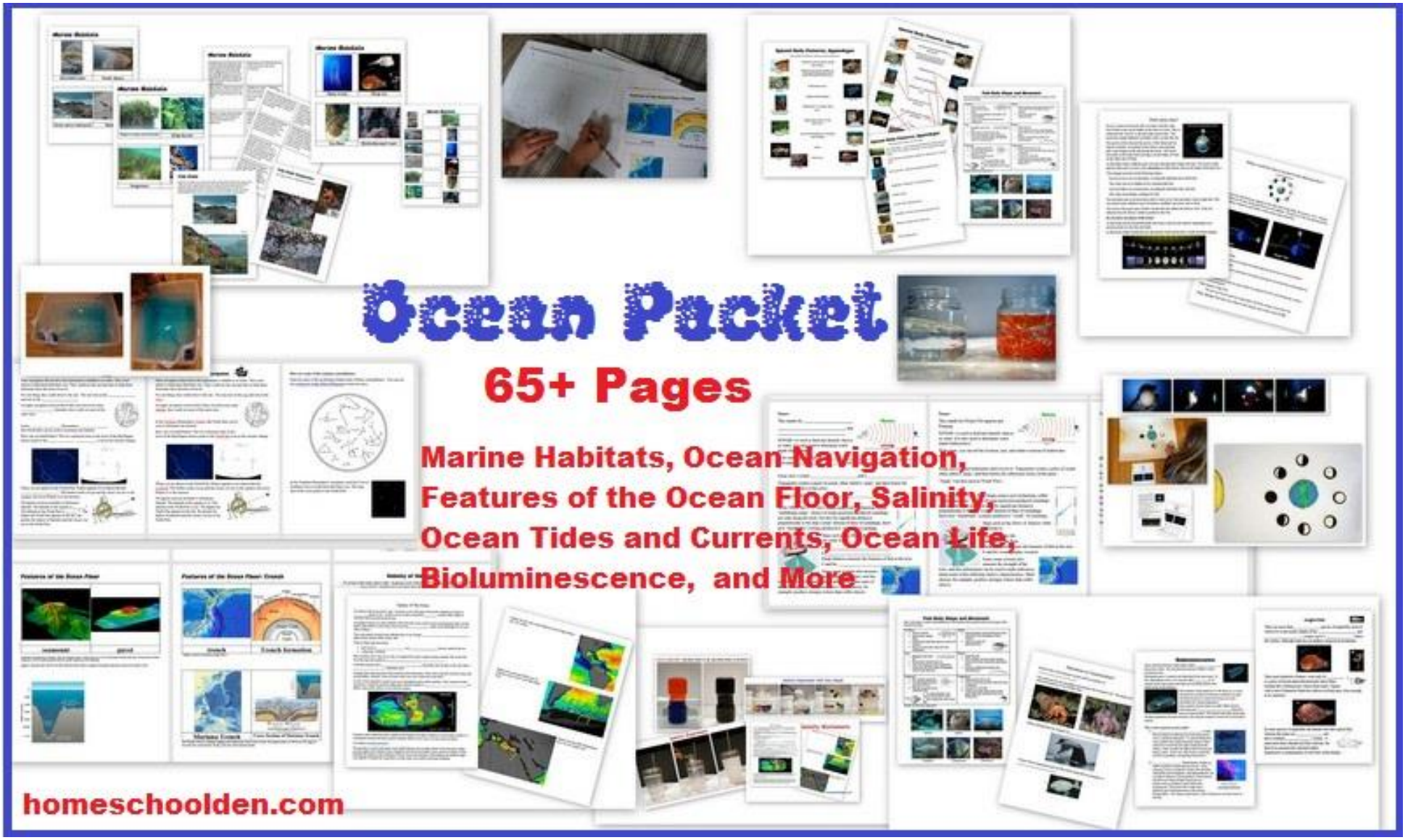
Ocean Packet Quick Preview



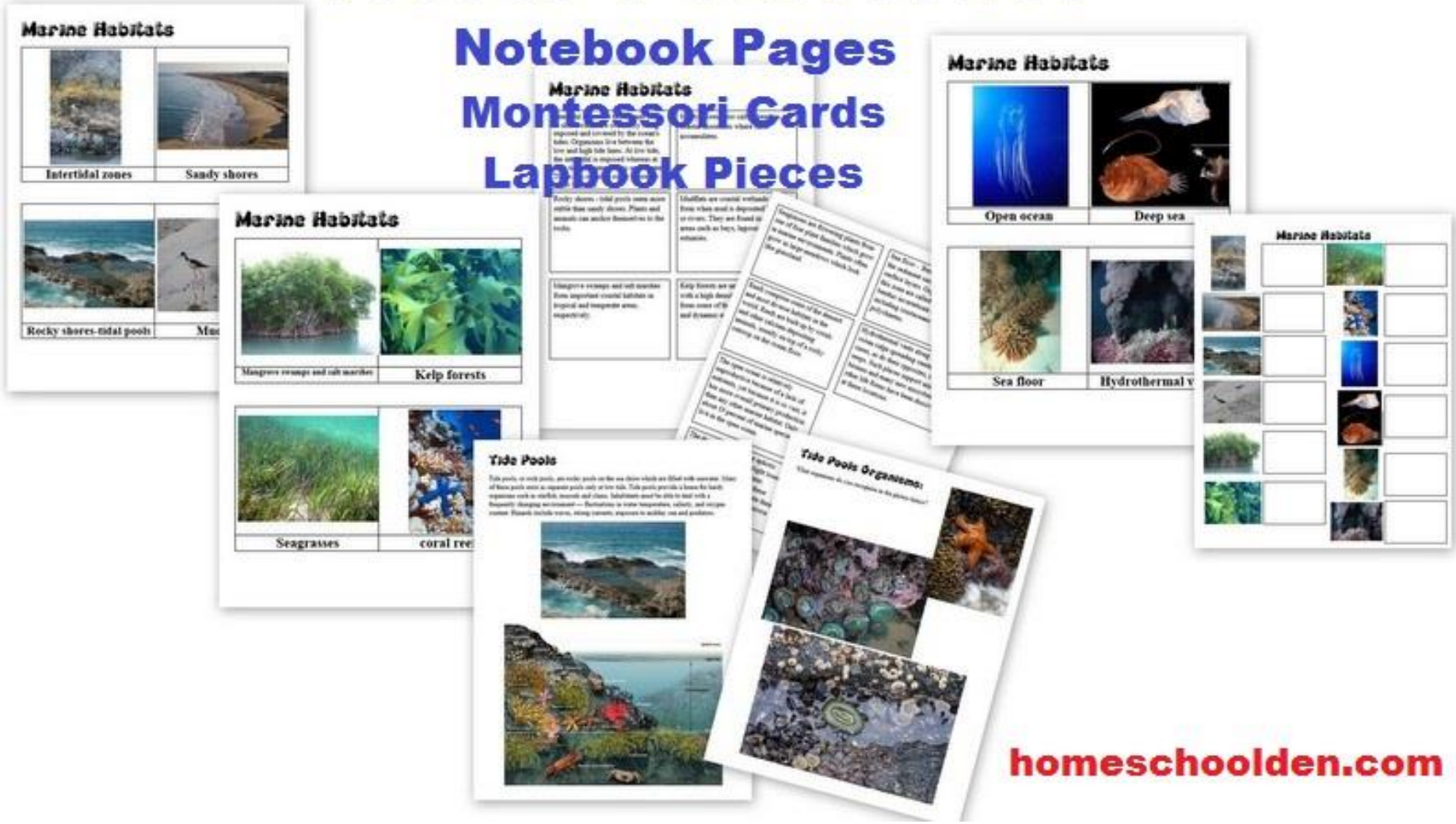
In our ocean studies we explored

- Marine Habitats
- Water Form Words (bay, estuary, lagoon, fjord, etc.)
- Features of the Ocean Floor (trench, seamount, guyot, etc.)
- Ocean Navigation (early navigation with astrolabes & the constellations, modern SONAR)
- Salinity
- Ocean Currents (Surface & Deep Sea Currents)
- Ocean Life:
  - Special Body Features
  - Fish Body Shape and Movement
  - Biological Interactions: Mutualism and Commensalism in the Ocean
  - Deep Sea Life – Bioluminescence, Anglerfish

We also talked about the ocean zones and different layers of the ocean.

