

THE WARBLER

AN EDUCATIONAL WEEKLY

ISSUE

133

OCTOBER 26, 2022

Dear Student, Artist, Thinker, Friend,

This week's edition of *The Warbler* focuses on **tides**. Tides refer to the rise and fall of sea levels caused by gravitational forces exerted by the Moon, the Sun, and the rotation of Earth. This means that tides vary in intensity and size depending on where the sun, moon, and earth are distanced in relation to each other. High tide means the water reaches to its furthest extent onto the shoreline. In contrast, low tide refers to when the water is receding to its furthest extent.

The ocean covers more than 70% of the earth's surface. Not only that, but 97% of the water on earth is in our oceans! It's safe to say that water takes up a big part of our life. Whether you have had the opportunity to visit a beach or not, we hope find something interesting in this week's newsletter.

Abigail and the APAEP Team



“Your soul is infinitely creative.
It is alive and expansive in nature.
It is curious and playful, changing
with the tides of time.”

DEBBIE FORD // Self-help author, coach, lecturer, and teacher

WORDS INSIDE

FOUND INSIDE POEM

consternation | feelings of anxiety or dismay

FOUND INSIDE

“ENVIRONMENTAL SENSORS ...”
hydrometric | Monitoring the components of the hydrological cycle

FOUND INSIDE “TIDAL ENERGY ...”

estuaries | type of marine and riverine ecosystem

salinity | the quality or degree of being saline

FOUND INSIDE RANDOM NEST

intertidal | denoting the area of a seashore which is covered at high tide and uncovered at low tide

...



SCIENCE

Tides and Water Levels

FROM NATIONAL OCEAN SERVICE

Tides are one of the most reliable phenomena in the world. As the sun rises in the east and the stars come out at night, we are confident that the ocean waters will regularly rise and fall along our shores. The following pages describe the tremendous forces that cause the world's tides, and why it is important for us to understand how they work.

Basically, tides are very long-period waves that move through the oceans in response to the forces exerted by the moon and sun. Tides originate in the oceans and progress toward the coastlines where they appear as the regular rise and fall of the sea surface. When the highest part, or crest of the wave reaches a particular location, high tide occurs; low tide corresponds to the lowest part of the wave, or its trough. The difference in height between the high tide and the low tide is called the tidal range.

A horizontal movement of water often accompanies the rising and falling of the tide. This is called the tidal current. The incoming tide along the coast and into the bays and estuaries is called a flood current; the outgoing tide is called an ebb current. The strongest flood and ebb currents usually occur before or near the time of the high and low tides. The weakest currents occur between the flood and ebb currents and are called "slack water" or "slack current". In the open ocean tidal currents are relatively weak. Near estuary entrances, narrow straits and inlets, the speed of tidal currents can reach up to several kilometers per hour.

What Causes Tides?

Gravity is one major force that creates tides. In 1687, Sir Isaac Newton explained that ocean tides result from the gravitational attraction of the sun and moon on the oceans of the earth.

Newton's law of universal gravitation states that the gravitational attraction between two bodies is directly proportional to their masses, and inversely proportional to the square of the distance between the bodies. Therefore, the greater the mass of the objects and the closer they are to each other, the greater the gravitational attraction between them.

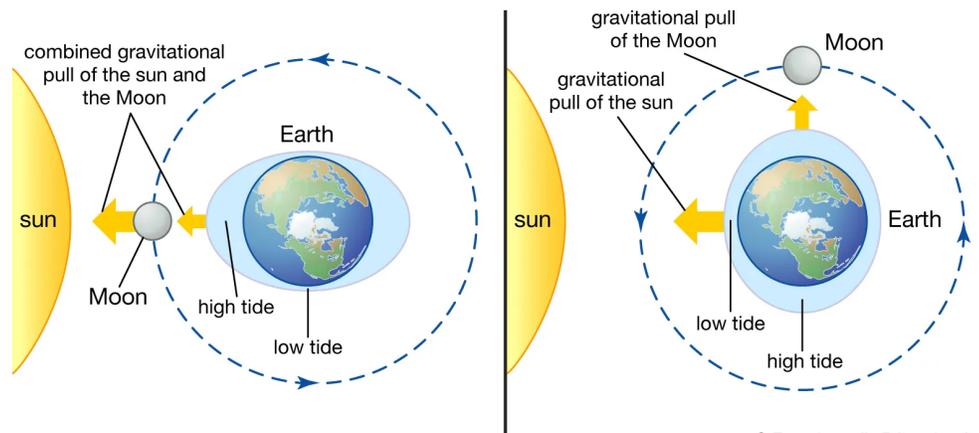
Tidal forces are based on the gravitational attractive force. With regard to tidal forces on the Earth, the distance between two objects usually is more critical than their masses. Tidal generating forces vary inversely as the cube of the distance from the tide generating object. Gravitational attractive forces only vary inversely to the square of the distance between the objects. The effect of distance on tidal forces is seen in the relationship between the sun, the moon, and the Earth's waters.

