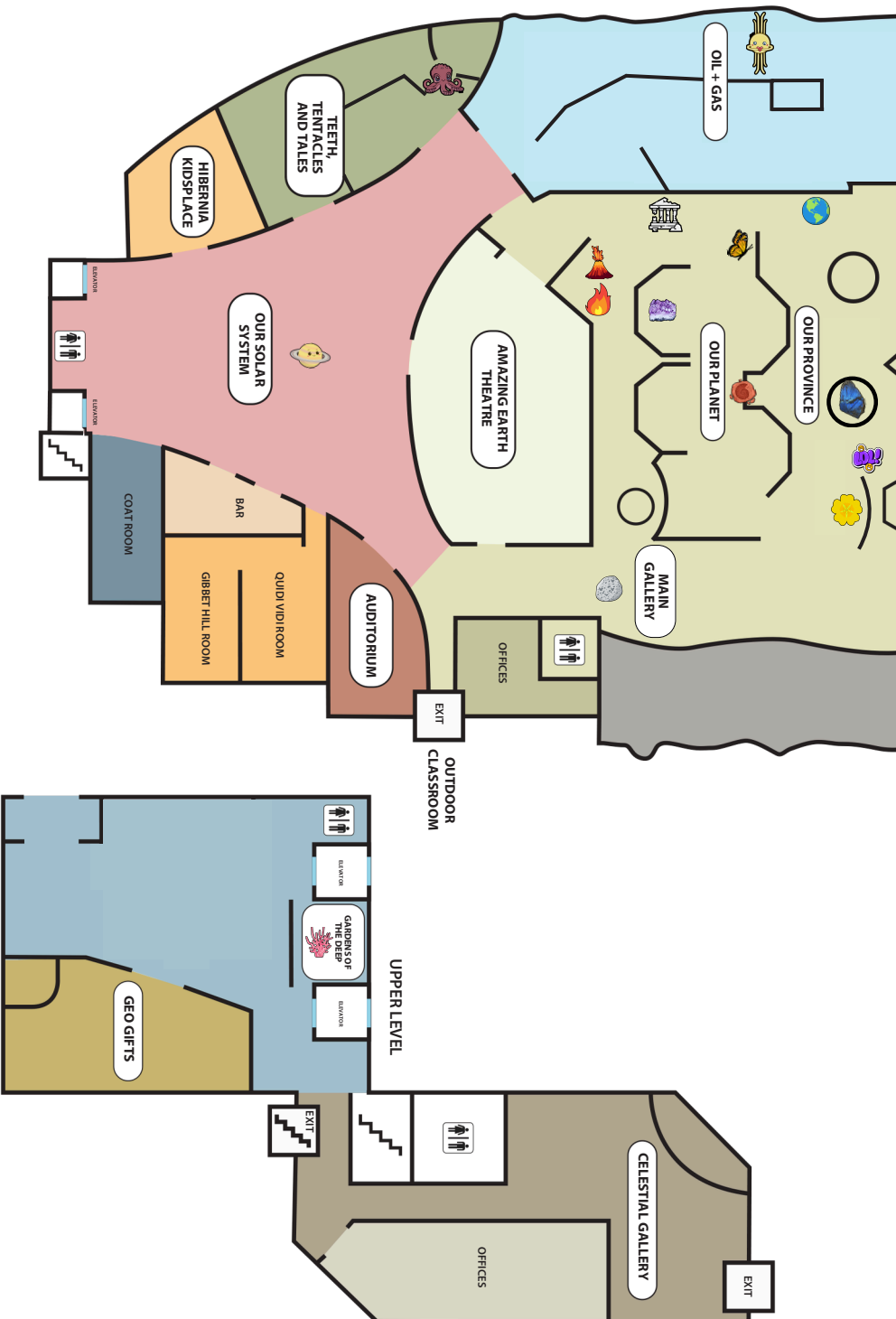


GUIDEBOOK TO



Johnson Geo Centre

DISCOVERY





DISCOVERY MAP

This Guidebook has lots of activities to discover during your trip to the Johnson Geo Centre!

Each icon shows the location of an activity in the booklet.

Find the page with that icon on it, and complete the activity.

HAVE FUN!

DEEP DIVE

Gardens of the Deep

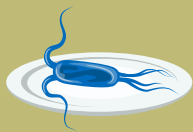
Welcome to the Johnson Geo Centre!
The oceans right off our coasts are
full of life, including deep-water
corals and **sponges**.