Marine Habitats

Notebook Pages
Montessori Cards
Lapbook Pieces



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Water Form Words

estuary	lagoon

An estuary is a partly enclosed coastal body of brackish water with one or more rivers or streams flowing into it, and
connection to the open sea.

A lagoon is a shallow body of water separated from a larger body of water by barrier islands or reefs.

bay	cove

A bay is a body of water connected to an ocean or lake, formed by an indentation of the shoreline. A large bay may be called a gulf, a sea, a sound, or a bight.

A cove is a smaller circular or oval coastal inlet with a narrow entrance; some coves may be referred to as bays.

Water Form Words

fjord	strait

A fjord is a particularly steep bay shaped by glacial activity.
A strait is a narrow body of water that joins two larger bodies of water, such as two oceans, two seas, or an ocean and a sea.

Water Form Words

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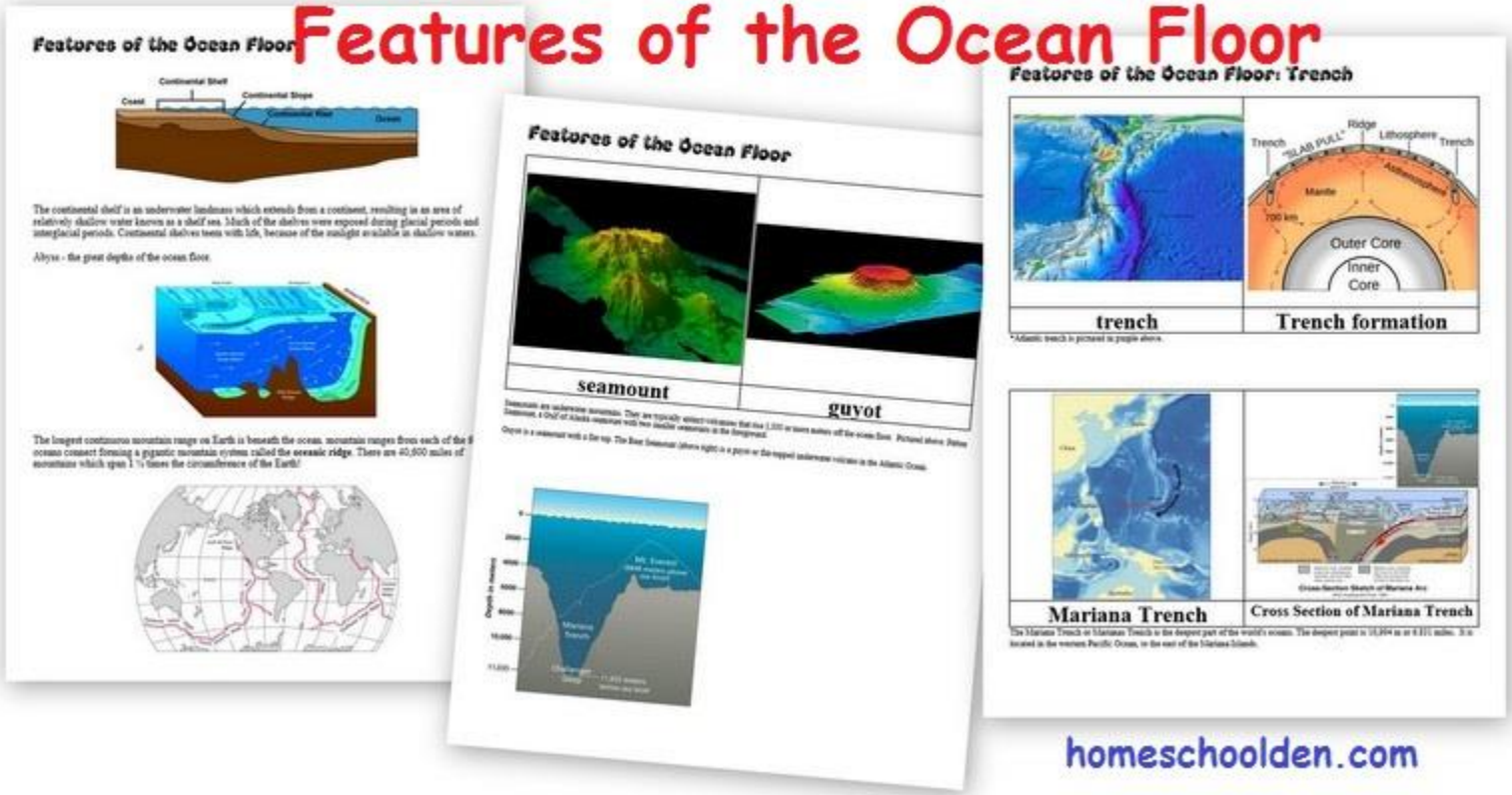
Features of the Ocean Floor



