

# Out of this World



May the Fourth is And if you don't know why, then "May the force (fourth) be with you!"

There is no greater mystery than space! Never-ending...always expanding! It's the setting of the biggest movie franchise ever. Countries have invested billions of dollars exploring it.

The **International Space Station** is the biggest object ever flown in space. It's about as wide as 5 hockey rinks. Zooming around the Earth at an average speed of 27,700 km/h, the Station completes 16 orbits per day. At night it can easily be seen from Earth, as it flies 320 km above us.

**Sixteen** countries, including Canada, the USA, Russia, and Japan worked together to build the Station, the ISS. You could call it the world's **orbital research laboratory**.

Scientists on the Station and on Earth are **studying** how different fluids, metals and other materials respond in space without the effect of gravity. These studies could help them better understand viruses, proteins and enzymes. Hopefully, these studies will one day lead to possible new **treatments** for many diseases and conditions, including cancer.

## Your Mission:

Design and construct a space station.

A long time ago, in a galaxy far, far away...



## Episode III

# THE PANTHER PRIDE

It is period of self-isolation in the galaxy. A brave alliance of underground Panthers has challenged the tyranny and oppression of the virus COVID-19!

## On the ISS

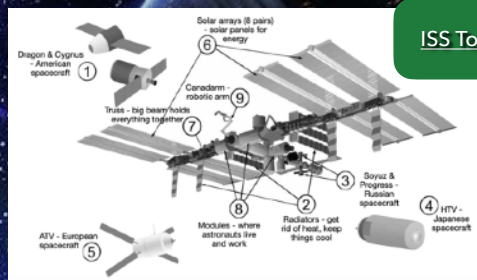
Due to it's size, the International Space Station had to be constructed on Earth in parts, or modules.

The first **component** of the ISS launched into orbit in 1998 and the last module was fitted in 2011. The Station is expected to be used until **2028**.

A typical crew is between 3 and 6 astronauts. While on the Station, **experiments** are conducted. A mission lasts on average about 6 months. Space vehicles travel to the station regularly bringing scientists and supplies. Six spaceships can connect to the Station at once.

The Station consists of 6 sleeping quarters, a kitchen, 2 bathrooms, a gym, 6 laboratories, a robotic arm, 16 solar panels, and 1 long beam (truss) that connects it all together. The ISS is being powered by solar energy.

Poster of the ISS



ISS Tour

## Imagine & Design

What is your Station going to look like?

- ✓ must keep humans alive
- ✓ contains workspaces
- ✓ has an energy source
- ✓ can withstand the heat of the sun
- ✓ can be assembled / disassembled
- ✓ exists in microgravity (very little)
- ✓ has docking stations for spacecraft

Fisheye Fly-Through

## Materials

- ➔ empty 2L bottles
- ➔ utility knife
- ➔ tape
- ➔ aluminum foil
- ➔ cardboard
- ➔ fittings (use recycled material to fit the modules - bottles - together)
- ➔ extra materials of your choice

Build an actual model of the ISS



## Build

- ▶ How will you connect your modules?
- ▶ What can be used to cool your Station from the heat of the sun?



## Test & Redesign

Rotate your Station. Remember in microgravity there is no sense of up or down, and loose items can float freely. Do you need to modify anything in your modules for microgravity?

Make solar panels out of cardboard and aluminum foil. Where is the optimal place to put them?

## Analyze & Reflect

- ✓ What are the advantages and disadvantages of your design?
- ✓ What extra materials did you use? Why?



# The Darkest Dark:

## Chris Hadfield aboard the ISS



As a child, Chris Hadfield watched **Apollo 11** land on the moon from his television. That was 1969. Then, in 1995, Chris Hadfield himself became a **Cosmonaut** when he launched into space aboard Space Shuttle **Atlantis** to resupply the

Russian Space Station "Mir." It was a short stay, but it made him the first Canadian to ever board the Russian Space Station. In 2012, on December 19, Chris launched again into outer space. This time, however, his stay would be much longer. On December 21, Chris entered the ISS (International Space Station) as a mission specialist. Thus, began his self-isolation in space as he became the first Canadian to **command** the ISS.

