SCIENCE CAMPS

Summer Science Activity Book

2020, Edition 2

Grades 4-6

UNIVERSITY OF SASKATCHEWAN
College of Engineering
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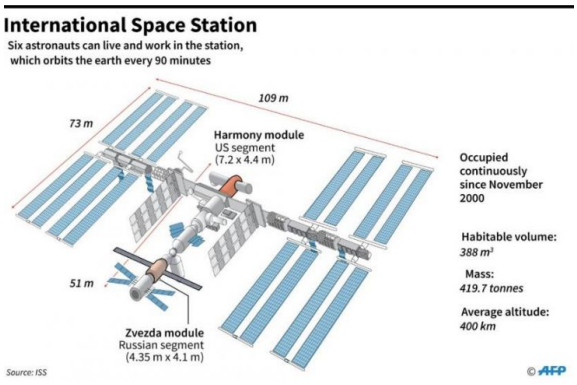
Build your own Space Station

A space station is a spacecraft that lets astronauts live in outer space for long periods of time. The only space station in orbit right now is the International Space Station (ISS).



Important Zones:

Sleeping Quarters

Astronauts zip into sleeping bags so they're not just floating around the station in their sleep. That would NOT be good.

Usually the sleeping bags are standing up which sounds weird but in space there is no gravity so you can't tell which way is standing up or lying down.

Galley (The galley is like the dining room)

All the food in space is canned or dehydrated (dehydrated is just a fancy word that means all the water was sucked out). All the food is like this because the astronauts can just store all the food without a fridge because they don't have any firdges on the space station.

Washrooms

Toilets in space are way more complicated than they are on Earth. On Earth, everything just falls into the toilet, right? That's because of gravity.

If we used Earth toilets in space, everything would just float around instead of falling in because of no gravity. YUCK!

Space toilets work like vacuums that suck the waste inside.

Dock

The dock is the part of the space station that lets spaceships attach to it so that astronauts can get onto the station.

Just make sure you're careful to not let on any mean aliens!

Robotic Arm

The robotic arm is used to help arriving spaceships attach to the dock and move stuff around on the outside of the station.

The arm will even hold onto astronauts that need to go outside where they are. We don't want any of the astronauts to just float away!

Laboratory

One of the main reasons humans made a space station was to do research and experiments in space. If we are going to do research and experiments, we have to have a laboratory.

Waste/Water Recycling

To make sure astronauts always have enough water the ISS has a special machine that can turn urine (pee) back into purified drinking water.

It might sound a little gross but the astronauts NEED that water! After the machine does it's work the water is totally clean and won't taste like pee even a little bit!