Our sun is 27 million times larger than our moon. Based on its mass, the sun's gravitational attraction to the Earth is more than 177 times greater than that of the moon to the Earth. If tidal forces were based solely on comparative masses, the sun should have a tide-generating force that is 27 million times greater than that of the moon. However, the sun is 390 times further from the Earth than is the moon. Thus, its tide-generating force is reduced by 3903, or about 59 million times less than the moon. Because of these conditions, the sun's tide-generating force is about half that of the moon.

The relationship between the masses of the Earth, moon and sun and their distances to each other play a critical role in affecting the Earth's tides. Although the sun is 27 million times more massive than the moon, it is 390 times further away from the Earth than the moon. Tidal generating forces vary inversely as the cube of the distance from the tide-generating object. This means that the sun's tidal generating force is reduced by 3903 (about 59 million times) compared to the tide-generating force of the moon. Therefore, the sun's tide-generating force is about half that of the moon, and the moon is the dominant force affecting the Earth's tides. ●

Tides are caused by the gravitational pull of the Sun and the Moon on Earth's water. When the Sun, Moon, and Earth form a straight line (left), tides higher and lower than usual are generated. In contrast, when the lines between the Sun and Earth and the Moon and Earth are perpendicular to one another (right), high tides and low tides are moderated.

Encyclopædia Britannica, Inc.



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ENVIRONMENT

What Would Happen if There Was No Moon?

FROM THE NINE PLANETS

The moon holds a significant relationship with the Earth: if there were no moon, our daily lives as humans would significantly change.

The first and most obvious change would be during the nighttime. Nights would be unbelievably darker, as the moon provides light to the Earth during the night hours by reflecting light from the sun. Scientists suggest that without human-made lighting, we would not be able to see the hands in front of our face without the moon during the nighttime. However, not only would nights be darker, but our days would change as well.

Just as the Earth exerts a gravitational pull, the moon also exerts a gravitational pull on the Earth. The moon pulls on the Earth and slows down the Earth's rotation. The moon's pull creates a bulge near the Earth's equator, which means there is a lower level of water at the poles.

The Moon's gravity causes the oceans on our planet to rise and fall. As the water moves, there is slight friction between the moving water and the spinning Earth. This friction causes the Earth's rotation to slow slightly. If there was no moon, then the water might spread across the planet equally and reduce the amount of friction.

This means that the earth would not slow, which then means that the hours of our days would change. Suddenly, without the moon, our days would last between 6 and 12 hours, rather than the 24 hours we experience now. If our days became this short, then we would have significantly more days in our calendar year. Instead of 365 days in a year, we would have over a thousand.

Since the moon affects the altitude and movement of Earth's water, our ocean tides would shrink. High tide occurs where the ocean bulges toward the moon, or where the moon pulls the ocean towards it. On the opposite side of our planet, the ocean bulges away from the moon, creating another high tide. The low tides occur on either side of the bulges. Remember that the Earth is rotating, so high tide becomes low tide as the Earth turns.

Scientists suggest that without the moon, tides would be 1/3 of the size they are now. High tides would be much smaller than they are now, and low tides would be even lower. This is because the sun would be influencing the tides, not the moon; however, the sun has a weaker pull, which would decrease the tides.

The change in the Earth's rotational speed and a change in the Earth's tilt would also affect the Earth's weather patterns. If the moon slows down the Earth's rotation, then the moon also affects the wind and wind speeds on our planet. Without the moon, we would see



Image by Shutterstock

an increase in wind speeds. Winds could become much faster and much stronger without the moon.

