model, they will test the designs by lacing the string through the straw, blowing up the balloon, and letting it fly. If their rocket reaches the end of the string, they have successfully launched their rocket. Before they build their rockets, girls will decide:

- The type of balloon to use
- The amount of air to use in their balloon
- The length of the straw or the number of pieces of straw
- How much tape they are going to use
- The type of string to use



NOTE: To create the most efficient flying experience, the string should be pulled as taut as possible. Girls can either help each other by holding the ends of the string or the ends can be taped to the walls or chairs.

After the girls have had time to test and modify their rockets, bring them together and invite them to share their findings. During the discussion, you can ask:

- How did you overcome any difficulties you had in launching your rocket?
- What was the best modification you made to your rocket? What made it the best for your design?

You can also give them some creative prompts to encourage their thinking such as:

- If you were to design an actual rocket, what might you need to do so it can go further or faster than other rockets?
- If you were to travel to different galaxies, what might you need to include on a rocket?
- What else could you see or do in the galaxy if you had a rocket

SCIENCE FICTION'S PLAYGROUND

"To infinity and beyond." – Buzz Lightyear

Space has always filled our imagination. Whether it's scientists, engineers or mathematicians trying to learn more about space, or artists, writers or musicians imagining the world beyond Earth through their art and words, it's human nature to be curious about the great unknown. This series of activities girls will use their imagination to explore space.

ACTIVITY 7: LIFE ON OTHER PLANETS

Recently, scientists discovered a nearby planetary system called TRAPPIST-1. Research is now underway to see if any of these Earth-like planets are habitable. In this activity, girls will discuss what makes a planet habitable and design a shelter that could be used to help them explore a new planet.

MATERIALS:

- Pencils and paper
- Chart paper and marker (to record brainstorming)
- Optional: A variety of recycled materials, or blocks, etc. to use as construction materials
- Optional: Tape or glue for their construction

Bring all the girls together and have them imagine that they are scientists who have just discovered a new planet! After some research, this is what they know about the planet:

- It has a breathable and protective atmosphere (the layer of gas makes it possible to breathe and protects the planet from meteors)
- There is water
- There is gravity similar to Earth

As a unit or in small groups you can ask them to decide:

- What is the geography like? For example, does it have mountains, continents, islands?
- Does the planet have different seasons? Or only one that never changes?
- What is the temperature like?
- Does it have a moon? More than one?
- Does it have a night and a day? Or one period of light or darkness that never ends?
- What is the planet called?

After ideas have been recorded, explain that they are going to create a temporary shelter for a research team exploring the planet. Have the girls work individually or in small groups. They can either draw the shelter on paper (they may choose to include several views such as exterior and interior) or they can build a model using recycled materials, blocks, etc. After they have designed their shelters, give them a chance to share their ideas with each other by setting up a gallery walk. As they are walking around have them talk in their groups about the things that are similar and different in other groups. Bring them back together to discuss:

- What unique elements/technologies did you need to design for your shelter to help support humans living on the planet (e.g. a water recycling system, an indoor sustainable garden, an energy generator)?
- What similarities did you notice in the designs? Differences?
- If you could re-design your shelter, what would you add or modify?
- How could you use your camping experiences to improve the design?
- Are there any special spaces that might need to be included if your shelter is designed for research?
- What were some of the creative solutions you came up with to solve problems such as where the researchers will go to the bathroom?

ACTIVITY 8: NEBULA IN A BOTTLE

When stars reach the end of their lives, they explode. If there is leftover debris, gravity pulls it together to create a nebula. From a distance, nebulae (more than one nebula) look like swirling clouds. In this activity, girls will create their own nebula. Note this activity could be messy.

MATERIALS:

- Clear container with a watertight seal – such as jam jars or small bottles with corks
- Cotton balls
- Food colouring or tempera paint
- Glitter or glitter glue
- Skewer or small dowel
- Water
- Optional: Clear nail polish or hot glue to seal the lid

You can show the girls pictures to spark their imagination and explain how nebulae are formed. The Hubble Space Telescope website has some excellent pictures: http://hubblesite.org/images/wallpaper.