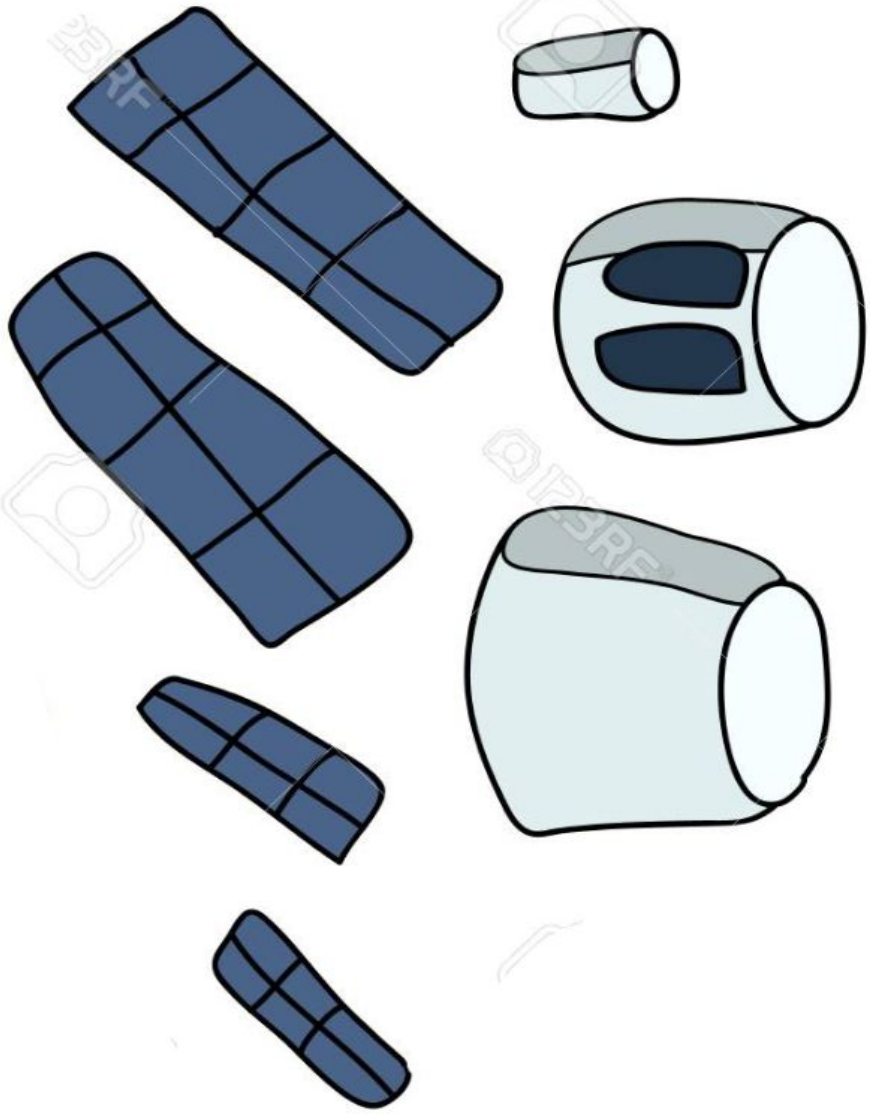
Observatory

Since they're in space, astronauts should be able to look out at it!

Now that you've learned about some of the important parts of a space station, it's time for you to get crafty and build your very own **SS Sci-Fi**! All the parts you need to build the station are right here

Instructions:

1. Cut out all the pieces
2. Glue or tape the pieces together
3. If your parents will let you, use some tape and string to hang it from your ceiling!



Try to make it look like this!

Women in STEM - Space Edition

Margaret Hamilton (born: August 17th, 1936)
She was the lead software engineer for the Apollo spacecraft - the first one to land on the moon. The system for the Apollo missions was written in an assembly language, or a low-level coding language that makes more sense to computers than humans - it isn't designed to be easily read by humans. Hamilton was an early pioneer in software engineering, so early that she is given credit for coining the term "software engineering." The picture beside this text is her standing next to the code and notes after the Apollo 11 mission, taken in 1969!

Mae C. Jemison (born: October 17th, 1956)
Mae Jemison joined the astronaut corps at NASA in 1987. She spent a total of 7 days, 22 hours, and 30 minutes in space aboard *Endeavor* in 1992, where she served as a Mission Specialist. This made her the first African American woman to be in space! She worked as a doctor, making her a great fit to conduct the medical research experiments being done on board. She studied how weightlessness and motion sickness affected herself and the crew. After returning to Earth, she retired from NASA to teach. She has since continued to advocate for science.

Roberta Bondar (born: December 4th, 1945)
Roberta Bondar was an astronaut aboard *Discovery* in 1992. This made her the first Canadian woman in space! In total, she spent 8 days, 1 hour, and 14 minutes in space. She had studied to be a neurologist and used this knowledge to serve as a Payload Specialist. She also received a bachelor's degree in both zoology and agriculture, a master's degree in pathology, and a doctorate's degree in neuroscience and medicine. She used her education to study how lower amounts of gravity affected living beings, including plants and humans. She was also the first neurologist to be in space.

UNSCRAMBLE THE WORDS - WOMEN IN STEM EDITION!

MSINOIS	Specialist	ALOAYPD	Specialist
YCOIRDVSE		OVAEEDNR	
NMATHLIO		OLALOP	
JINMOSE		NAODRB	

Answers:
Column 1: Mission, Discovery, Hamilton, Jemison
Column 2: Payload, Endeavor, Apollo, Bondar

Cree and Ojibway Constellations

Long before Europeans crossed the Atlantic Ocean and colonized North America the Indegenous peoples had many stories explaining the constellations they saw in the sky. These constellation stories were often rooted in their connection to nature and the world around them.

