

Coloring Page

Color Sedna and Toklo traveling through space
by matching each symbol with its color!



Animals from the Film



Sedna

The sea otter

The sea otter is a marine mammal that lives in the cold waters of the North Pacific region, near the Arctic.

Size: 120 to 150 cm

Weight: 20 to 45 kg

Diet: It mainly eats sea urchins, shellfish, crabs, fish, and sometimes uses stones to break open shells.

Toklo

The cormorant

The cormorant is a large black seabird with a long neck, commonly found along the coasts of Europe.

Size: 75 to 95 cm

Weight: 2 to 3,5 kg

Diet: It mainly feeds on fish.



Kuak

The razorbill (penguin)

The penguin is actually a bird that can fly. It lives along the cold coasts of the North Atlantic region: Iceland, Greenland, Canada, and the Northern and Norwegian Seas.

Size: 40 to 48 cm

Weight: 500 to 800 g

Diet: Fish, small crustaceans, krill, and mollusks.



Did you know?

What is the difference between a penguin from the North and a penguin from the South?

The penguin living in the Northern Hemisphere flies very well, and does not walk upright; it also swims but remains a true flying bird.

The penguin living in the Southern Hemisphere cannot fly, and walks upright; it swims using wings that have turned into flippers.





What you need:

- Fruit juices of different colors,
- Popsicle molds (or small cups)
- A teaspoon
- A freezer



Step 1



Step 2



Step 3

Prepare the juices

- Choose thick juices (such as smoothies or juices with pulp), or add a little fruit purée to make them thicker.

Freeze by layer

- Pour the first layer of juice into the mold (about 1 cm high).
- Put it in the freezer for 30 min to 1 h, until this layer is set (but not completely frozen).

Add the next layer

- Take the molds out of the freezer.
- Gently pour the second layer of juice (a different color) on top of the first one, using a spoon to avoid mixing the layers.
- Put it back in the freezer for 30 min to 1 h.



Step 4



Step 5

Repeat the steps

- Continue until the mold is full, letting each layer freeze before adding the next one.

Insert the sticks

- When the mold is almost full, place a wooden stick in the center.
- Let it freeze completely (at least 4 h).



Tips for perfect layers

Use juices with different densities. For example, put a thick juice (like mango purée) at the bottom and a thinner juice (like apple juice) on top.

Pour slowly. Use a spoon or a dropper to add the layers without mixing them.

Freeze well between each layer. This is the key to keeping the colors from mixing.

The Amount of Water on Earth

How to figure out
386,000,000,000,000,000,000
liters of water on Earth?

**1**

Let's pretend 1L of water represents all the water on Earth.

**2**

Remove one large tablespoon.

This represents all the freshwater on Earth.

**3**

Let one drop of that water fall.

This represents the directly accessible drinking water.

Drinking water is barely
one drop of the whole

You can now see how precious drinking water is, we must protect it and not waste it.

Water is mostly on the surface

Total water represents about 0.02% of the Earth's volume—it is small!

On the surface: Oceans, seas, lakes, rivers, glaciers.

In the ground: Soil moisture, groundwater (aquifers), and small amounts trapped in rocks.



Where does our drinking water come from?

Depending on the region, it comes from:

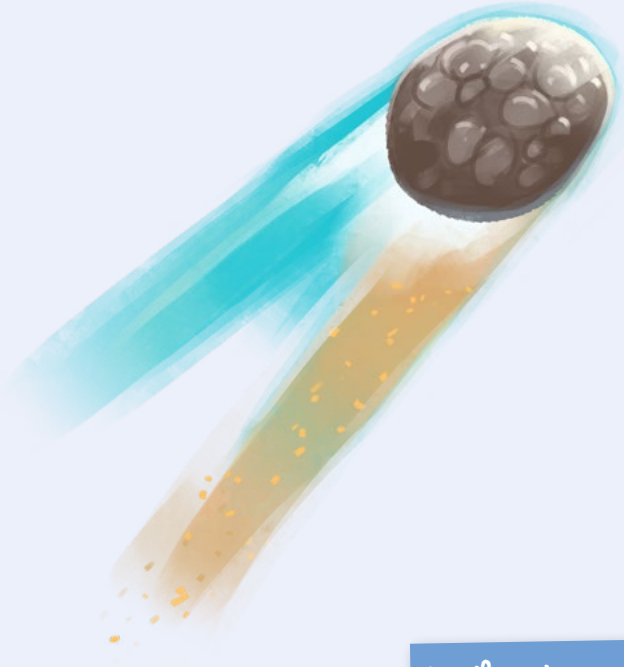
Groundwater
(the most common source)

Rivers

Lakes or dams

Desalination of seawater
(rare, mostly in desert areas)

Comets



Imagine a giant, dirty snowball traveling very, very far through space, around the Sun!

