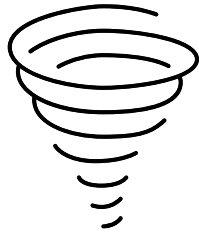


INVESTIGATING SPIRALS



A twist, a turn, a pattern to learn

The Science of Spirals



Spirals are one of the most common shapes found in nature. A spiral is a curve that circles around a center point and slowly moves outward or inward each time it turns. We can see spirals in giant galaxies like the Milky Way, where billions of stars spin around a bright center, and in powerful storms like hurricanes and tornadoes that twist through the air.



Spirals also appear in living things. Snail shells and sea shells grow in spiral shapes so the animal can keep growing without changing its form. Inside the human ear, a tiny spiral called the cochlea helps us hear by turning sound vibrations into signals for the brain.



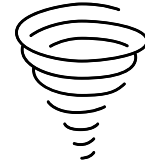
Plants show spirals in the way leaves, pinecones, and flowers grow, allowing them to collect light and fit together without wasting space. Spirals are strong, efficient, and beautiful—proof that patterns in nature often follow simple, repeating designs.

The Science of Spirals

Fill in the Blank



growing	spiral
efficient	tornadoes
Milky Way	hurricanes
cochlea	flowers
repeating	



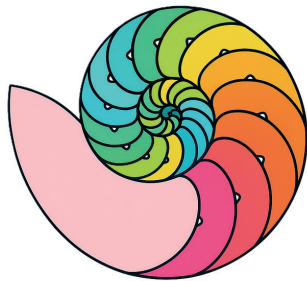
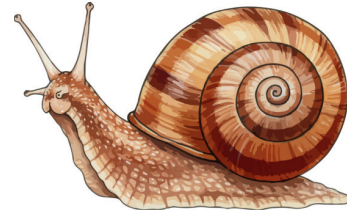
1. A _____ is a curve that circles around a center point and slowly moves outward or inward each time it turns.
2. We can see spirals in giant galaxies like the _____, where billions of stars spin around a bright center.
3. Powerful storms such as _____ and _____ twist through the air in spiral motion.
4. Snail shells and sea shells grow in spiral shapes so the animal can keep _____ without changing its form.
5. Inside the human ear, a tiny spiral called the _____ helps us hear by turning sound vibrations into signals for the brain.
6. Plants show spiral patterns in their leaves, pinecones, and _____ so they can collect light and fit together without wasting space.
7. Spirals are known to be strong, _____, and beautiful patterns found throughout nature.
8. The repeated shapes and motion of spirals remind us that many natural patterns follow simple, _____ designs.

Styles of Spirals

Even Spiral (Archimedean Spiral)-

Each loop stays the same distance apart as it grows.

You can see this in a fern frond or a snail shell—each turn neat and even



Growing Spiral (Logarithmic Spiral)-

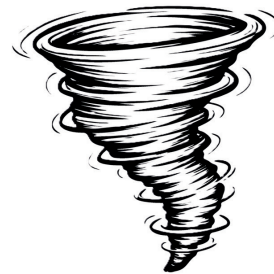
Each loop spreads out wider as it moves outward.

You can see this in a sunflower center or a seashell, where the spiral keeps growing but never changes shape.

Vortex Spiral-

A moving spiral made by spinning air or water.

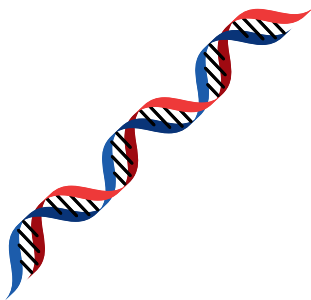
You can see it in a tornado, a hurricane, or even when water drains in a sink.



Helix-

A spiral that climbs upward or downward, like a spring. Helix spirals can twist upward or downward, making them three-dimensional shapes

You can see it in DNA, a curling vine, or curly hair.