Additionally, we might see a change entirely in seasons. The moon affects the angle of the Earth's tilt. Currently, the Earth sits at a 23.5-degree tilt. This means our planet leans slightly to one side as it sits in space. The tilt creates what we know as seasons and changing weather. Without the pull of the moon, this tilt would change. Either the tilt would become extreme, leading to extreme and severe seasons, or the tilt would decrease, and we would see almost no seasons at all.

The moon influences life as we know it on Earth. It influences our oceans, weather, and the hours in our days. Without the moon, tides would fall, nights would be darker, seasons would change, and the length of our days would alter. ●

Edited for space

WORD PLAY A Rebus puzzle is a picture representation of a common word or phrase. How the letters/images appear within each box will give you clues to the answer! For example, if you saw the letters "LOOK ULEAP," you could guess that the phrase is "Look before you leap." *Answers are on the last page!*

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MATHEMATICS

Sudoku

#265 PUZZLE NO. 3074040

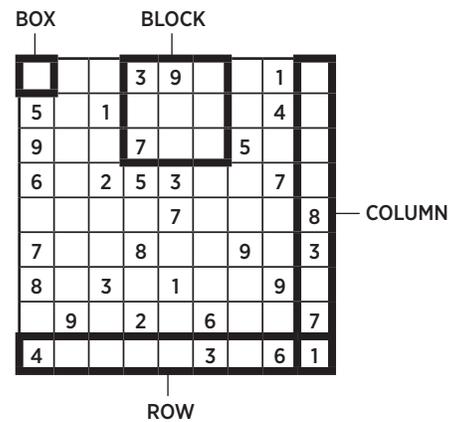
				2		6		
	6	8			9			
				4			9	
9	7						4	5
	2	4						
8		5		2				
7	9		5				1	
				1		9		
5		6		3				8

#266 PUZZLE NO. 4976041

4						5		9
			7		9			
5		1			6	7		
	5			1	3			
1	8			9				
2								
			1					
		6		8			3	2
				4			8	7

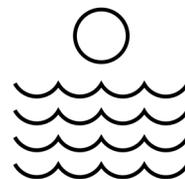
SUDOKU HOW-TO GUIDE

1. Each block, row, and column must contain the numbers 1-9.
2. Sudoku is a game of logic and reasoning, so you should not need to guess.
3. Don't repeat numbers within each block, row, or column.
4. Use the process of elimination to figure out the correct placement of numbers in each box.
5. The answers appear on the last page of this newsletter.



What the example will look like solved

2	4	8	3	9	5	7	1	6
5	7	1	6	2	8	3	4	9
9	3	6	7	4	1	5	8	2
6	8	2	5	3	9	1	7	4
3	5	9	1	7	4	6	2	8
7	1	4	8	6	2	9	5	3
8	6	3	4	1	7	2	9	5
1	9	5	2	8	6	4	3	7
4	2	7	9	5	3	8	6	1



“Language exerts hidden power,
like the moon on the tides.”

RITA MAE BROWN // Novelist, poet, screenwriter, activist

DID YOU KNOW?

Astronomer **Seleucus of Seleucia** was the first scientist to admit that tides were caused by the Moon in 150 BC.

Maximal tides occur when the 3 celestial bodies (sun, earth, moon) align and pull in the same direction.

The Moon can exert a tidal force on the **whole planet** at once.

Tides arrive **four times** a day.

The **Bay of Fundy** in Canada has the honor of being home to the world's highest tides.