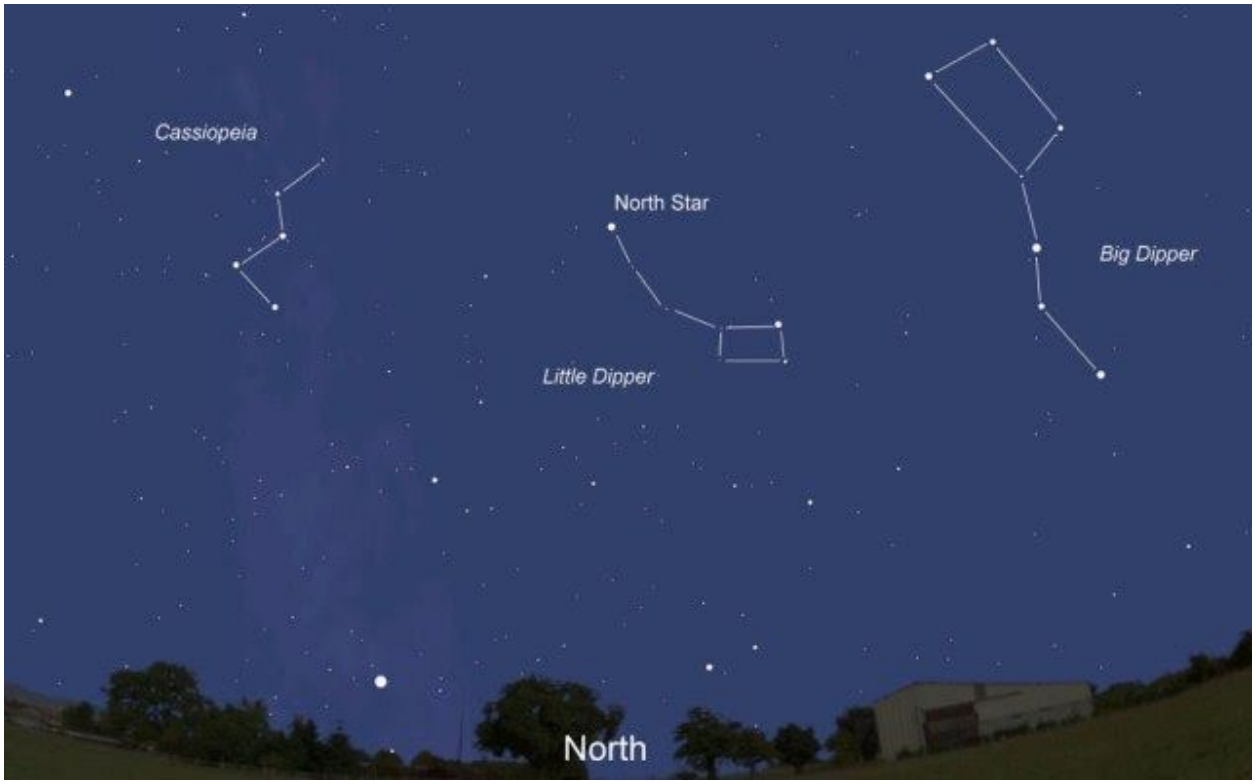
The Dog Star - Atima Atchakosuk

“In Cree the Little Dipper is called The Dog Star, Atima Atchakosuk, and the North Star is called the Wolf Star. Long ago the people had no dogs to protect them. Their relatives the wolf, coyote, and fox saw this. The wolves held a council and decided that two of them would go to live with the people, as did the coyote’s and foxes’ councils. Two pups from each council were also sent to all the four directions of humankind. From these four came all the dogs in the world, and now they guard our homes and camps. To honor this sacrifice the Creator placed a reminder in the heavens. The North Star anchors the leash as the dogs run around their sky camp. The three stars of the little dipper handle represent the wolf , coyote, and fox. The four bowl stars represent the pups sent to the four directions of humankind.”