Styles of Spirals: True or False

1. An even spiral grows wider and wider with each turn.

TRUE or FALSE

2. A fern frond and a snail shell both show even spirals.

TRUE or FALSE



3. A growing spiral spreads out farther as it moves outward.

TRUE or FALSE



4. The sunflower and seashell are examples of growing spirals.

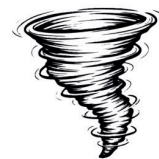
TRUE or FALSE

5. A vortex spiral can be seen in air and water, such as tornadoes and hurricanes.

TRUE or FALSE

6. A helix is a flat spiral that stays on one level.

TRUE or FALSE



7. DNA, a vine, and curly hair all show the shape of a helix.

TRUE or FALSE

8. All spirals grow randomly with no order or pattern.

TRUE or FALSE



9. The vortex spiral stays still and never moves.

TRUE or FALSE

10. Helix spirals can twist upward or downward, making them three-dimensional shapes.

TRUE or FALSE

Styles of Spirals Cryptogram

A	B	C	D	E	F	G	H	I	J	K	L	M
7	25	3	16	12	20	24	21	9	4	1	19	11

N	O	P	Q	R	S	T	U	V	W	X	Y	Z
17	23	18	8	6	13	15	10	5	14	26	2	22

Hint: Use the key code above to solve the encrypted message

7 19 19 13 18 9 6 7 19 13

20 23 19 19 23 14 7 6 10 19 12

12 7 3 21 15 10 6 17

25 10 9 19 16 13 23 17

15 21 12 23 17 12 25 12 20 23 6 12

9 15 15 23 24 6 23 14 .



Spirals in Weather and Water

Spirals aren't just in galaxies or shells — they swirl through our skies and oceans, too! When air or water begins to move and spin, it often forms a spiral shape called a vortex. A vortex is a powerful, spinning motion that draws things toward its center. You can see one when water drains down a sink, when a dust devil twists across a field, or when a mighty hurricane forms over the ocean.

In the atmosphere, warm air rises and cool air sinks. As this movement combines with Earth's rotation, it creates spinning systems like tornadoes and hurricanes. Tornadoes are smaller but faster, forming a narrow spiral that touches the ground. Hurricanes are huge and wide, with spiral bands of clouds circling a calm center called the eye. Both are shaped by the same natural forces — rotation, gravity, and motion — working together in perfect order.

Spirals also appear in water. When waves crash against rocks or currents meet, they can form swirling whirlpools that pull water in circles. Even the way ocean currents move across the planet follows spiral patterns, guided by Earth's spin and temperature differences. These swirling motions help move energy, heat, and nutrients all around the world — keeping the oceans, and even our weather, in balance.

The spiral shapes we see in weather and water show how energy naturally moves in an organized way. Instead of rushing in random directions, air and water follow curved paths that help balance forces of motion, temperature, and pressure.

These spinning patterns allow storms to release energy safely and help ocean currents carry warmth around the planet. By studying spirals, scientists learn how nature manages movement efficiently — turning what might seem like wild motion into a pattern of balance and design.



Spirals in Weather and Water

Circle the letter of the best answer to each question.

1. What is a vortex?
 - A. A straight flow of air or water
 - B. A spinning motion that draws things toward its center
 - C. A type of cloud that does not move
 - D. A calm area of ocean water
2. What causes tornadoes and hurricanes to spin?
 - A. The pull of the Moon
 - B. Earth's rotation and moving air
 - C. Ocean animals swimming in circles
 - D. Rain falling at an angle
3. The calm center of a hurricane is called:
 - A. The spiral zone
 - B. The vortex eye
 - C. The eye
 - D. The circle of clouds
4. What do ocean whirlpools and draining water have in common?
 - A. They both move in spiral patterns
 - B. They both make thunder and lightning
 - C. They both form only in cold water
 - D. They both stop the movement of air
5. What can we learn from studying spirals in weather and water?
 - A. Nature's motion is random and chaotic
 - B. Spirals help energy move in organized, balanced ways
 - C. Air and water never mix
 - D. Spirals are only found in living things

Spirals in Plants

Sunflower



Look closely at the center of a sunflower. The seeds aren't placed randomly—they spiral outward in two directions, forming a perfect pattern. This design helps the sunflower fit the most seeds in the smallest space. Each seed grows at just the right angle so it never blocks the one before it. This spiral pattern, called phyllotaxis (fill-oh-TACK-sis), helps the flower stay balanced, bright, and full.