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Early Navigation

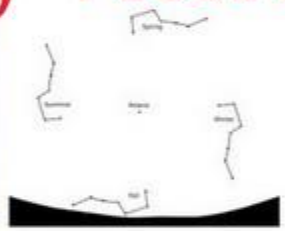
Early navigators did not have the instruments available to us today. They used nature to help them find their way. They could use the sun and stars to help them determine their direction of travel.

For one thing, they could observe the sun. The sun rises in the _____ and sets in the _____.

At night, navigators noticed that if they traveled at the same _____ (latitude), they could see most of the same stars.

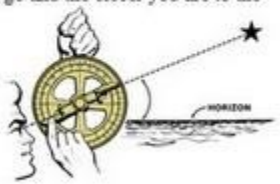
In the _____ Hemisphere, _____ (the North Star) can be used to determine the latitude.

How can you find Polaris? The two outermost stars in the _____ always point to the _____ even as the seasons change.



When you are almost at the North Pole, Polaris appears to be almost directly _____. The further south you go and the closer you are to the equator; the lower Polaris is to the horizon.

Navigators used an astrolabe to determine latitude. The latitude at the equator is _____°. The latitude at the North Pole is _____°. The higher the North Star appears in the sky, the greater the degree of latitude (and the closer you are to the North Pole.



Early Navigation

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For one thing, they could observe the sun. [illegible] the east and sets in the west.

At night, navigators noticed [illegible] latitude, [illegible] the stars.

[illegible] Hemisphere, Polaris (the North Star) can be [illegible] determine the latitude.

[illegible] you find Polaris? The two outermost stars in the [illegible] the Big Dipper always point to the North Star even as the seasons change.

[illegible] most at the North Pole, Polaris appears to be almost directly [illegible] further south you go and the closer you are to the equator; the lower [illegible] Horizon.

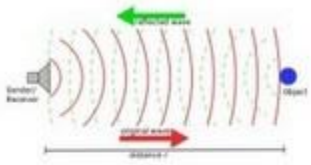
[illegible] astrolabe to determine [illegible] The latitude at the equator is 0°. The [illegible] is 90°. The higher the [illegible] sky, the greater the [illegible] the closer you are to the

Sonar:

This stands for _____

_____ and

_____



SONAR—is used to find and identify objects in water. It is also used to determine water depth (bathymetry).

With sonar, you can tell the _____, _____, and relative _____of underwater objects.

Sonar uses a sound _____ and a _____.

Transmitter creates a pulse of sound, often called a "ping," and then listens for reflections (echo) of the pulse.

"Sonar" was first used in _____

In the 1960s, the U. S. Navy began using a new technology called "multibeam sonar." Arrays of sonar projectors produced soundings not only along the track, but also for significant distances perpendicular to the ship's track. Instead of lines of soundings, these new "multibeam" systems produced a "swath" of soundings.

Ships such as the *Henry B. Bigelow* (left) use sonar to

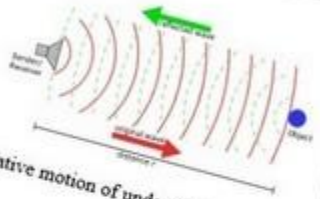
- _____,
- _____,
- help fisheries measure the biomass of fish in the area
- and for _____.