The Fisher Stars - Ochek Atchakosuk

“The Big Dipper is the Fisher Stars in Cree legends from Northern Manitoba. (The fisher is a small relative of the wolverine.) This legend tells us how summer was brought to the north. Long ago there was no summer in northern Manitoba. Certain animals were selected to bring summer to the north. The Ochek, the fisher, was given this task and in honor of this, the Creator placed the fisher in the sky”

These stories are from Jane Houston Jones - “First Nations Astronomy - seeing the Cree and Ojibway Sky”

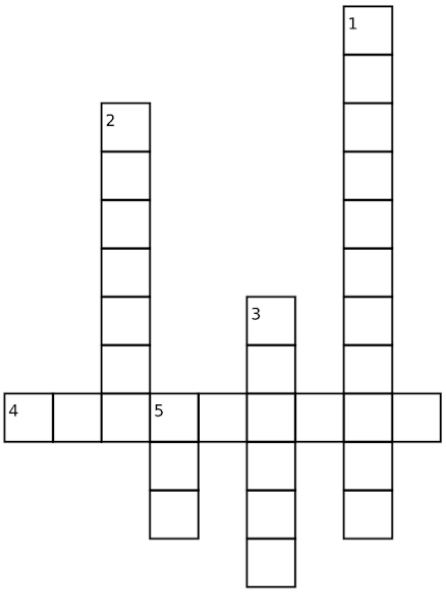


The constellations may be higher or lower in the sky depending on the season and time of day. All constellations rotate around the north star because of earth's spin.

Connect the dots and guess which constellation this is!

HINT: small relative of the wolverine

Cree Constellations



Down:

1. The Cree legend of the big dipper
2. Cree constellation for little dipper
3. Brought summer to the north
5. Number of pups sent from each council

Across:

4. anchors the leash of the dogs in the sky camp

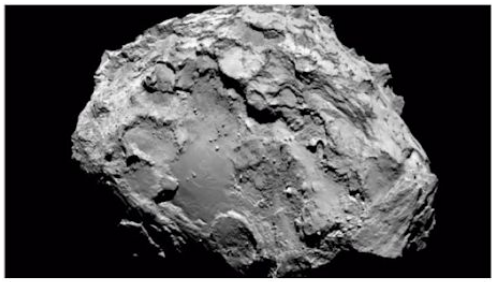
Answers:

1. Fisherstars **2. Dogstar**
3. Fisher **4. Northstar**
5. Two

Comets

What is a comet?

A **comet** is a big ball of ice and dust. They are in our solar system circling around our sun, just like us! Sometimes they are called space rocks.



There are a lot of other types of space rocks!

When a piece of comet breaks off, it is called an **asteroid** if it is bigger and a **meteoroid** if it is smaller. If a meteoroid comes into earth's atmosphere, it is called a **meteor**. Meteors will burn up as they enter earth's atmosphere, but if there is some rock left and it lands on earth, it is called a **meteorite.**

Comets were made 4.5 million years ago!

When the sun was born, it was surrounded by dust and water. These started to clump together to become comets and travelled away from the sun. Today, comets are often the size of a small town in Saskatchewan!

What is a shooting star?

A **shooting star** is not actually a star at all! They are actually meteoroids, and the streak of light that follows it is the meteor burning up in earth's atmosphere.

What is a meteor shower?

A **meteor shower** is just a lot of shooting stars that can last from a few minutes to several days! Meteor showers are caused by a comet. As comets travel through space, they break and leave dust and rock pieces behind in their path. Many of these pieces are just the size of a grain of sand! As the earth orbits the sun, it can pass through a comet's path. When this happens, those tiny pieces of dust enter earth's atmosphere and burn up, and each one is a shooting star!

Check this out!

This summer, between August 11-13, there will be a massive meteor shower (called the **Perseid meteor shower**) visible almost everywhere on the planet, especially here. It is one of the biggest meteor showers and could show up to 50 shooting stars per hour! It will be most visible in the very early mornings before the sun comes up, and you can see it best if you are somewhere away from city lights, but a backyard or park will still work! And don't worry if you miss it – it comes back every summer!