The **isolation** of space is vastly different then the isolation felt here on earth during the COVID-19 pandemic. In space, there is no sound, no air pressure, very very little gravity and the temperature can fluctuate from +258 to -148 degrees Fahrenheit. **Life in space is impossible.**

And yet, in the year 2020, we have reached a point where our scientists and engineers are exploring the idea of building settlements on the moon and Mars. Think about that: **in 50 years, we could have people living on other planets and moons**, and Canada will be a huge part of this project.

[Live stream inside the ISS](#)

## Chris Hadfield Videos

Click on the links below to watch Canada's favourite astronaut.

- ★ [What I Learned From Going Blind In Space](#)
- ★ [A Historic Trip Through Canadian Space Exploration](#)
- ★ [16x9 - Rocket Man: Canada's Top Astronaut](#)

# Captain's Log



Chris Hadfield would make **daily video logs of himself in space to deal with isolation and contribute to history.**

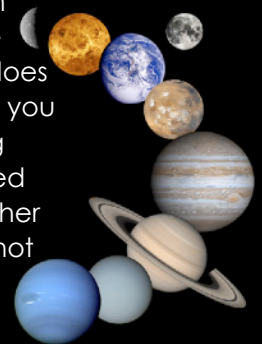
We too are experiencing an **extraordinary** event. Start the **COVID-19 Time Capsule** uploaded onto teams and contribute to it regularly so you too can be a part of history. You could choose any format for your Time Capsule: voice recordings, journaling, videos, photos, poetry, etc.

Imagine sharing it with the kids in your life years from now!



[Live video of Earth from the ISS](#)

In order to settle in space, we require technology that does not exist yet. Can you think of something that we might need to survive on another planet that does not exist yet? *It's harder than you think!*



[Sighting Opportunities of the ISS](#)

## Settling Mars



**What would it take to establish a settlement on the Red Planet?**

NASA and its partners have set a goal to put humans on Mars. Leading scientists, engineers, and innovators are pioneering the research and development of space technology to make that dream a reality.

[Conduct some research on the planet.](#)

Then, design what a possible settlement on Mars could look like.



# Qui suis-je?

Tu peux créer une fusée

## Jeu d'association

- Mercure \_\_\_\_ 1. Je suis la planète qu'on surnomme la "planète rouge".
- Venus \_\_\_\_ 2. Je suis la planète située le plus loin du soleil.
- Terre \_\_\_\_ 3. Je suis la plus grosse planète du système solaire.
- Mars \_\_\_\_ 4. Je suis très chaude le jour (315 C) et très froide la nuit (-165 C)!
- Jupiter \_\_\_\_ 5. J'ai besoin de 365 jours pour faire un tour complet du soleil.
- Saturne \_\_\_\_ 6. J'orbite autour du soleil sur mon côté, alors une nuit dure 21 années!
- Uranus \_\_\_\_ 7. Je suis la planète la plus lumineuse du système solaire.
- Neptune \_\_\_\_ 8. Je suis entourée de plusieurs anneaux formes de glace.

# Qu'est-ce que cela veut dire en anglais?

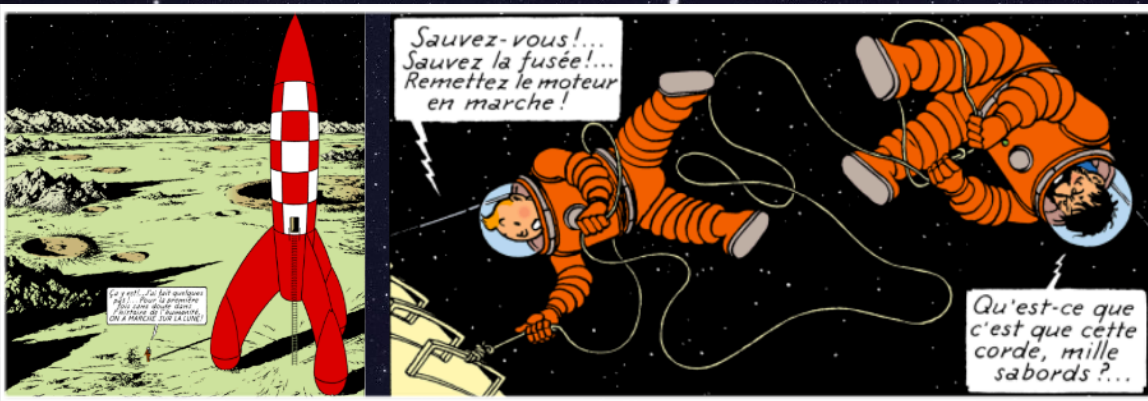
- une fusée
- l'espace
- la lune
- atterrir
- écraser
- lunaire
- la terre
- le moteur
- les étoiles
- alunir
- vite