- A comet is a **small celestial body** that is part of the Solar System.
- It is made of **ice** (frozen water and gases) mixed with **dust** and **rocks**. This is called its nucleus.
- Comets spend most of their time in the very cold regions of space, far away from the Sun.

Why do comets have two tails?

When a comet gets close to the Sun, its ice **sublimate**: they change directly from a solid form into a gas form. The released gas and dust form an atmosphere around the nucleus, called the **coma**.

The dust tail: Solid grains pulled from the nucleus are pushed by sunlight. They form a white or yellowish trail that follows the comet's path.

The gas tail (not always visible): Ionized gases, made of electrically charged particles affected by the solar wind, are pushed straight away from the Sun. It often appears bluish.

So, a comet can show two distinct tails, created by different processes but both coming from the **sublimation** of its ice.

And the most amazing part:

This tail is made of dust and ionized particles and **can stretch over millions of kilometers**, which is huge compared to the comet's small nucleus and the gas cloud around it.

What is sublimation?

Sublimation happens when a comet's ice heats up and turns directly into gas, because there is no liquid water into space.



Short glossary of Celestial Bodies



A comet

A ball of ice and dust that orbits the Sun.



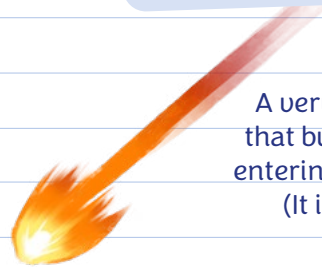
An asteroid

A large rocky or metallic object that orbits the Sun, mostly between Mars and Jupiter.



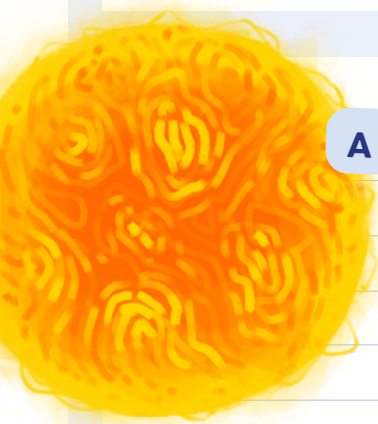
A meteorite

A piece of rock (from an asteroid or a comet) once it is found on the surface of a planet.



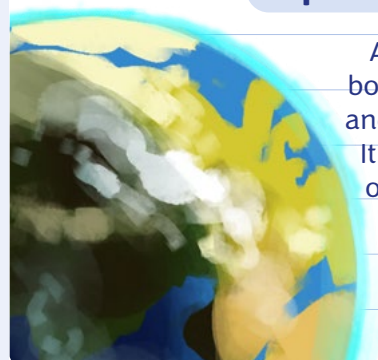
A shooting star

A very small piece of rock that burns up quickly when entering Earth's atmosphere. (It is not really a star.)



A star

A huge, very hot ball of gas that produces its own light (like the Sun).

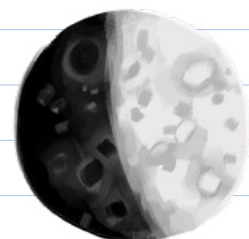


A planet

A very large celestial body that orbits the Sun and has cleared its orbit. It does not produce its own light but reflects the light of its star.

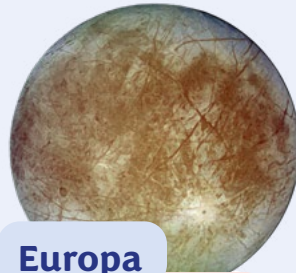
A moon

A rocky or icy body, of various sizes, that orbits a planet. And yes, there are actually many moons into space!



Water and the Moons

In our solar system, some moons hide water in the form of ice or underground oceans.



Europa

Moon of Jupiter

Ice crust with a warm, salty underground ocean. 2 space probes are currently on their way to Europa, arriving around 2030 (Juice, Europa Clipper).



Enceladus

Moon of Saturn

Ice crust with a warm, salty underground ocean. There are geysers that blast water and ice into space.