Comets

O N J M B T X E S I S P O C Q H D N S K

Q W G D E R S C R P Z S U Q T X I H U S

C K I O X T Z U Q E T H B Z J T O E K H

M S M U N C E A D I H R J D N O R C S O

W B W U S R P O X H I P U X T T O S N W

H F Y P N T W F R O B Y S I C R E H Q E

Y X P I M B J Q Z O E R N O E R T E B R

M E T S Y S R A L O S G M C M Y E C L H

A S T E R O I D U K S E A R A T M I I M

H U L I V P H E C T T P H R X N A N Y M

Z Y N S R P K P A U S F I E U H B J H Z

T T I B R O I R R K D P U G C I Y A H K

ASTEROID
DUST
METEOROID
SHOWER

ATMOSPHERE
ICE
ORBIT
SOLARSYSTEM

COMET
METEOR
SHOOTINGSTAR
SPACEROCK

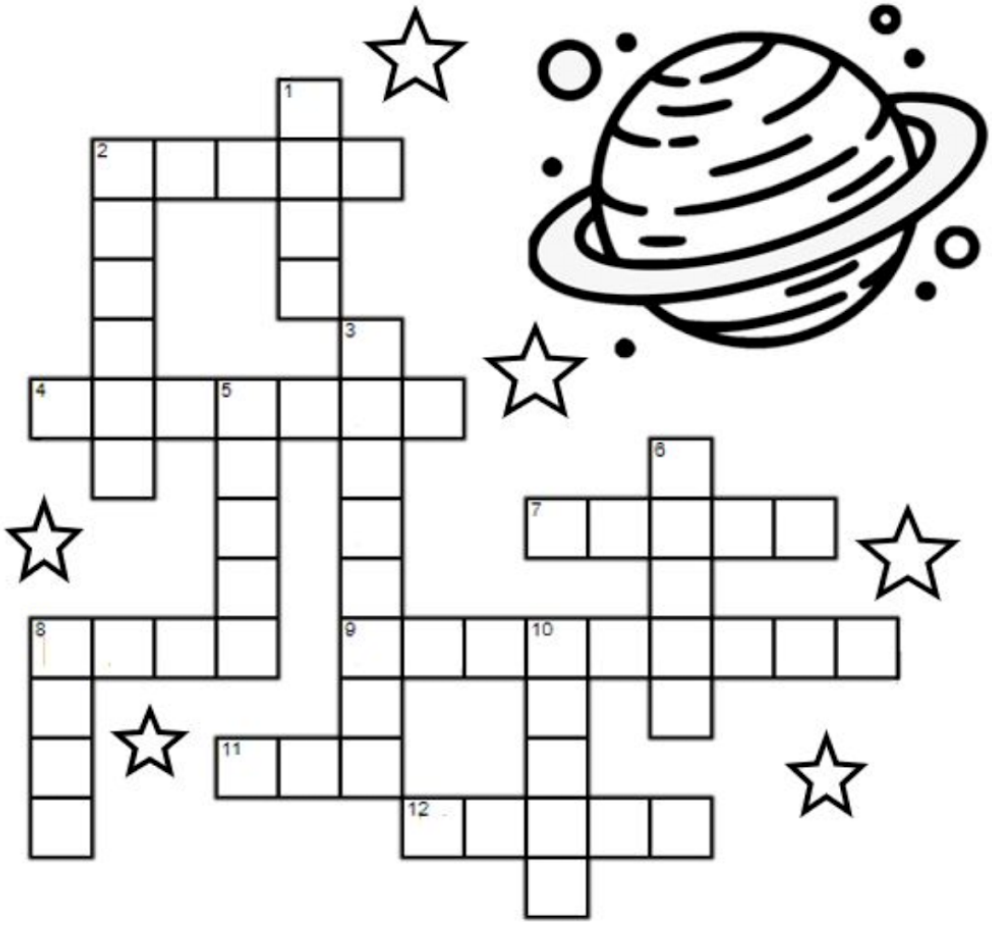
Space Crossword !

Across

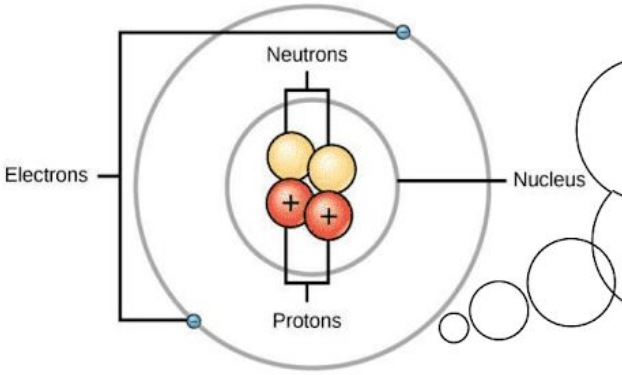
2)A big ball of ice and dust orbiting the sun
4)A language all astronauts must speak
7)Recently found on the surface of Mars
8)The red-planet
9)First man to walk on the moon
11) Astronauts spend 2 hours of their day here
12) The hottest planet in our solar system

Down

1)What animal is the big dipper supposed to be
2)The swan constellation
3)The robotic arm on the ISS, Canadian made
5)The Mars Curiosity rover will do this every year on its birthday
6)Are formed when molecular clouds are packed together tightly
8)Control the Earth's tides
10)_____ does not travel in space (think of your different senses)



Let's Talk About Stars!