A l'oral essaie de faire une phrase pour chaque mot.

# Le savais-tu?



L'auteur belge Hergé a écrit plus de 24 albums dans la série Les Aventures de Tintin. C'est une des bandes dessinées les plus populaires en Europe, lue de 7 à 77 ans ! C'est en 1950 que Hergé a sorti On a marché sur la Lune, 19 ans avant les premiers pas de Neil Armstrong ! C'était incroyable d'imaginer un tel voyage à l'époque !



Tu peux regarder le dessin animé On a marché sur la Lune.

# This Week's SchMath (Science + Math) Problems

Monday	A <b>10-day</b> space expedition is being planned. Each astronaut needs <b>80 ounces of water/day</b> . At this rate, how many ounces of water does each astronaut need for the entire flight? If there are <b>5</b> astronauts going, how much water is needed in total?
Tuesday	<b>Two</b> planets have orbit periods of <b>3</b> years and <b>5</b> years. How long will it take them to return to the same locations that they started at? ( <b>HINT- find the lowest common multiple</b> )
Wednesday	A massive star in the Eta Carina cluster erupted in a giant flare in <b>1843</b> . How many years has it been since this eruption?
Thursday	While stargazing this week, find, draw, and name your own <b>constellation</b> . <b>Graph</b> your constellation and write the <b>coordinates</b> . Post your coordinates and the name of your created constellation on Teams for your classmates to replicate (Thursday's Panther Photo Challenge). Will they look the same?
Friday	On September 1, 1859, the sun released a cloud of plasma called a Coronal Mass Ejection at <b>11:18 AM</b> . If the cloud reached Earth on September 2 at <b>04:54 AM</b> , how many hours did it take the cloud to travel from the sun to the earth?

# Finding Constellations in the Sky

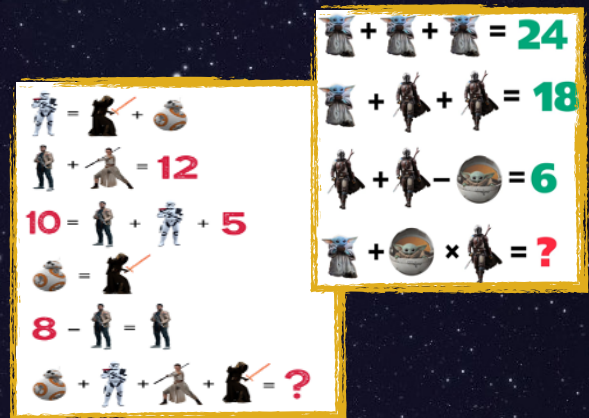
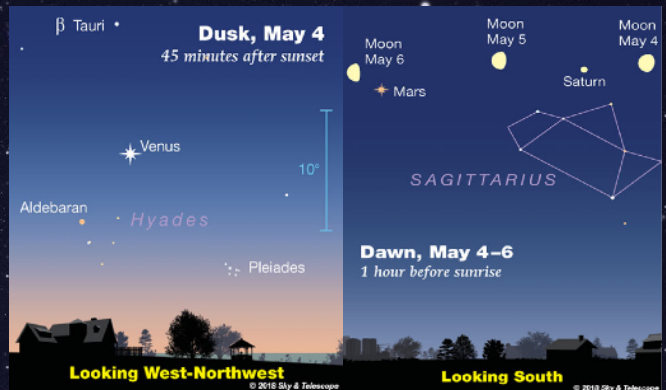


Twilight is not only the title of the famous movies and books, but it also describes two moments during the day. **Twilight** is the light in the sky between sunset and dusk, or between **dawn** and sunrise. Even though we can no longer see the sun directly during these two periods of time, they will be useful when trying to find planets in the sky!