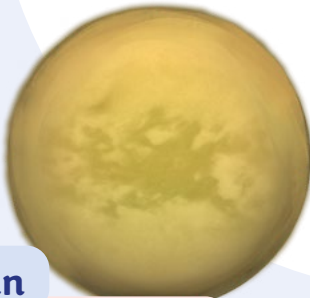


Callisto

Moon of Jupiter

Callisto has a very ancient, icy surface.

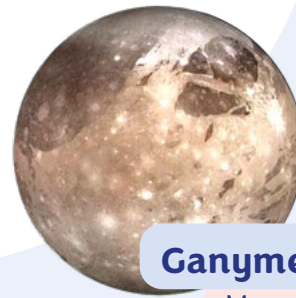
Water is in the form of ice on the surface and liquid below due to the heat from the core.



Titan

Moon of Saturn

Titan is a special moon because it has an atmosphere like Earth. It is very cold there (-180°C): the water ice is as hard as rock, and there are strange seas made of hydrocarbons.



Ganymede

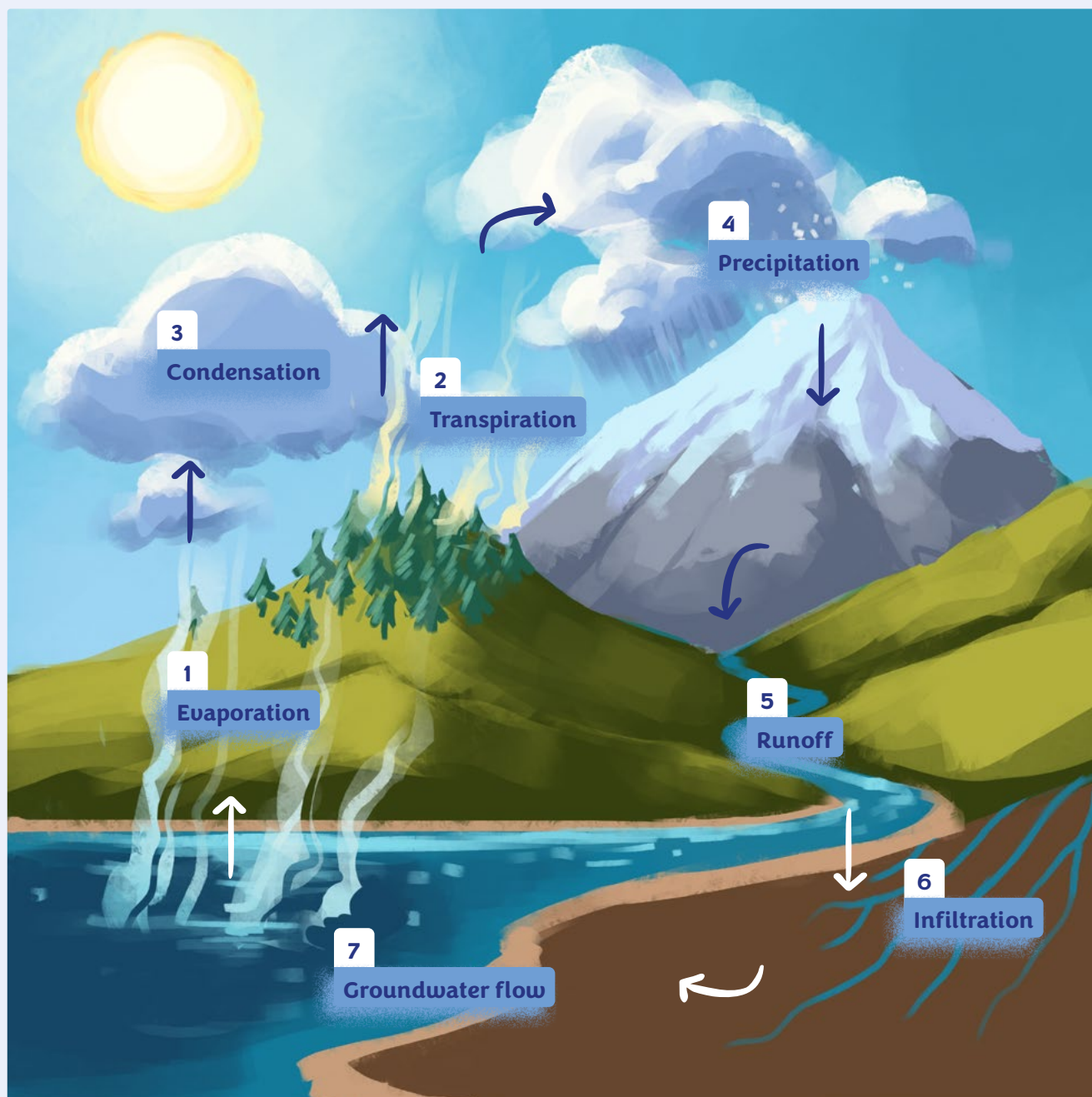
Moon of Jupiter

Ganymede resembles a giant layer cake made of alternating layers of ice and liquid water. It is also the largest moon in the solar system.

Life on the moons?

We look for water on other planets and moons because where there is water, there can be life.





Making a water-cycling Terrarium



What you need:

- Large transparent jar with lid
- A bit of soil
- A few seeds or small plants
- Water

STEP 1

Put some soil and seeds at the bottom. Water lightly.

STEP 2

Close the lid tightly. Place the jar near a window (not in direct sunlight at first).

The Cycle in the Jar

- The sun heats the water and the soil (**evaporation**).
- Plants release water vapor (**transpiration**).
- Water vapor rises and cools upon contact with the cold lid (**condensation**).
- Droplets get bigger and fall back to the ground (**precipitation**).

The States of Water

What you need:

- A saucepan
- Water
- A cooktop



Put ice cubes in the saucepan
= **solid state**.



Heat gently: the ice cubes melt and become water
= **liquid state**.



Continue heating: the water boils and turns into steam
= **gaseous state**.