Source: factcity.com

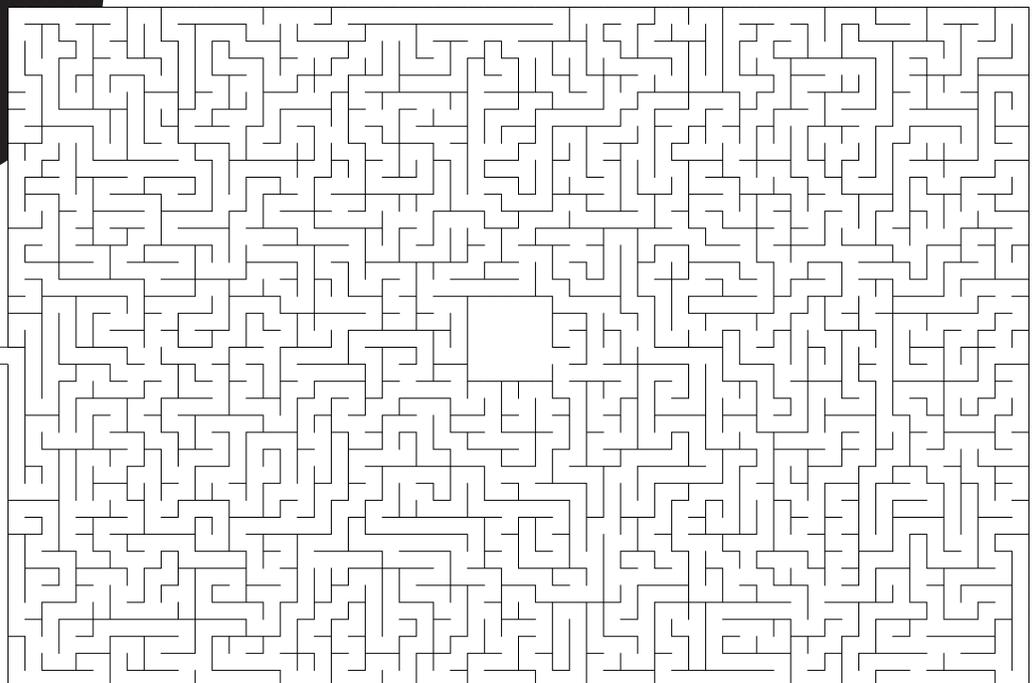


Maze

This maze is a collection of paths, where there is both a start and ending point. The player starts from the start point and follows a path of their choice, which leads to the end point. ▶

“Language is not just a code; you are writing into its history, into its tides.”

HISHAM MATAR // American writer



ART + CULTURE

Tides

BY MAGGIE WANG

We defeated the sea.
Heavy rain and gusts of wind brought widespread flooding,
Lifted our palms to meet the droplets.

In yours landed a quiet fever, shivering. It spoke of moonlight,
Trees toppling, buildings damaged, rivers bursting their banks.
“In your last night, we will replace the sun.”

Keep talking, you said, and let me imagine
Thousands of people left to take extra care
In fields flooded with consternation.

As winter hit the surface of the lake
One journey was made easier by the storm.
Each stream was shattered. For comfort’s sake,

You turned away, knowing how
High wind speeds inland were an unusual feature.
I held your light and watched you weep.

You talked about the tide and showed me how to get there,
But flooding on the tracks caused delays and cancellations.
I asked how you could live under this barren moon.

Dear heart, you said, under the clouds,
When a bridge closes for only the second time in history,
You cannot speak or look to heaven for help.

Come in and sleep, I said, you must be tired
After holding back the sea for almost an hour.
Otherwise our universe will burn,

And I won’t wait for the moon to rise
Or for the gusts of wind to die down.
I’ll go out under the ghostly white sky.

Then you must keep me inside
While the warnings for snow and ice remain in place
And ask me about love to keep despair away.



Word Search

F	L	O	O	D	I	N	G	S	C	G	O	R	E
C	O	N	S	T	E	R	N	A	T	I	O	N	N
E	U	N	I	V	E	R	S	E	I	U	P	O	E
I	F	A	O	N	O	O	I	E	T	R	N	P	N
M	R	A	I	T	L	E	N	E	R	R	A	B	R
A	T	I	T	I	B	U	I	L	D	I	N	G	S
G	H	E	H	R	E	W	A	R	N	I	N	G	S
I	G	T	R	E	T	T	A	H	S	T	N	O	W
N	I	O	R	E	P	L	A	C	E	M	E	N	T
A	L	O	E	E	A	T	N	D	A	V	T	S	I
T	N	R	I	R	S	D	R	O	P	L	E	T	S
I	O	E	O	N	O	T	E	N	E	V	A	E	H
O	O	C	U	D	F	E	G	S	U	R	V	T	T
N	M	L	C	N	A	O	T	O	V	R	O	I	L

- | | | |
|-------------|-------------|---------------|
| DROPLETS | IMAGINATION | UNIVERSE |
| SHATTER | BARREN | CONSTERNATION |
| REPLACEMENT | BUILDINGS | HEAVEN |
| FLOODING | MOONLIGHT | WARNINGS |

WRITING PROMPT

In this poem, Maggie writes about impending climate change. Choose a line or set of lines that stands out to you and describe the ways you interpret it. Why does it stand out to you? Using this prompt write or create a short essay, blog, poem, or illustration.