Some sonar systems also measure the strength of the echo, and this information can be used to make inferences about some of the reflecting object's characteristics. Hard objects, for example, produce stronger echoes than softer objects.

Sonar:

This stands for SOund NAvigation and Ranging.

SONAR—is used to find and identify objects in water. It is also used to determine water depth (bathymetry).



With sonar, you can tell the location, size, and relative motion of underwater objects.

onar uses a sound transmitter and a receiver. Transmitter creates a pulse of sound, hen called a "ping," and then listens for reflections (echo) of the pulse.

as first used in World War I.

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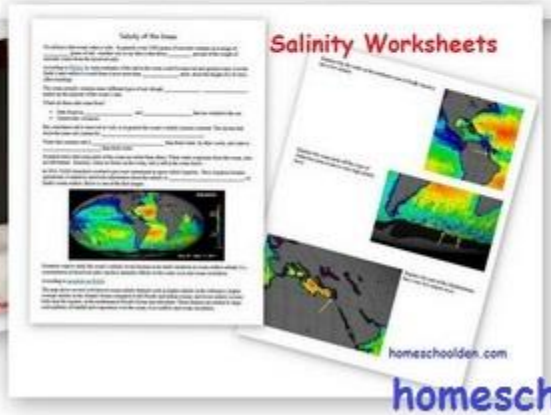
Ships such as the *Henry B. Bigelow* (left) use sonar to

- survey marine life,
- map the ocean floor,
- help fisheries measure the biomass of fish in the area
- and for oceanographic research.

Some sonar systems also measure the strength of the rmation can be used to make inferences reflecting object's characteristics. Hard e, produce stronger echoes than softer

Ocean Unit:
Salinity Activities



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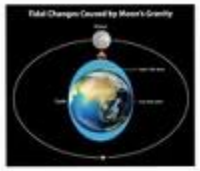
What causes tides?

Spring & Neap Tides and the Phases of the Moon

What causes tides?

If you've been to the beach, then you know that the water level of the ocean can be higher up the shore or lower. This is called the tide. Gravity is one force that causes tides. The moon has a major influence on Earth's tides, as does the sun.



The gravity of the Sun and the gravity of the Moon pull on objects on Earth. In response to the Moon's gravitational pull, water bulges on the side facing the moon. The Moon also pulls on the Earth itself, leaving a second bulge of water on the other side of Earth.

As the Earth rotates, different parts of it pass through these bulges and dips. The result is high and low tides once or twice a day (depending on other factors such as the shape of the land, etc.)

Tide changes proceed via the following stages:

Sea level rises over several hours, covering the intertidal zone; flood tide.

The water rises to its highest level, reaching high tide.

Sea level falls over several hours, revealing the intertidal zone; ebb tide.

The water stops falling, reaching low tide.

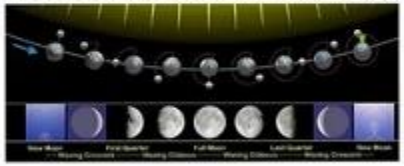
The intertidal zone is the area that is above water at low tide and under water at high tide. This can include many different types of habitats: mudflats, tide pools, and so forth.

The Moon is the main cause of tides, but the Sun also affects the tides as well. Tides are influenced by the Moon's relative position to the Sun.

Do you know the phases of the moon?

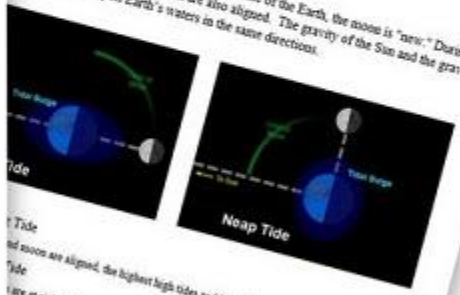
As the Moon travels around the Earth, the Moon is thrown into shadow depending on its position relative to the Sun and Earth.

As the moon rotates around the sun, the portion of the Moon that is visible on Earth changes:



Where would the Sun be located in the drawing below?

n the Sun and Moon are aligned on the same side of the Earth, the moon is "new." During
ll moon, the Sun, Earth and Moon are also aligned. The gravity of the Sun and the gravity
Moon combine to pull Earth's waters in the same directions.