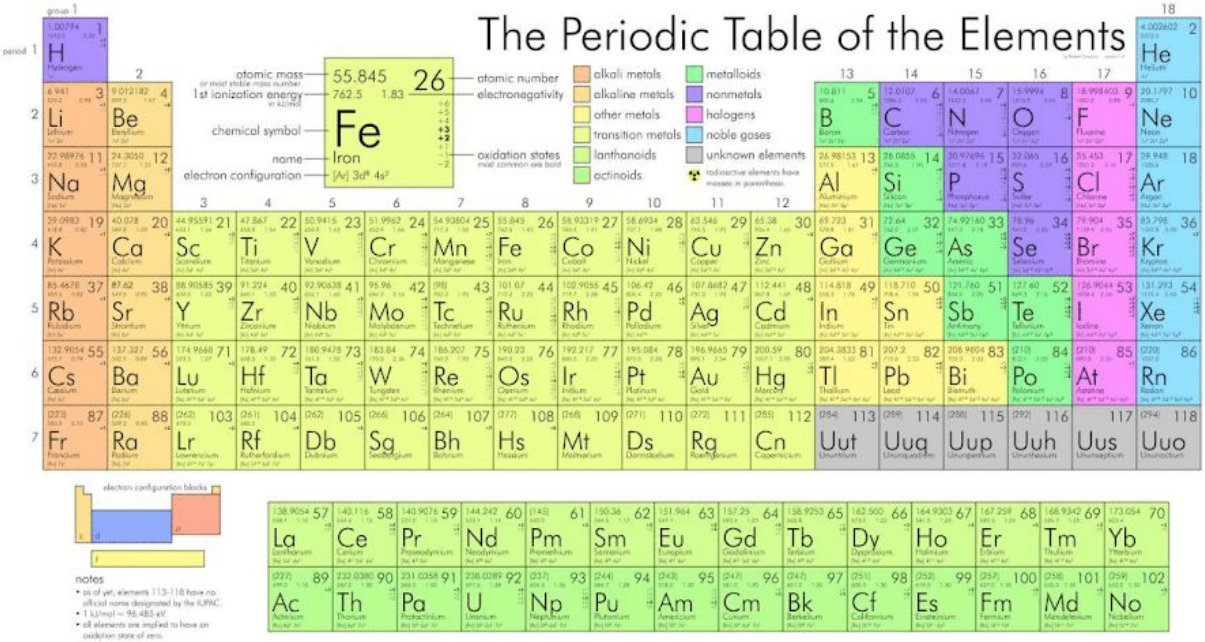
Do you know what an atom is?

An **atom** has been known as the smallest particle that cannot be divided further. Protons are positively charged; electrons are negatively charged whereas neutrons have no charge on it.

The number of protons in the nucleus of an atom determines the **atomic number** of that atom. This atomic number then determines the position of that atom in the **periodic table**.

Two atoms with an identical number of protons in their nuclei belong to the same element.