Maggie Wang is the first-prize winner in the Poems to Solve the Climate Crisis Challenge on Young Poets Network. She is also the first-prize winner in Our Whole Lives, We Are Protest: A Poetry Challenge Inspired by the People of 1381. Additionally Maggie Wang studies history and economics at the University of Oxford. Her writing has appeared in *Poetry Wales*, *Versopolis Review*, and elsewhere. She is a Ledbury Emerging Poetry Critic and a Barbican Young Poet.

EQUIPMENT

Environmental Sensors | What is a Tide Gauge?

FROM AZOSENSORS.COM

A tide gauge is a piece of equipment used for measuring the changes in sea level with respect to a height reference surface. Although tide gauges have not been used as a primary source of sea-level data for several years, they play a key role in the instrumentation at modern-day tide gauge locations to verify water level.

Types of Tide Gauge Instruments

There are three main types of tide gauges:

Acoustic systems | These systems make use of the transit time of a sonic pulse to measure sea-surface distance.

Pressure systems | They monitor sub-surface pressure and convert it into height with reference to water density and gravity of acceleration.

Radar systems | These systems, similar to acoustic transmission employ radio frequencies to measure sea-surface distance.

Working Principle

A sensor network is used to record measurements of changes in sea levels. A general working principle involves water traveling through a bottom pipe hooked to electronic sensors that are designed to measure the height of this water passing through.

A GPS system is also used for measuring tidal water levels. Water enters the tide gauge through a bottom pipe, and the water level is measured using electronic sensors, usually GPS. The device consists of two antennas and receivers, one pointing to the zenith and the other pointed down towards the sea surface. The former antenna tracks the direct signal, and the latter traps the reflected signal from the water surface. The interference between the direct and reflected signals can be determined by the signal-to-noise ratio data.

This GPS system is still in its early stages of application as this can only be used when the water level is calm. Further research will need to focus on how GPS technology can be applied during different stages of the tidal water movement.

Applications

In addition to providing precise tidal information, tide gauges are critical for port and harbor operations, surveying, dredging, instrumentation deployments, and a number of other applications.

Some of the other major applications of tide gauges are:

- ▶ Calibration of satellite radar altimeters
- ▶ Study of vertical references and their relations
- ▶ Improvement of the tide models, usually in complex

coastal zones

- ▶ Evaluation of the spatial altimetry results
- ▶ Validation of the climate models

Products on the Market

The TideMaster Portable Tide Gauge by Valeport, a manufacturer of hydrometric and oceanographic instrumentation, is a great example of advanced instrumentation to measure seawater levels.

This tide gauge can be used in fresh and saltwater with the deployment of up to one year. The system also offers real-time data extraction for the reliability and validity of data.

There are also standalone tide gauge instruments. One in particular currently on the market includes the PTG500e Tide Gauge by Environmental Systems & Services (ES&S) that can be used in remote locations



and also as part of a larger network. This particular product is key to modern tide gauge instruments with a unique capability of being able to measure marine data including the direction of wind speed, temperature, and pressure in the atmosphere.

UK National Network

Serious flooding in 1953 as a consequence of storms that hit the North Sea was soon followed by a UK National Tide Gauge Network. The network involved gathering tidal information through the application of tide gauge instrumentation.

The aim is to analyze the data and assess the level of threat of possible flooding that could affect the coastal areas that occupy the British Isles.

The types of tide gauges used in the network include full- and mid-tide bubblers (measure the excess air that is produced as a result of air pressure and water pressure), direct pressure transducers, pneumatic gauges. The data gathered from such instrumentation provides detail on the tidal response, storm surge behavior, and the rise in sea levels. ●

The rise and fall of the tides play an important role in the natural world and can have a marked effect on maritime-related activities. The image above shows the NOAA San Francisco Tide Station, in operation for more than 150 years.

Photo and caption from oceanservice.noaa.gov

FEATURE

Tidal Energy

FROM NATIONAL GEOGRAPHIC

Tidal energy is produced by the surge of ocean waters during the rise and fall of tides. Tidal energy is a renewable source of energy.

During the 20th century, engineers developed ways to use tidal movement to generate electricity in areas where there is a significant tidal range—the difference in area between high tide and low tide. All methods use special generators to convert tidal energy into electricity.