Tide

and moon are aligned, the highest high tides and lowest low tides are produced.

Tide

are at right angles to the Earth, producing the lowest high tides and the highest low

and moon align once again, and the Sun augments the Moon's gravitational pull, causing a second spring tide.

Third Quarter, Neap Tide

The Moon and Sun once again are at right angles to the Earth, causing a second Neap Tide.

***Note:* Spring** Tide does not relate to the season, but to the word JUMP.

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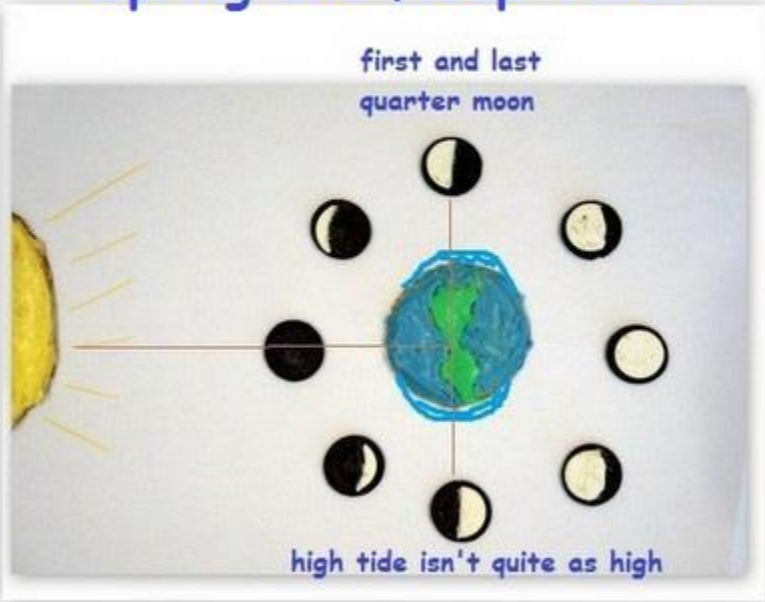
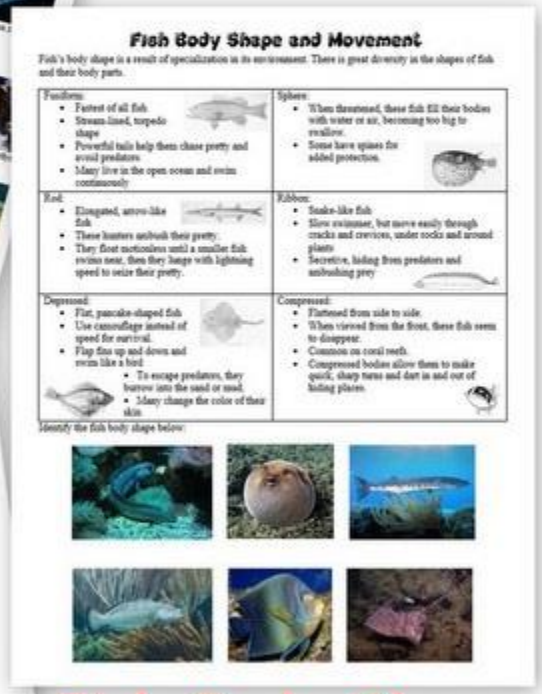
Activity to Understand Spring and Neap Tides

Spring Tide (above)
Neap Tide (right)



Fish: Special Body Features



barbels,
spines,
bioluminescence,
claws,
etc.

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Fish Body Shape & Movement

Bioluminescence Worksheets

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Bioluminescence

Many midwater fish have light organs called _____ that produce light. This biological production of light is called bioluminescence.

Bioluminescence is common and important in the open ocean. In fact, (depending on how you count it) nearly _____% of animals in the open waters emit light (not including animals that dwell on the ocean bottom).

Most animals on this planet live in the deep sea, so some scientists have pointed out that more creatures use light (bioluminescence) to communicate than use sound (including A

Some anima… bioluminescent _____ which t… house in black pouches. The bacteria emit light all the time, but these organisms can open and closing, allowing the creature to control how much light is emitted.

Why would organisms produce light?