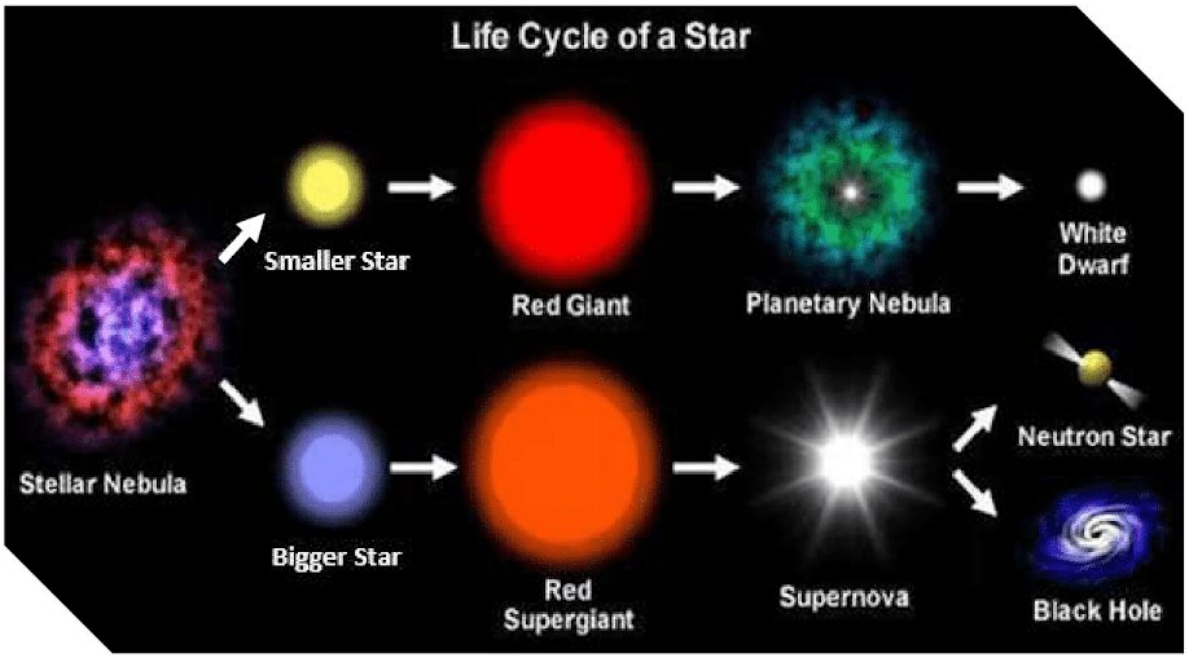
An element, like hydrogen, oxygen or iron, is a substance that cannot be broken down into anything else and is found in the period table.



What is a Star?

Stars are balls of burning gas made of different kinds of atoms!
Some atoms can join to form complex structures called **molecules**. Molecules do not fuse the nuclei of an atom but hold the atoms close - like holding somebody's hand.

What Does the Life Cycle of a Star Look Like?
Stars have *two* different life cycles depending on the size of the star! They always start as a **stellar nebula**. A stellar nebula is a small cloud filled with hydrogen molecules that are being pushed together by gravity.



In the core of the star, atoms combine to form new elements. That means that hydrogen atoms can combine to form helium! Making new elements releases a lot of energy. This is what makes the star burn. This reaction keeps happening in the core of the star until there is almost no hydrogen left.

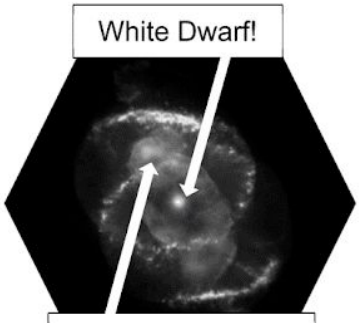
The star is called a **main-sequence star** while this fusion is happening. This is the longest life stage of a star! This stage can go quickly at 20 *million* years or go slowly at 100 *billion* years.

The bigger the star is, the faster it burns! This means that big stars have a much shorter life than small stars.

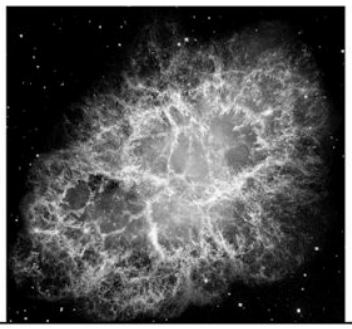
As the creation of new elements slows, the star gets bigger. It also turns red in colour.

This is called a **red giant** in smaller stars and a **red *super*giant** in bigger stars.

In bigger stars, helium atoms can combine to make even larger elements. It cannot happen in smaller stars. This means the star stops burning! When this happens, any molecules left around the core are blown away in a small explosion called a **planetary nebula**. It is the last life stage of smaller stars. The now-dead core of the star is called a **white dwarf**, which is extremely hot.