Tidal energy production is still in its infancy. The amount of power produced so far has been small. There are very few commercial-sized tidal power plants operating in the world. The first was located in La Rance, France. The largest facility is the Sihwa Lake Tidal Power Station in South Korea. The United States has no tidal plants and only a few sites where tidal energy could be produced at a reasonable price. China, France, England, Canada, and Russia have much more potential to use this type of energy.

In the United States, there are legal concerns about underwater land ownership and environmental impact. Investors are not enthusiastic about tidal energy because there is not a strong guarantee that it will make money or benefit consumers. Engineers are working to improve the technology of tidal energy generators to increase the amount of energy they produce, to decrease their impact on the environment, and to find a way to earn a profit for energy companies.

Tidal Energy Generators

There are currently three different ways to get tidal energy: tidal streams, barrages, and tidal lagoons.

For most tidal energy generators, turbines are placed in tidal streams. A tidal stream is a fast-flowing body of water created by tides. A turbine is a machine that takes energy from a flow of fluid. That fluid can be air (wind) or liquid (water). Because water is much more dense than air, tidal energy is more powerful than wind energy. Unlike wind, tides are predictable and stable. Where tidal generators are used, they produce a steady, reliable stream of electricity.

Placing turbines in tidal streams is complex, because the machines are large and disrupt the tide they are trying to harness. The environmental impact could be severe, depending on the size of the turbine and the site of the tidal stream. Turbines are most effective in shallow water. This produces more energy and allows ships to navigate around the turbines. A tidal

generator's turbine blades also turn slowly, which helps marine life avoid getting caught in the system.

The world's first tidal power station was constructed in 2007 at Strangford Lough in Northern Ireland. The turbines are placed in a narrow strait between the Strangford Lough inlet and the Irish Sea. The tide can move at 4 meters (13 feet) per second across the strait.

Barrage

Another type of tidal energy generator uses a large dam called a barrage. With a barrage, water can spill over the top or through turbines in the dam because the dam is low. Barrages can be constructed across tidal rivers, bays, and estuaries.

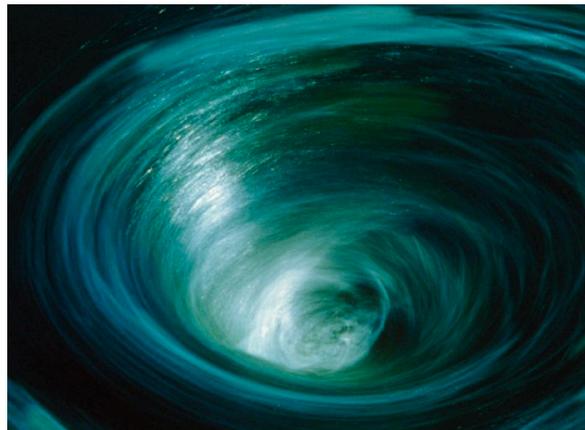
Turbines inside the barrage harness the power of tides the same way a river dam harnesses the power of a river. The barrage gates are open as the tide rises. At high tide, the barrage gates close, creating a pool, or tidal lagoon. The water is then released through the barrage's turbines, creating energy at a rate that can be controlled by engineers.

The environmental impact of a barrage system can be quite significant. The land in the tidal range is completely disrupted. The change in water level in the tidal lagoon might harm plant and animal life. The salinity inside the tidal lagoon lowers, which changes the organisms that are able to live there. As with dams across rivers, fish are blocked into or out of the tidal lagoon. Turbines move quickly in barrages, and marine animals can be caught in the blades. With their food source limited, birds might find different places to migrate.

A barrage is a much more expensive tidal energy generator than a single turbine. Although there are

“The tide of history only advances when people make themselves fully visible.”

ANDERSON
COOPER //
American journalist



A vortex, or a whirlpool, of water whirls from the sea into a turbine of the Barrage de la Rance electric power generating station in Brittany, France. Tidal energy is a renewable source of energy, created by the predictable and powerful movement of tides as they move to and from the shoreline.

Photograph by
James A. Sugar

no fuel costs, barrages involve more construction and more machines. Unlike single turbines, barrages also require constant supervision to adjust power output.

The tidal power plant at the Rance River estuary in Brittany, France, uses a barrage. It was built in 1966 and is still functioning. The plant uses two sources of energy: tidal energy from the English Channel and river current energy from the Rance River. The barrage has led to an increased level of silt in the habitat. Native aquatic plants suffocate in silt, and a flatfish called plaice is now extinct in the area. Other organisms, such as cuttlefish, a relative of squids, now thrive in the Rance estuary. Cuttlefish prefer cloudy, silty ecosystems.