1) _____: to hide. Many predators in midwater have upward pointing eyes to search for silhouettes. To protect themselves, some creatures have light producing organs on their underside to match the dim light coming from the surface. Many can dim the light as they descend into deeper waters. In this way, they become somewhat invisible to predators viewing them from below.

2) _____: Bright flashes of light can startle a predator causing them to hesitate. Some organisms (such as copepods, shrimp, tube-shoulder searsid fish, and ctenophores, and siphonophores) will use light to distract or divert predators. Some animals will shoot out clouds of light which acts as a smoke screen so predators cannot follow the escaping prey. The picture above right shows defensive spew bioluminescence in the shrimp, *Parapandalus*. The vampire squad emits a cloud of luminous sec… arm tips.

Image …
oceanexplorer.NOAA.gov

3) _____: Some organisms may emit light as a warning to stay away. Possible warning bioluminescence in the brittle star, *Ophiochiton ternispinus*. Image courtesy of oceanexplorer.NOAA.gov

4) _____: Some organisms use lighted body parts to lure and attract prey. Anglerfish has "fishing lures" that dangle in front of their mouths. Gulper eels have a light at the end of their tail; it is thought they use this light to attract prey to its mouth.

Right: The bioluminescent lure of the barbeled dragonfish, Eustomias pacificus. Dragonfish image courtesy of oceanexplorer.NOAA.gov
Below: anglerfish.

5) _____: Many creatures have specific light patterns, specific to a certain sex. Anglerfish and lantern fish are both thought to produce light to attract a mate.

In the Bathypelagic Zone (Midnight Zone), bioluminescence is as prevalent as in the Mesopelagic Zone (Twilight Zone), however in the complete darkness of this zone, there is no need for countershading.

Bioluminescence can be found in many organisms:

- Dinoflagellates (marine plankton) and radiolarians (protozoa – zooplankton)
- Various jellyfish
- Cnidarians (corals, anemone, etc.)
- Annelids (worms)
- Molluscs (such as gastropods)
- Cephalopods – Squid have at least 70 luminous genre
- Crustaceans
- Echinoderm (such as brittle stars, sea stars, sea cucumbers)
- Fish –one family of sharks (lantern shark) and in 42 families of bony fish
  - Anglerfish, Pomyfish, Lantern fish, Hatchet fish, Dragon fish

Bioluminescence

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Image above and below courtesy of oceanexplorer.NOAA.gov

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THE LAYERS OF THE OCEAN ACTIVITIES

This second activity is available in feet and in meters.