**Did you know corals and sponges
are animals, not plants?!**

Corals and sponges don't make their
own food using sunlight,
so they are not plants!

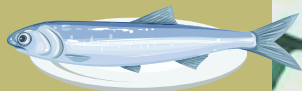
Imagine you own a restaurant for
corals and sponges.
What would you serve them?



Plankton



Cheeseburger



Small fish



Seaweed



Chocolate



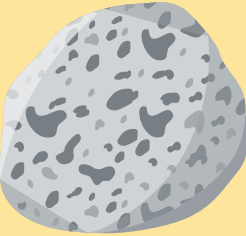
Krill

Answers at back.

LET'S ROCK!

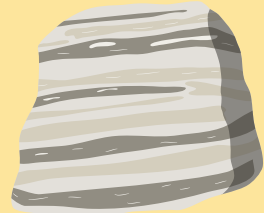
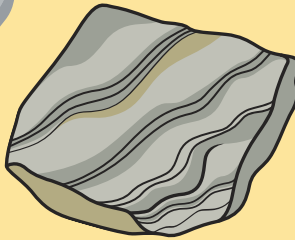
Main Gallery Entrance

There are many different rocks in this world, but they all belong to one of three types:



IGNEOUS

metamorphic



SEDIMENTARY



Our rock wall is grey green sandstone, a sedimentary rock.

Let's take a closer look at the 3 types and see which one is your favourite!



LAVA'S ALL YOU NEED

Our Planet

Igneous Rocks - Identification Station

Igneous rocks are rocks born from fire!



Hot Fact: Igneous comes from the Latin word *ignis*, which means fire!

There are 2 types of igneous rock:

- 1** those that form from magma inside a volcano (intrusive)
- 2** those that form from lava on the surface of the Earth (extrusive)

**QUIZ
TIME!!!**

Take a look at the 8 samples in front of you.
Which igneous rock...

has the
most holes?

is the
shiniest?

is the
reddest?

Answers at back.

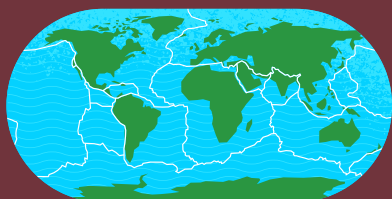
WHOA! VOLCANO!

Our Planet

Where Can I Find a Volcano?

Volcanoes are found along tectonic plate boundaries.

A tectonic plate is a piece of the surface of the Earth, or the Earth's crust.



Tectonic plates fit together like puzzle pieces and cover the whole Earth!

When tectonic plates pull away from or crash into each other, rock at their boundaries can melt and rise up to make a volcano!

Imagine you are
a volcano!
Jump up and explode!

Look at the map.
Are there more
volcanoes around
the Atlantic or
Pacific Ocean?

Answers at back.

SHAKE, RATTLE AND ROLL!

Our Planet Earthquakes

When tectonic plates press against each other really hard and then suddenly slip, they can create an earthquake. Earthquakes can shake the earth so much, they can destroy buildings.

The shaking waves an earthquake makes are called **seismic waves**.

Seio means “I shake” in
Ancient Greek!



A seismometer measures shaking waves in an earthquake.

Jump on our earthquake mat and record how much seismic energy you can make!



**-HIGH-
SCORE**



CH-CH-CH-CH-CHANGES!

Our Planet

Metamorphic Rocks - Identification Station

Metamorphic is one of the 3 rock types. Metamorphic means changing. Metamorphic rocks are ones that have changed from one rock to another.

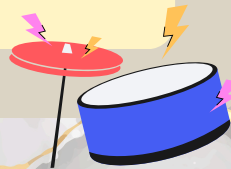
When a caterpillar changes into a butterfly it is called complete metamorphosis.

Metamorphic comes from the word **metamorphosis!**



Metamorphic rocks have protoliths or parent rocks. These are the rocks they once were before they changed.

**GIVE YOUR PARENT A "ROCK" STAR
NICKNAME!**



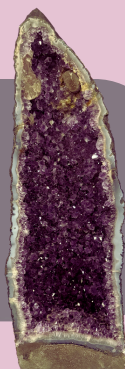
MINERAL MIX-UP

Our Planet

A Recipe for Rocks

Minerals are the building blocks of rocks. They are made of one or more chemical elements.