Tidal Lagoon

The final type of tidal energy generator involves the construction of tidal lagoons. A tidal lagoon is a body of ocean water that is partly enclosed by a natural or manmade barrier. Tidal lagoons might also be estuaries and have freshwater emptying into them.

A tidal energy generator using tidal lagoons would function much like a barrage. Unlike barrages, however, tidal lagoons can be constructed along the natural coastline. A tidal lagoon power plant could also generate continuous power. The turbines work as the lagoon is filling and emptying.

The environmental impact of tidal lagoons is minimal. The lagoons can be constructed with natural materials like rock. They would appear as a low breakwater (sea wall) at low tide, and be submerged at high tide. Animals could swim around the structure, and smaller organisms could swim inside it. Large predators like sharks would



The Rance Tidal Power Station bridges the Rance River in Brittany, France. The power plant, which was built by Electricite de France (EDF), usurps tides coming from the Gulf of Saint-Malo on the Atlantic Ocean to turn its 24 turbines. The generators work with a combination of tidal power and propeller-driven turbine engines.

Photograph by Dani7c3 (Wikipedia)

not be able to penetrate the lagoon, so smaller fish would probably thrive. Birds would likely flock to the area.

But the energy output from generators using tidal lagoons is likely to be low. There are no functioning examples yet. China is constructing a tidal lagoon power plant at the Yalu River, near its border with North Korea. A private company is also planning a small tidal lagoon power plant in Swansea Bay, Wales. ●

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RANDOM-NEST

Why Do We Need Tides?

BY REALONOMICS | JANUARY 30, 2022

Tides affect other aspects of oceanic life, including the reproductive activities of fish and ocean plants. Floating plants and animals ride the tidal currents between the breeding areas and deeper waters. **The tides help remove pollutants and circulate nutrients ocean plants and animals need to survive.**

Waves **transmit energy**, not water, and are commonly caused by the wind as it blows across the ocean lakes and rivers. Waves caused by the gravitational pull of the moon and the sun are called tides. The ebb and flow of waves and tides are the life force of our world ocean.

Why are tides important to humans?

We study **tides for safe navigation, recreation, and coastal development**. Commercial and recreational fishermen use their knowledge of the tides and tidal currents to help them improve their catches. Depending on the species and water depth in a particular area, fish may concentrate during ebb or flood tidal currents.

Why are tides important to marine life?

Tides affect marine ecosystems by **influencing the kinds of plants and animals that thrive in** what is known as the intertidal zone — the area between high and low tide. ... Sand crabs not only burrow to survive they actually follow the tides to maintain just the right depth in the wet sand.

What would happen if there were no tides?

The moon influences life as we know it on Earth. It influences our oceans weather and the hours in our days. Without the moon, **tides would fall, nights would be darker, seasons would change, and the length of our days would alter.**

Why are some tides higher than others?

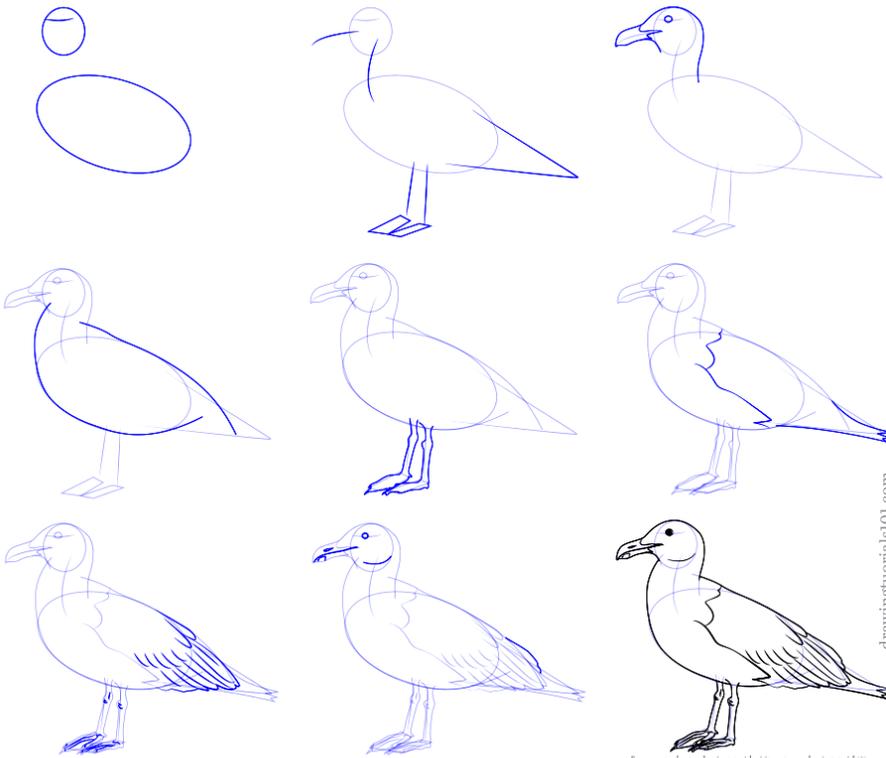
Some places have a larger tidal range than others **because of differences in the shape of the ocean floor**. ... At times when the Sun, Earth, and Moon are in line with each other (during full and new moons) the tidal range is larger because both the Sun's and Moon's gravitational pull create the tide.