Place a cold plate above the pan: the steam condenses into droplets = **liquid state again**.



Why do I make steam by blowing on car windows when it's cold?

Fog on car windows (or on any cold surface) is a phenomenon related to water condensation—that is, the transition of water from a gaseous state (vapor) to a liquid state.

Why does it happen?

Air contains water vapor

When we breathe, speak, or even sweat, we release water in the form of (invisible) vapor into the air. In a car, this humid air is trapped inside.

Windows are cold

In winter or cool weather, car windows are colder than the interior air. When water vapor comes into contact with a cold surface (like the window), it cools down and turns into tiny water droplets: this is steam.

Condensation

It is the same phenomenon that creates dew on the grass in the morning or droplets on a cold glass of water in summer.

What are the different states of water?

Sublimation

Solid → Gas

ex.: on Mars, ice turns directly into vapor without becoming liquid

Solid condensation

Gas → Solid

ex.: formation of frost on a very cold window in winter

Liquid condensation (liquefaction)

Gas → Liquid

ex.: steam on a mirror after a hot shower

Solidification (freezing)

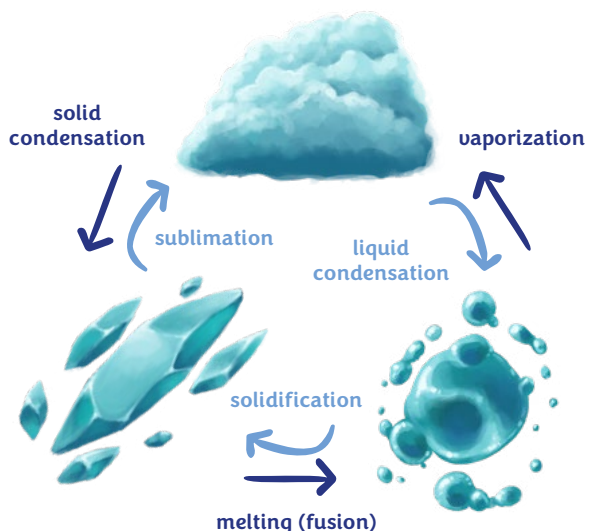
Liquid → Solid

ex.: water that freezes

Vaporization

Liquid → Gas

ex.: water that boils at a specific temperature (the boiling point)



Water and Density

What you need:

- 3 glasses of water
- 3 raw eggs
- Salt
- Spoon

Step 1 Prepare 3 glasses



Glass 1

Fill with tap water (fresh water).



Glass 2

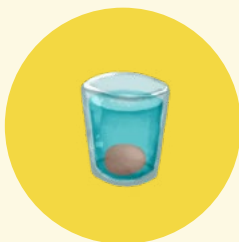
Fill with water and add 5–6 tablespoons of salt (salty / brackish water).