Amethyst is a variety of the mineral quartz! It is purple due to bits of iron in it.



Can you unscramble the names of 8 minerals we have on display at the Johnson Geo Centre?

IREVLS

ZATURQ

LICTACE

LOGD

RITYPE

THATIMEE

PECPOR

EAHILT

Answers at back.



SEDIMENTAL VALUE

Our Planet

Sedimentary Rocks - Identification Station

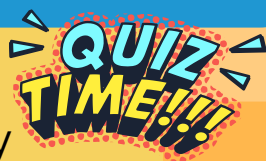
Wind and water can break small bits of rock called **sediment** away from larger rock. These sediment grains can then be blown or floated into large bodies of water.

There, they settle in layers and with enough layers (weight and pressure) and enough time, sedimentary rock forms!



Only sedimentary rocks can have fossils!

Take a look at the 6 samples in front of you. Which sedimentary rock...



has lots of shells?
is made of lots of small sand grains?
is a fossil fuel?

Answers at back.

A PLACE AT THE TABLE

Our Province

Tablelands



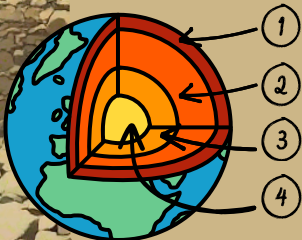
The Tablelands
in Gros Morne
National Park are
home to a
special stone -
peridotite!

This rock was formed in the **mantle** of
the Earth and is rarely found on the
surface.

The plants that grow in the Tablelands are
different than the ones that grow nearby.
Only special plants can survive near
peridotite!



Do you know the 4 layers of the Earth?



Answers at back.

GNEISS DAY FOR IT!

Our Province

Gneiss

Let us introduce you to one of the oldest rocks on Earth - the **gneiss** in our Main Gallery!



This rock is 3.8 billion years old and from Saglek Bay in Labrador!

Imagine the long beard this old rock would have and draw it here.



Gneiss is pronounced “nice” making for some gneiss puns!



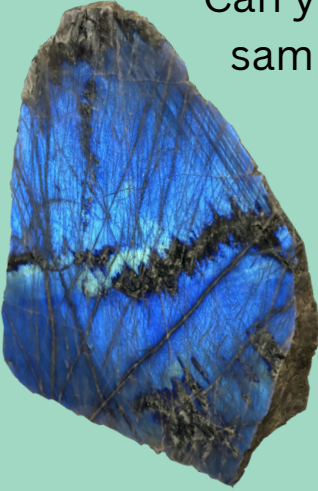
What's the best rock joke you've ever heard? Tell it to someone today!

THE BRIGHT STUFF

Our Province

Labrador: An Ancient Land

Can you find our beautiful sample of **Labradorite**?



Labradorite is Newfoundland and Labrador's provincial mineral that shines with blues and greens, and sometimes yellows and reds.

Our anorthosite block also contains flecks of labradorite!
Do you see them shining?



Labradorite is used to make beautiful jewelry and snazzy countertops! What would you decorate with it?



MOVERS AND QUAKERS

Our Province

Traveling Continents

The Earth's **tectonic plates** have been moving around for years and years. In fact, the continents have moved all around the world over the last 3 billion years.



We have ripple marks in our rock wall that were caused by hurricanes that happen in the Southern Hemisphere. This is proof that the rocks here have moved around the world!

Take our globes for a spin and find the red dot on each. That's where Newfoundland is now. On how many globes is there land under the red dot? And water?

Land	Water

Answers at back.

DINOSAUR HUNT

Our Province

Birth of the Atlantic Ocean

There are dinosaur-aged rocks in the Grand Banks off the coast of Newfoundland. 225 million years ago, when dinosaurs roamed the Earth, there was a river valley that was above sea level in the same spot where the Grand Banks are now.



Did you know our rock wall is 300 million years older than the dinosaurs?! That's why there are no dinosaur fossils on Signal Hill.

Take a look around this gallery.
Can you spot a cast of a dinosaur bone?

Give your best
dino ROAR when
you find it!

What part of a
dinosaur is it?
And what dinosaur
is it from?

Answers at back.