The key benefits of tidal power include the following:

- ▶ Tides are easily predictable.
- ▶ Inexpensive to maintain
- ▶ Reliable and renewable source of energy
- ▶ Produce no greenhouse gases or other waste.

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HOW TO DRAW A SEAGULL



drawingtutorials101.com



WORDS OF ENCOURAGEMENT

A tide refers to the rise and fall of sea waves. As they depend on the moon and sun, tides are constantly on the move. Unlike tides, it's nearly impossible for humans to be on the go all the time. The constant movement of the ocean reminds me of society, and how it has become normalized and almost expected to be busy all the time. Being busy can be entertaining but also very stressful.

This week, I wanted to share some relaxation techniques with you, to combat the stress you may encounter daily. Journaling is a form of expression, one that is private, allowing you to be your most vulnerable self. Another way to relax your mind is through meditation. Maybe repeat a few affirmations to yourself during meditation. Another way to unwind would be through exercise, if you are able. Being active produces endorphins, which are "feel good" chemicals that are released in your brain.

Hopefully, these tips help you whenever you are feeling stressed. We hope you have a great rest of your week!

Abigail

Answers

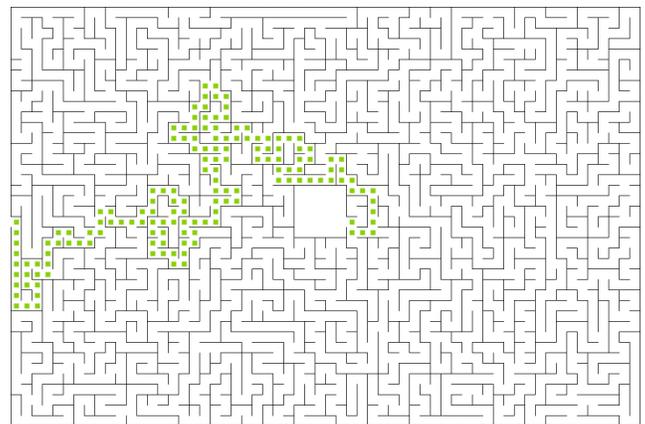
SUDOKU #265

1	4	9	8	7	2	5	6	3
2	6	8	3	5	9	4	1	7
3	5	7	1	4	6	8	9	2
9	7	1	6	8	3	2	4	5
6	2	4	7	9	5	3	8	1
8	3	5	4	2	1	6	7	9
7	9	2	5	6	8	1	3	4
4	8	3	2	1	7	9	5	6
5	1	6	9	3	4	7	2	8

SUDOKU #266

4	7	3	8	2	1	5	6	9
8	6	2	7	5	9	3	4	1
5	9	1	4	3	6	7	2	8
6	5	9	2	1	3	8	7	4
1	8	7	6	9	4	2	5	3
2	3	4	5	7	8	9	1	6
3	2	8	1	6	7	4	9	5
7	4	6	9	8	5	1	3	2
9	1	5	3	4	2	6	8	7

Page 5 MAZE



Rebus Puzzle

Page 3

1. Man Overboard
2. Positive Feedback
3. One for the money, Two for the show

UNTIL NEXT TIME !