Glass 3

Place 1 egg halfway up by adjusting the salt concentration.

Step 2 Place an egg in glass 1 and 2 and observe the result



Glass 1

The egg sinks (it is denser than fresh water).



Glass 2

The egg floats (salt water is denser than the egg).



Glass 3

The egg stays suspended.

Observation

The density of a liquid changes how objects float in it.

The Dead Sea: a place where you float effortlessly!

The Dead Sea is a very salty lake. Its water contains much more salt than seawater. Because of all this dissolved salt, the water becomes very dense. Result: objects—and even people—float much more easily than in normal water!

It's the same phenomenon as in the egg experiment: in fresh water, the egg sinks; in salty water, it floats.



The atmosphere

Mars

Polar ice caps:
Water ice and
carbon dioxide ice
(called "dry ice")

95 %

carbon dioxide (CO_2),
with a little nitrogen
and argon. Oxygen
represents only 0.13%
and water vapor 0.03%.

- Impossible to breathe.
- Liquid water cannot stay on the surface.

The atmosphere is
much thinner than
Earth's: the pressure is

**150 to
200 x**
lower

Water exists as **ice** or very
thin vapor.

Like Earth, Mars has **seasons due to the tilt of its axis**. Temperatures go from $-14^{\circ}C$ in summer to $-120^{\circ}C$ in winter, with an average of about $-60^{\circ}C$. Ice caps are therefore **naturally found at the poles**.

Sublimation



No atmosphere
=
No protective blanket
to keep water



And just like that,
ice turns **directly**
into water vapor:
this is
sublimation

Robots searching
for ice

2008

Phoenix Mission

Main goal: Study the Arctic region of Mars, near the polar ice cap.

Major discovery: Phoenix confirmed **the presence of water ice** in Martian soil by photographing it over several days and watching **it sublimate**.

Other results: the probe observed Martian snowfall and showed that water can move between the atmosphere and the ground.

Importance: this mission proved that Mars still contains water in the form of ice, which is essential for understanding its climate and potential habitability.

Since 2021

Perseverance Mission

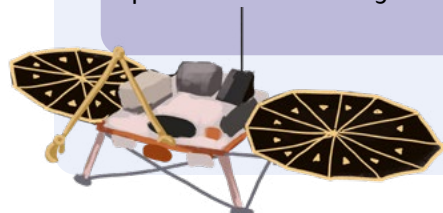
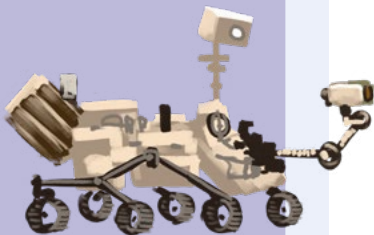
Exploration site: Jezero Crater, which once contained a lake and a delta formed by water.

Main goal: search for signs of past water activity and collect rock samples.

Recent discoveries:

Perseverance identified minerals such as kaolinite (clay), which formed in the presence of liquid water in the past.

Importance: by studying these rocks, scientists want to understand whether Mars could once have been habitable and if it preserved traces of ancient life.



The Inuit Language

In the movie H_2O , some names come from the Inuit language, spoken by peoples who live in very cold regions. For example, *Toklo* means bear, *Sedna* is the name of a sea goddess, and *Kuak* means *hole in the ice*. You too can discover Inuktitut, which is part of the Inuit language family.

Learn to Speak Inuktitut



Some graphemes:

◁ a	Δ i	▷ u	
< pa	^ pi	> pu	(A dot on a grapheme
Q na	σ ni	o nu	makes the vowel twice
ˆ sa	ˆ si	ˆ su	as long.)
c la	c li	u lu	

Match the Inuktitut word
with its translation:

◁ ˆ ˆ Δ c Q ▷

ani
= outside

nau
= boat

ili
= to learn

nai
= over there

aluru
= hello

sai
= before /
in front of

Going further

Ainngai

aĩn-gaĩ

◁ Δ ˆ ◁ Δ

= Hello

Ullaakkut

ou-lou-koute

▷ c ˆ d ˆ

= Good morning

Uvanga __ atira

ou-von-ga __ a-ti-ra

▷ ˆ ˆ ˆ __ ◁ ˆ ˆ

= My name is __

Qujannamik

cou-ya-na-mik

ˆ d ˆ ˆ ◁ ˆ

= Thank you