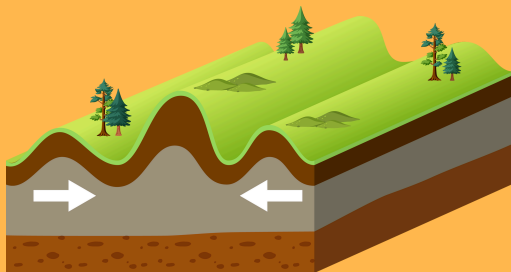
SPEAK OF THE DEVIL

Our Province

Devil's Cleft Model

The arch you see in our gallery is a model of dangerous section of the North Head Trail around Signal Hill.

The rock of Signal Hill is sandstone. The layers of the rock are now tilted from tectonic plates coming together and bending them downwards.



One layer of this sandstone was softer and eroded more quickly than the others, leaving behind the Devil's Cleft gap in the rock.



Take a snap with our model with your most devilish smile!

FOSSILS, FOSSILS EVERYWHERE

Our Province

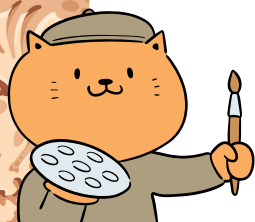
Mistaken Point Cast Wall

This large cast is of a surface at Mistaken Point. There are over 150 fossils on it!

A volcano erupted when these soft-bodied organisms were alive and buried them in ash, preserving the shapes of their bodies.



A **paleoartist** is someone who draws what organisms would have looked like from their fossils. Pick a fossil and draw the organism below.



COME FLY WITH ME

Our Future & Space

Earth Observation

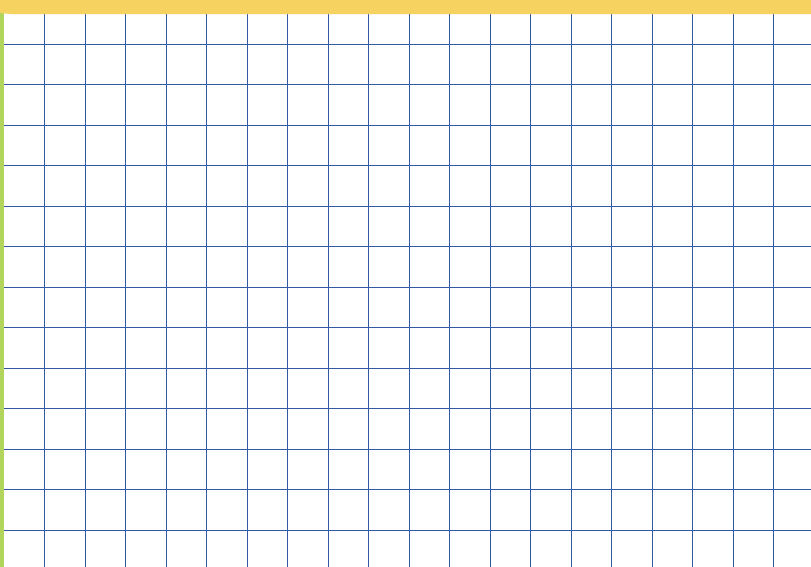
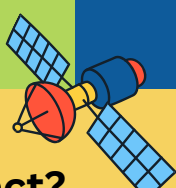
Satellites collect data on all sorts of things: our ocean, ice, land masses and the atmosphere.

The information received can help us protect our environment and keep people safe in natural disasters.

Imagine you are a satellite.

What sort of data would you collect?

Soar around the globe at the entrance to the exhibit and take note of your observations.



GIVE ME A HAND, WOULD YA?

Our Future & Space

Canadarm 2 Model

The Canadarm 2 is a large robotic arm that is used on the International Space Station (ISS).

When extended, it is 17 meters or 56 feet long (6 times larger than our model) and it can lift over 250,000 lbs! That's about 42 African elephants!



If you were to design a robotic arm, what would you design it to do?

Canadarm is used to make repairs to the ISS; move supplies, equipment and people; and to make “Cosmic Catches,” catching passing ships so that their astronaut crews can board the ISS.



Image of Canadarm 2: www.asc-csa.gc.ca/eng/iss/canadarm2/about.asp

ROAMIN' AND ROVIN'

Our Future & Space

Mars Lander and Rover Case

Rovers have been sent to Mars since 1997 to investigate whether there used to be water and life on the planet.



There have been 6 rovers sent to Mars.

Can you find their names in the puzzle below?