Daisy

The daisy shows the same kind of spiral as the sunflower but in a softer, smaller way. If you look at the yellow center, you can see the tiny florets twisting around each other in neat, curved rows. These gentle spirals give the daisy its round, even shape and help new florets grow evenly from the middle outward. What looks simple is actually a tiny masterpiece of design.



Fern Frond



A young fern begins as a curled spiral called a fiddlehead. As it grows, the spiral slowly unrolls, stretching into a long green leaf. This shape helps the fern protect its leaf while it's developing, then open wide to catch sunlight. The spiral reminds us that growth can be both careful and beautiful at the same time.

Spiral Aloe (Succulent)

Some plants, like aloe, form spirals in the way their leaves grow. When you look down on a spiral aloe, you'll see thick green leaves arranged in a perfect swirl—each one slightly turned from the last. This pattern lets the aloe fit many leaves close together while saving space and collecting sunlight evenly. It's nature's geometry in living form.



Spirals in Plants



Match the Word to the Definition



a. spiral b. seed c. phyllotaxis d. floret e. fiddlehead f. leaf g. succulent

☐

The spiral plan that helps plants arrange leaves, petals, or seeds evenly around a stem.

☐

The small part in the center of a daisy or sunflower that grows in curved rows.

☐

A curved shape that winds around a center point, often seen in flowers or leaves.

☐

A thick, fleshy plant that stores water, like the aloe.

☐

The small part of a plant that can grow into a new plant.

☐

The curled-up beginning of a fern before it unrolls into a leaf.

☐

The flat green part of a plant that collects sunlight for energy.

Spirals in Animals & People

Directions: Read the text below. Then answer the questions that follow.



Did You Know?

The human cochlea makes about two and a half turns, while a guinea pig's cochlea coils about four full turns inside its ear!

Spirals can be found in many living creatures, both large and small. The tails of spider monkeys, chameleons, and seahorses curl in graceful spirals that help them grip, balance, or anchor themselves. Some animals, like rams and goats, grow horns that twist outward in spiral curves as they age. Inside the body, many mammals—including humans—have a spiral structure deep in the inner ear called the cochlea. Its coiled shape helps the ear sort sounds from high to low, allowing us to hear a wide range of tones.

Even on the smallest level, spirals play an important role in life. The instructions that build every plant, animal, and person are stored in a molecule called DNA, which twists into a double spiral called a helix. This tiny spiral is found in every living organism on Earth.

Whether in the curl of a tail, the turn of an ear, or the twist of a microscopic strand of DNA, the spiral shape helps nature stay organized, balanced, and strong.

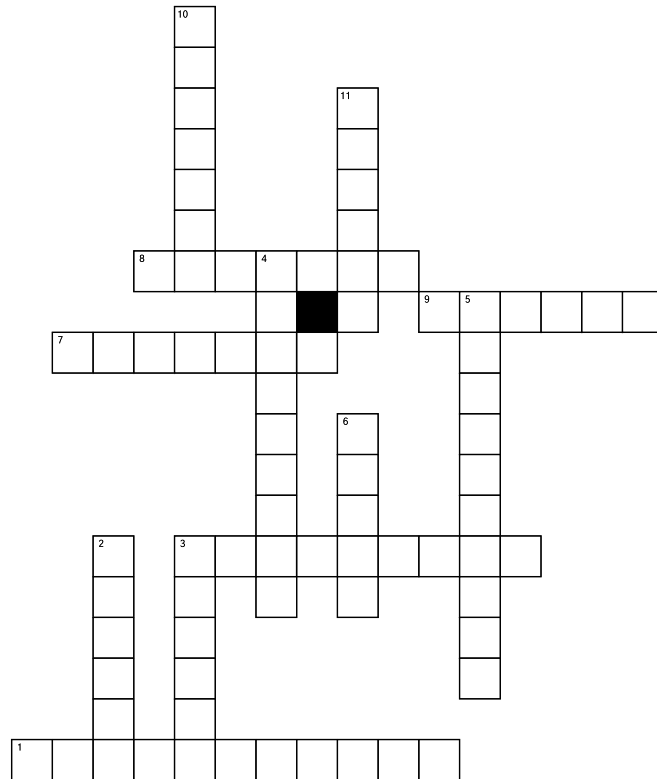
1. What shape is the tiny part of the inner ear called the cochlea?
 - A. A straight tube
 - B. A spiral
 - C. A circle
 - D. A triangle
2. What does the spiral shape of the cochlea help animals and people do?
 - A. See better
 - B. Hear sounds
 - C. Smell food
 - D. Balance on one foot
3. Which animal uses its spiral tail to hold onto things and stay balanced?
 - A. Spider monkey
 - B. Elephant
 - C. Frog
 - D. Whale
4. What is the name of the molecule that carries instructions for life in all living things?
 - A. DNA
 - B. Protein
 - C. Water
 - D. Oxygen
5. According to the “Did You Know?” fact, which animal’s cochlea has more turns?
 - A. Human
 - B. Cat
 - C. Guinea pig
 - D. Dog





