

3...2...1...Blast off!

On December 19, a Russian Soyuz spacecraft will take to the sky. On board will be **cosmonaut** Roman Romanenko, U.S. astronaut Tom Marshburn and Canadian Chris Hadfield. Their destination? The International Space Station (ISS).

The travelers will meet up with three astronauts who arrived at the space station in November. For several months, they will all work together on Expedition 34. Then, in March, 2013, the first three astronauts to arrive will go home. Another trio will make the journey to the space station to take part in Expedition 35.

SPOTLIGHT ON CANADA

Mr. Hadfield's role in the two expeditions means a lot to Canada. His six-month mission

will be just the second long-duration stay on the space station for a Canadian. He'll also co-pilot the Soyuz spacecraft on the way to the ISS. That's a challenge he's spent ten years training for.

Once aboard the space station, the Canadian astronaut will spend three months as a flight engineer. His duties will include running **Canadarm2** and overseeing a space walk.

Chris Hadfield's most important function, however, will occur during Expedition 35. That's when he'll become the first Canadian to take over as Commander of the ISS.

"It's very big for me personally. It's very big for me professionally. But it's also very

big for Canada," the astronaut said. "It's a big deal."

SCIENCE IN MICROGRAVITY

Mr. Hadfield and the other astronauts will be engaged in many daily activities. They'll need to exercise a lot to prevent bones and muscles from becoming weak during the spaceflight. Repairing and maintaining the space station will take up time, too. But the focus of each day's activities? Science.

At any time, about 100 science experiments are running on the ISS. Mr. Hadfield will oversee five projects. One involves testing a toaster-sized medical device called a Microflow. This tool could eventually help doctors on Earth. It could

DEFINITIONS

CANADARM2: a type of robotic arm, developed in Canada for use on the ISS

COSMONAUT: an astronaut in the Russian space program



allow them to quickly diagnose conditions troubling people in remote locations.

In another experiment, Mr. Hadfield will monitor how astronauts respond to rapid changes in blood pressure. The aim? To identify people who faint or get dizzy easily. That's useful information for space travelers. And back home, it could help tell which seniors are more likely to fall, for example.

DID YOU KNOW?

Robert Thirsk was the first Canadian to participate in a long-duration spaceflight aboard the ISS. He spent six months at the space station in 2009.

Mr. Hadfield will also look at how radiation affects humans. He'll explore how particles spread out in liquids. He'll also study how to better build plastics. As well, he will carry out experiments designed by students as part of a Canadian Space Agency (CSA) contest. They involve testing how common items such as socks, dental floss and duct tape behave in **microgravity**.

BRINGING US ALONG FOR THE RIDE

To get Canadians to follow his adventure, Mr. Hadfield will be tweeting regularly. He also plans to use music to draw attention to his mission. He has written a song with Canadian musician Ed Robertson called ISS (Is Somebody Singing). On **Music Monday**, he plans to perform it from space. Mr. Robertson and school choirs across Canada will sing along.

"I'm really looking forward to it," he said. "Imagine floating weightless, watching the world pour by through the big bay window of the space station, playing a guitar ... just a tremendous place to think about where we are in history."

ONE SMALL STEP AT A TIME

One hundred years from now, says Mr. Hadfield, we may think we took mere baby steps toward space exploration in the 21st century. Yet to him, these steps are huge. After all, each time out we learn lessons that help pave the way for future spaceflights.

"Before we go any significant distance, we need ... proven technologies that you can absolutely count on with your

THE INTERNATIONAL SPACE STATION

The International Space Station (ISS) is a huge science lab in the sky. It is in constant orbit some 360 kilometres above the Earth.

The \$100-billion structure, started in 1998, was put together like a giant Lego toy. Fifteen countries, including Canada, helped build it, with the United States leading the effort. Today, it measures 78 metres by 88 metres, about the size of a football field.

Astronauts experiment under conditions not normally found on Earth, such as weightlessness. This work has greatly improved our lives. It has helped us develop robotic microsurgery, Magnetic Resonance Imaging (MRI) and CAT scans to take pictures of our internal organs, and laser technology used in heart surgery.

life," he says. "The best place to test them and develop them is the space station."

Bon voyage, Chris Hadfield! ★

DEFINITIONS

MICROGRAVITY: an environment in which there is very little net gravitational force

MUSIC MONDAY: an annual event first held in 2005 to celebrate music by inviting Canadian students and others to sing the same song at the same time. In 2013, Music Monday will be on May 6.