CURIOSITY PERSEVERANCE OPPORTUNITY
SOJOURNER SPIRIT ZHURONG

C	O	P	P	O	R	T	U	N	I	T	Y	J
K	D	C	F	C	V	J	X	N	S	U	Y	C
O	B	U	E	S	G	A	U	Q	I	G	T	A
P	E	R	S	E	V	E	R	A	N	C	E	Y
P	T	I	R	I	P	S	X	O	G	F	R	C
R	E	O	V	I	Z	H	R	L	V	S	T	L
I	Z	S	O	J	O	U	R	N	E	R	U	H
R	D	I	W	C	H	A	O	M	A	I	R	W
K	N	T	P	Z	M	S	P	I	T	O	I	A
E	X	Y	L	U	Y	R	E	Y	X	J	E	T
P	E	R	S	V	A	V	U	T	A	N	C	E

Answers at back.

ROCKET, MAN

Our Future & Space

Ares V Rocket Model

Ares V was a rocket designed to carry cargo to the Moon and Mars. Sadly, it was never launched due to budget cuts.

The Ares V would have been able to lift over 157,000 lbs (71 metric tons) to the Moon!
That's about 6.5 school busses!



Luckily, all that scientific research didn't go to waste!

The plans from Ares V were incorporated into the Space Launch System, a crew and cargo vehicle.

Now countdown and blastoff to our Reception Hall, under the planets!



OUT OF THIS WORLD



Reception Hall

There are 8 planets in our Solar System!
Can you name them all?

These huge planet models are hollow on the inside, so they're lighter than you'd think!



Here are some interesting planet facts.
Can you identify the planet that each is about?



Which planet is so hot that metals would be liquid there?



What two planets might rain diamonds?



What planet has a storm on its surface that's bigger than Earth?



What planet has the biggest volcano in the Solar System?

Answers at back.

DRILLING DOWN

Oil + Gas Gallery

When **organic matter** gets trapped in layers of sedimentary rock, if there is enough heat and pressure, it can be changed into oil and gas.

To trap oil, you need the right “rock sandwich”:

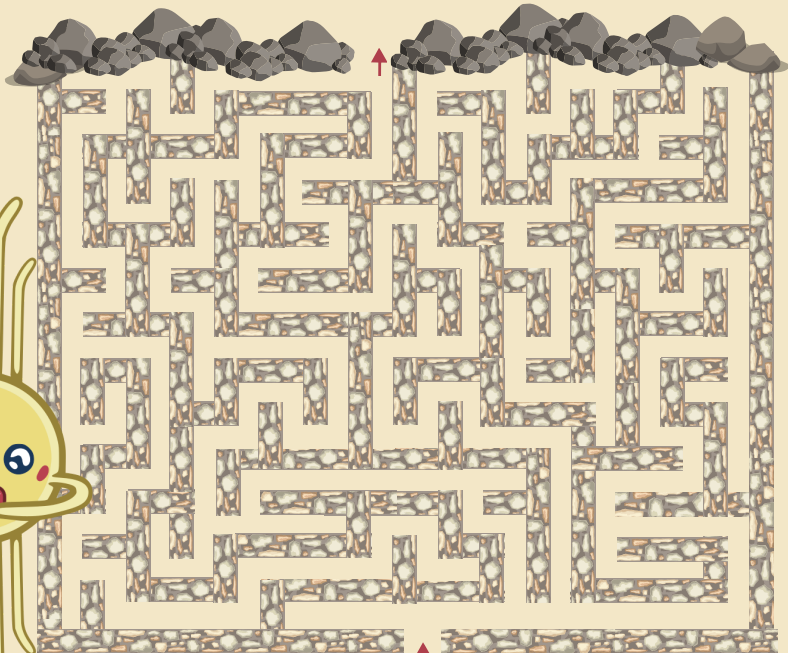
Top: rock with no tiny holes

Middle: rock with tiny tunnels

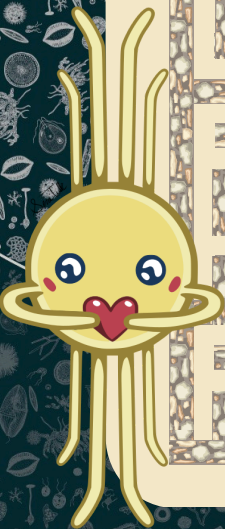
Bottom: rock with tiny holes for organic matter



Can you get the oil through the maze?