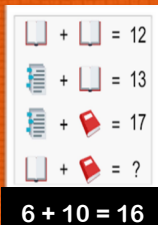
## 1. What does "from dusk to dawn" mean?

The **cardinal directions** will also help with finding planets because they help **orienting**. These directions are known as **north, south, east, and west**. You can use the mnemonic "No Eating Soggy Waffles" in a clockwise order to help you remember. A trick to find east and west without a phone is to look at a sunrise and a sunset. The sun rises from the east and the sun sets in the west. During the day, you can also plant a stick in the ground, place a rock at the tip of its shadow and after waiting for 30 minutes, place another rock at the end of the new shadow. The imaginary line between the two rocks will go from W (the first rock) to E (the second rock). For more tips on how to tell the cardinal directions, click [here](#).

2. With the help of the text above and the images below, try to find Venus and Mars outside in the real sky. Use the Star Tracker app on your phone if you need help with orienting!



## Last Week's Answers



$3 + 3 \times 7 = 24$

Monday	Answers will vary but multiplication is repeated addition. $4 \times 3$ is the same as $4+4+4$ or $3+3+3+3$ .
Tuesday	Mountains form because of the movement of the earth's crust. Research "tectonic plates" or "mountain formation" to learn more.
Wed.	Answers may vary
Thursday	You have a 1 in 2 chance of flipping a coin and landing on heads. If you flip the coin thirty times, it should land on heads approximately 15 times.
Friday	7 books would cost \$42 and 9 books could be purchased with \$54.

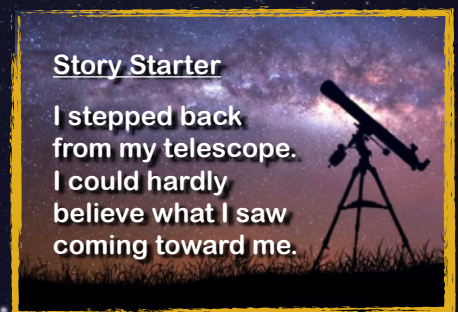


## Movie Soundtracks

Sometimes the music in movies is just as memorable as the characters.

**John Williams** has written the music to all 9 Star Wars movies. Many would say he is the greatest film composer of all time. To date, Williams has won 5 Oscars for his music.

Has John Williams written the music to any of your favourite movies?



# Drawing Constellations

Have you ever looked at stars and connected them to make **constellations**? This pandemic may give us a better opportunity to spot constellations in the sky due to a decrease of pollution in the air and airplanes in the sky. Take a look up and see if you can find some famous constellations or invent some of your own!

In the **Cartesian Plane** below, place the coordinates to the right and connect them in order to create famous constellations. You can even add some colour to personalize it and make it look like a night sky!

To place coordinates into the Cartesian Plane, follow the **x axis** for the **first** number and then go up or down from that point by using the **y axis** for the **second** number. The first coordinate for Orion is placed on the graph for you.

Finally, we encourage you to **research** the names of these constellations. Some of them may lead to some pretty interesting stories!



Orion (The Hunter)
(-5,9)
(-2,-1)
(-3,-9)
(0,0)
(2,1)
(5,8)
(7,-7)

Leo (The Lion)
(-18,-6)
(-11,0)
(-9,-5)
(1,4)
(2,2)
(4,0)
(4,8)
(6,7)
(6,-5)

Teapot (part of Sagittarius, the Archer)
(-10,0)
(-8,4)
(-8,-2)
(0,6)
(3,2)
(3,-4)
(7,1)

Cassiopea (a queen from Greek Mythology)
(-9,7)
(-5,-1)
(0,0)
(4,-5)
(10,0)

Cygnus (The Swan)
(-9,8)
(-5,-3)
(-4,6)
(-1,0)
(5,-4)
(6,6)
(7,-9)
(10,10)

Big Dipper (Part of Ursa Major, the Great Bear)
(-18,3)
(-11,4)
(-6,3)
(1,1)
(3,-5)
(13,-5)
(15,3)