To create their nebula, have the girls complete the following steps:

1. Pour water into the container until it is a third full.
2. Add one to two drops of colour or paint to the water and stir it in.
3. Pull apart a cotton ball and push it into the jar. Stir it around with the skewer so it absorbs the liquid. Add as much cotton as is needed so there is very little liquid left.
4. Add glitter and stir. Try to add the glitter down the sides so it is more visible.
5. Repeat steps 1 through 4 again with a second colour. Girls can push the cotton down into the layer if they want it to blend together.
6. Repeat steps 1 through 5 again with a third colour. Fill nearly to the top but ensure they leave space for the lid or cork to close. If needed, they can seal the container using glue or clear nail polish.

Once the girls have completed their nebula, you can set up a gallery and have them look at each other's pieces and come up with creative names for them. If your meeting space permits, you can take the girls outside to look at the stars and ask them to imagine all the nebulae that could be up there. You can also ask them to imagine a sky without stars and think about how life would be different.

EXTENSION:

Girls can also use smaller bottles and an eye-hook screw to create a charm for a necklace using the same method. Ensure the bottles are sealed with multiple layers of clear nail polish to anchor the top in place.

CONCLUDE your instant meeting with the following Closing Activity.

CLOSING ACTIVITY: COMMUNITY SPACES

MATERIALS:

- Drawing materials

Bring the girls together and ask them to think of the ways that they can make space more accessible to the members of their communities. Do they have...?

- Open spaces for star-gazing?
- High schools or universities with telescopes?
- Planetariums or science centres?
- A newspaper with a science columnist?
- A community centre with a projection screen?
- A library with a section of books on space?

Have them work together or in pairs to think of ways to bring together girls in their community to experience these resources. They can draw a poster to encourage others to check out one of the spaces that is available or they can write a letter to a local organization, such as the ones listed above, to suggest that they work together to host a space night. They can also think about how they may bridge with other units in their area or online to create a space- or science-themedevent. After they have finished they can mail their letters or hang their posters in community spaces to encourage more people to look up and start a conversation about space and exploration.

EXTENSION:

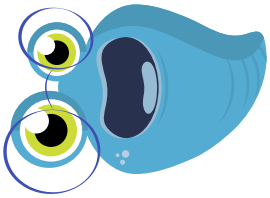
Girls who use social media such as Snapchat may be interested in designing a geofilter (a digital overlay that changes a photo). They can design a plan for a filter using drawing materials or digital tools and think of about the features they would include to inspire others to consider their connections with space.

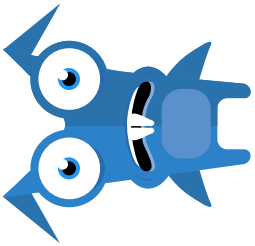
Snapchat has a place for users to submit their designs or ideas at https://www.snapchat.com/geofilters.