Answers at back.



SINK YOUR TEETH INTO THIS

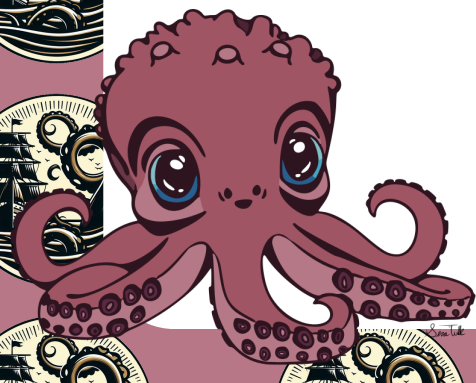
Teeth, Tentacles and Tales

Mythical creatures can look very similar to creatures that actually exist or they might have a mix of a body parts from different creatures.

Mythical creatures were created by societies all over the world to explain the un-explainable.



Looking at the pictures of mythical creatures in the Gallery, can you draw up your own in the space below?



ANSWERS

Deep Dive: Plankton, Krill and Small Fish.

Lava's All You Need: Most holes: Vesicular Basalt;
Shiniest: Pegmatite; Reddest: Rhyolite

Whoa! Volcano!: Pacific Ocean

Mineral Mix-Up: Silver; Quartz; Calcite; Gold;
Pyrite; Hematite; Copper; Halite.

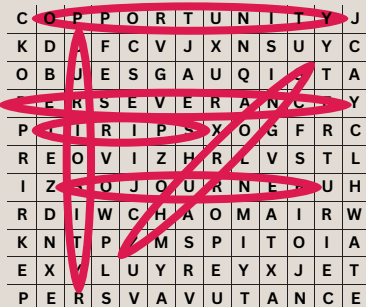
Sedimental Value: Limestone; Sandstone; Coal

A Place at the Table: (1) Crust; (2) Mantle; (3) Outer
Core; (4) Inner Core.

Movers and Quakers: Land: 4; Water: 9

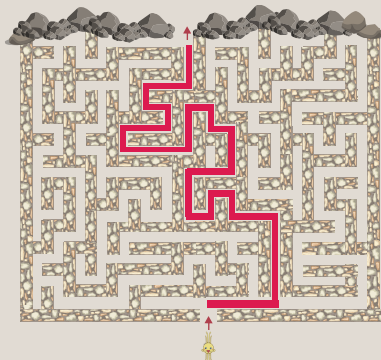
Dinosaur Hunt: An Iguanodon vertebra (back bone).

Roamin' and Rovin':



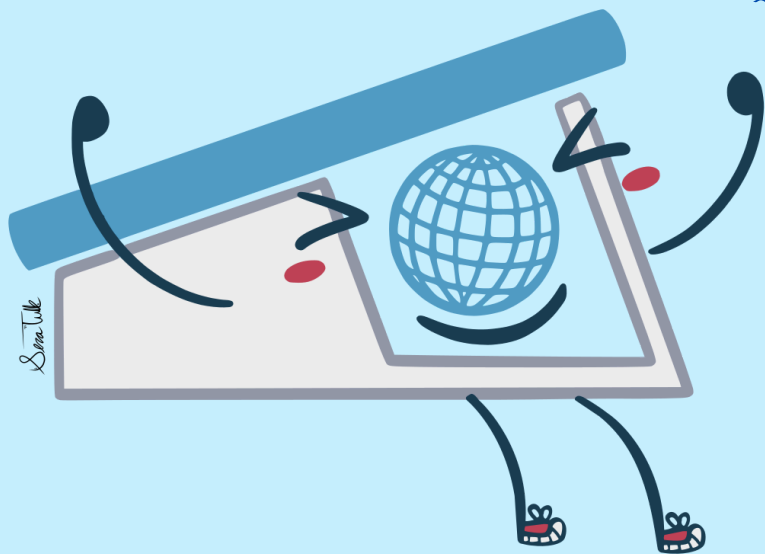
Out of This World: (1) Venus; (2) Uranus and
Neptune; (3) Jupiter; (4) Mars

Drilling Down:



FIELD NOTES

PROPERTY OF THE JOHNSON GEO CENTRE



Written, designed and dreamed up by Kate Murphy,
Science Interpreter at the Johnson Geo Centre