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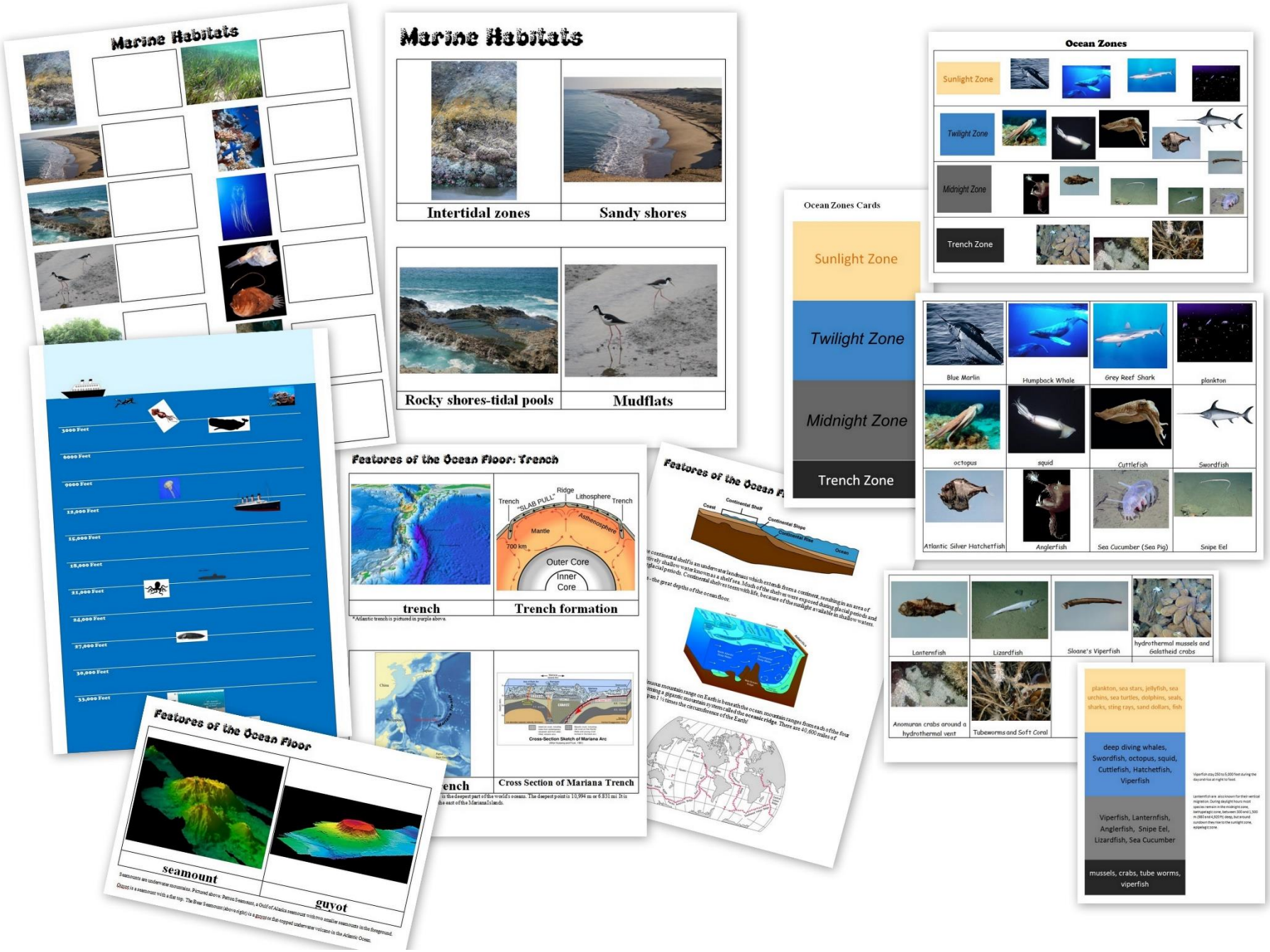
Marine Habitats
Marine Habitats
Intertidal zones
Sandy shores
Rocky shores-tidal pools
Mudflats
Ocean Zones
Sunlight Zone
Twilight Zone
Midnight Zone
Trench Zone
Ocean Zones Cards
Sunlight Zone
Twilight Zone
Midnight Zone
Trench Zone
Blue Marlin
Humpback Whale
Grey Reef Shark
plankton
octopus
squid
Cuttlefish
Swordfish
Atlantic Silver Hatchetfish
Anglerfish
Sea Cucumber (Sea Pig)
Snipe Eel
3000 Feet
6000 Feet
9000 Feet
12,000 Feet
15,000 Feet
18,000 Feet
21,000 Feet
24,000 Feet
27,000 Feet
30,000 Feet
33,000 Feet
Features of the Ocean Floor: Trench
trench
Trench formation
Ridge
Trench
"SLAB PULL"
Lithosphere
Trench
Asthenosphere
Mantle
700 km
Outer Core
Inner Core
Features of the Ocean Floor
seamount
guyot
Features of the Ocean F
Continental Shelf
Coast
Continental Slope
Continental Rise
Ocean
Cross Section of Mariana Trench
Cross-Section Sketch of Mariana Arc
Lanternfish
Lizardfish
Sloane's Viperfish
hydrothermal mussels and Galatheid crabs
Anomuran crabs around a hydrothermal vent
Tubeworms and Soft Coral
plankton, sea stars, jellyfish, sea urchins, sea turtles, dolphins, seals, sharks, sting rays, sand dollars, fish
deep diving whales, Swordfish, octopus, squid, Cuttlefish, Hatchetfish, Viperfish
Viperfish, Lanternfish, Anglerfish, Snipe Eel, Lizardfish, Sea Cucumber
mussels, crabs, tube worms, viperfish