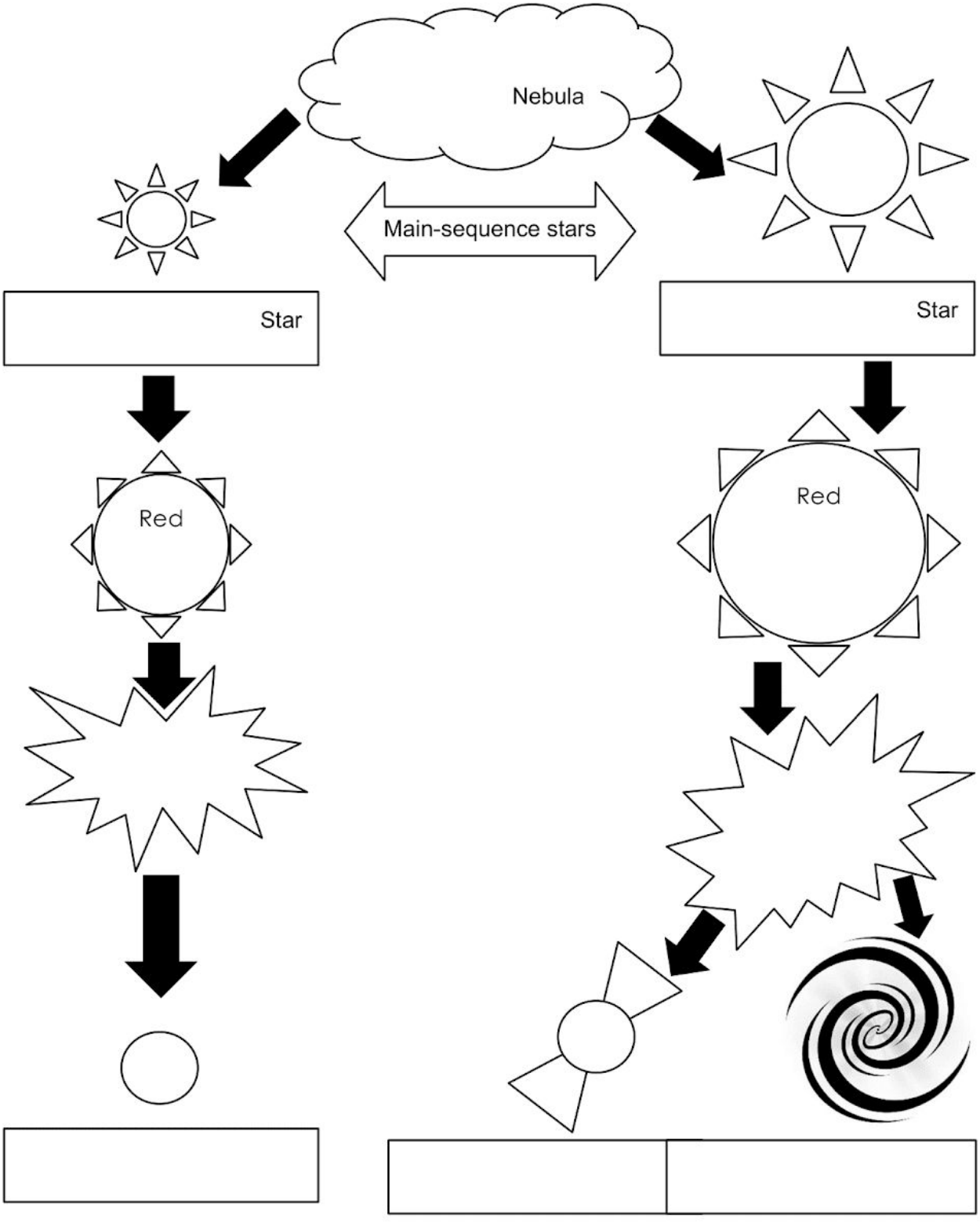
In bigger stars, new elements are made until **iron** is created in the core. When iron is created, no energy is let off. This means the star cannot burn. Eventually, gravity pushes *too hard* on the dead core of the star and causes it to explode. This life stage of bigger stars is called a **supernova**. All neutrons from atoms in the star are pushed together, making a **neutron star**. If the star is very massive, a **black hole** can be formed instead of a neutron star.



The remains of a supernova that happened in 1054!

Activity Time

Hello scientists! We hope you had fun learning about the star. Now its time to put your learnings into practice! Label the steps given in the star life cycle diagram below. You can check your answers using the diagram on page 2 of Let's Talk About Stars!



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