ON THE LINES

Answer the following in complete sentences:

1. What does ISS stand for?

2. What is the ISS, and how was it built? Explain.

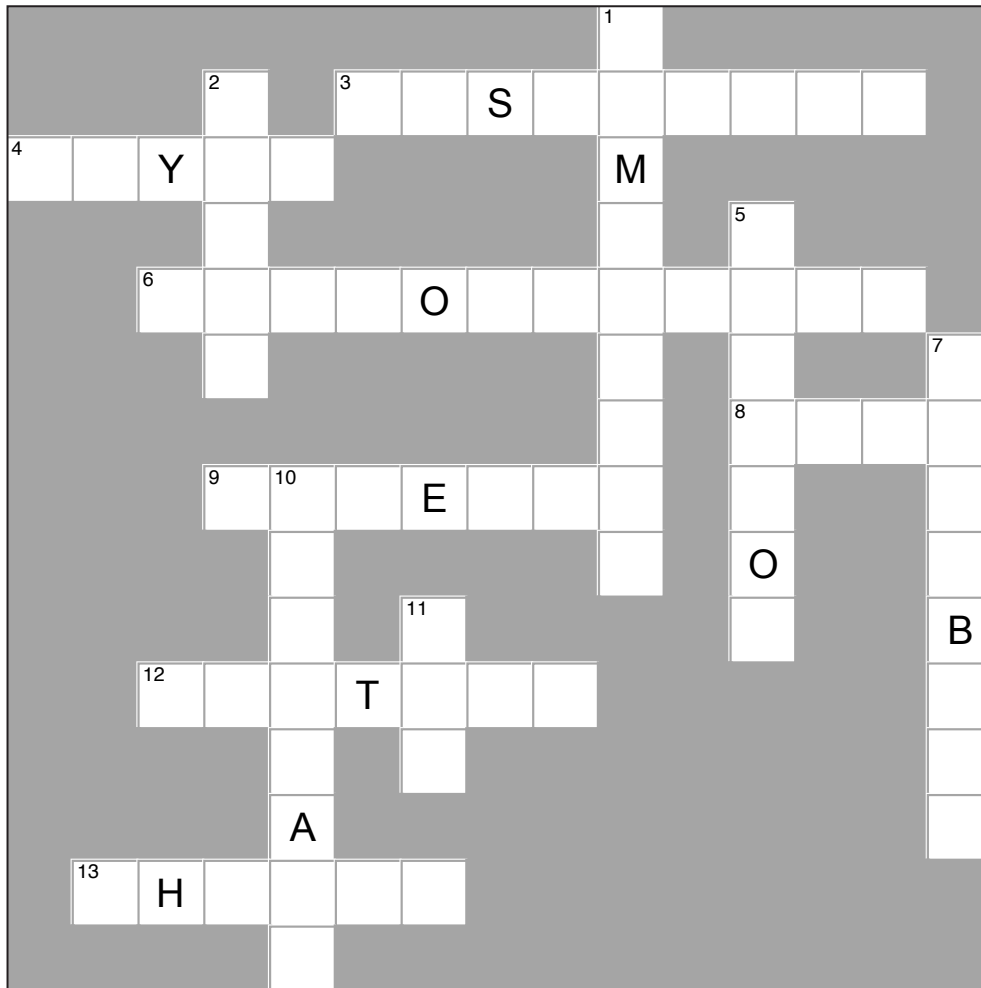
3. How are conditions on the ISS different from on Earth?

4. What will be Chris Hadfield's most important contribution to Expedition 35?

5. List at least two other reasons why Chris Hadfield's participation in Expedition 34/35 is significant.

6. Explain what a Microflow is and why it is being developed.

7. Describe at least three other projects that Chris Hadfield will be involved in.



ACROSS

- Russian space traveller
- Russian spacecraft
- environment with little gravitational force
- the ISS was put together like giant _____ toy
- main focus of ISS activity
- ISS = International Space _____
- first Canadian to endure long-duration spaceflight

DOWN

- Chris Hadfield will be the _____ of the ISS
- May 6, 2013 is _____ Monday
- the ISS cost \$100 _____ to build
- the ISS is about the size of a _____ field
- robotic arm used on space vehicles
- Chris Hadfield will stay on the ISS for this many months