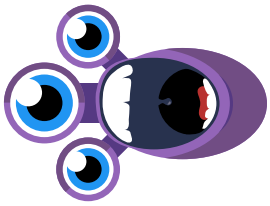
APPENDIX

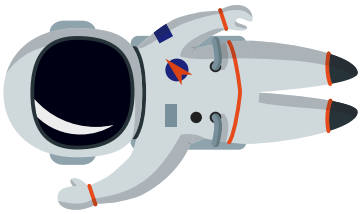
PROBLEM IMAGES :
ALIEN JUMP

PROBLEM IMAGES :
TROUBLESOME TRANSPORT

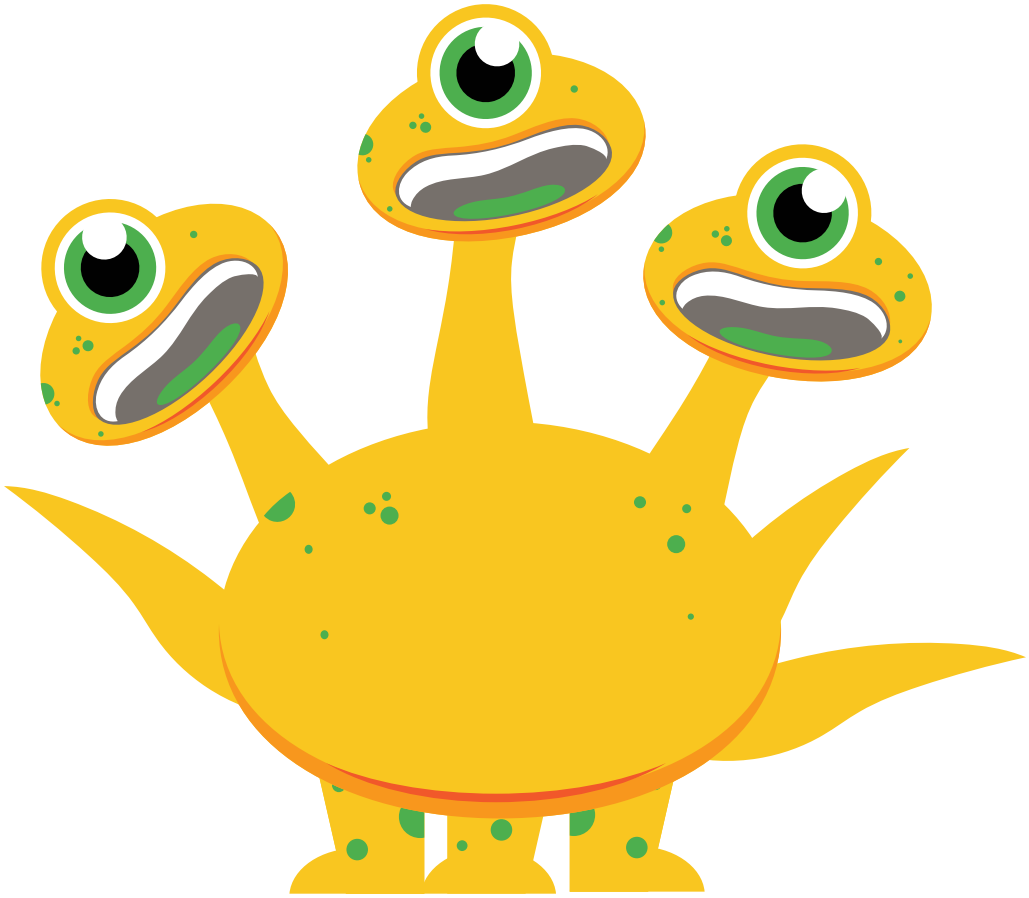








PROBLEM IMAGES : DEFEAT THE ALIEN



MORE SOURCES

For space and exploration check out NASA – www.nasa.gov

- This website offers girls games, facts, pictures, and videos on nearly every aspect of space exploration. They also have links to various social media feeds that girls can follow if they are interested in learning more.

The Canadian Space Agency (CSA) - www.asc-csa.gc.ca/eng/default.asp

- This website offers girls a peek into the role that Canadians are playing in space research. There is also information here about the Canadarm and the role it plays on the International Space Station (ISS).

International Space Station - www.nasa.gov/mission_pages/station/main/index.html

- The ISS website offers girls a look into life on the space station, including stories and videos from astronauts who are currently working there and the research they are working on.

Universe Today - www.universetoday.com

- Universe Today is focused on space and astronomy news. In addition to breaking news in research and discovery, they also have an archive of all space related topics. This is site is best suited to girls in Guides to Rangers.

Hubble Space Telescope - hubblesite.org

- The Hubble Space telescope takes amazing photographs of the far reaches of space not often visible from Earth. Girls who are interested in seeing pictures of nebulae, planets, asteroids will be blown away by the stunning images here.

Physics Girl - physicsgirl.org

- Dianna Cowern is the creator of Physics Girl. Her videos and blogs bring a playful and accessible approach to big questions in research and exploration. Girls who are interested in the TRAPPIST-1 discoveries will find more information here as well.

Dr. Katherine (Katie) Mack - www.astrokatie.com

- Dr Katherine (Katie) Mack is a theoretical astrophysicist. Her work focuses on finding new ways to learn about the early universe and fundamental physics using astronomical observations, probing the building blocks of nature by examining the cosmos on the largest scales. Her blog and social media feeds bring older girls a relevant and scientific lens to world events and news.