Spiral Crossword

sunflower
vortex
design
pattern
efficiency
spiral
phyllotaxis
galaxy
cochlea
shell
hurricane



Across:

1. The spiral pattern in which leaves, petals, or seeds are arranged on a plant.
3. A plant whose seeds form a spiral pattern that follows a mathematical design.
7. A repeated design or arrangement found in nature or art.
8. The spiral-shaped part of the inner ear that helps us hear.
9. The purposeful arrangement of parts that work together in balance and order.

Down:

2. A giant system of stars, gas, and dust held together by gravity.
3. A curve that circles around a center and moves outward or inward.
4. A large storm that forms over warm ocean water and spins in a spiral.
5. Doing something with no waste of space, energy, or movement—like a spiral design.
6. A hard outer covering that often grows in a spiral shape.
10. A fast-spinning column of air that reaches from clouds to the ground.
11. A spinning motion of air or water, like a tornado or whirlpool.



Spiral Word Scramble

Unscramble the words.

Unscramble the words.

- | | | | |
|----------------|-------|-----------------|-------|
| 1. arspli | _____ | 11. leoa | _____ |
| 2. slelh | _____ | 12. nvie | _____ |
| 3. aptrnte | _____ | 13. lysipxthoal | _____ |
| 4. gtrohwr | _____ | 14. yagaxl | _____ |
| 5. esde | _____ | 15. tordaon | _____ |
| 6. luoensrwr | _____ | 16. oipolrlwh | _____ |
| 7. cecoalh | _____ | 17. nurerahci | _____ |
| 8. ydsai | _____ | 18. msotr | _____ |
| 9. ernf | _____ | 19. dgnise | _____ |
| 10. addehlfeid | _____ | 20. anuert | _____ |

Word Box

spiral	seed	phyllotaxis	aloe
tornado	hurricane	growth	storm
vine	fiddlehead	daisy	pattern
fern	sunflower	galaxy	cochlea
shell	nature	whirlpool	design

Spiral Word Search

Up, Down or Diagonal



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

TORNADO
EFFICIENCY
HURRICANE
PATTERN
SPIRAL
GALAXY

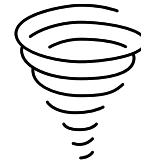
PHYLLOTAXIS
SUNFLOWER
COCHLEA
DESIGN
VORTEX
SHELL

The Science of Spirals

Fill in the Blank



growing	spiral
efficient	tornadoes
Milky Way	hurricanes
cochlea	flowers
repeating	



1. A spiral is a curve that circles around a center point and slowly moves outward or inward each time it turns.
2. We can see spirals in giant galaxies like the Milky Way, where billions of stars spin around a bright center.
3. Powerful storms such as hurricanes and tornadoes twist through the air in spiral motion.
4. Snail shells and sea shells grow in spiral shapes so the animal can keep growing without changing its form.
5. Inside the human ear, a tiny spiral called the cochlea helps us hear by turning sound vibrations into signals for the brain.
6. Plants show spiral patterns in their leaves, pinecones, and flowers so they can collect light and fit together without wasting space.
7. Spirals are known to be strong, efficient, and beautiful patterns found throughout nature.
8. The repeated shapes and motion of spirals remind us that many natural patterns follow simple, repeating designs.

Styles of Spirals: True or False

1. An even spiral grows wider and wider with each turn.

TRUE or FALSE

False — an even spiral keeps the same distance between each loop

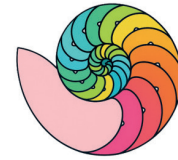
2. A fern frond and a snail shell both show even spirals.

TRUE or FALSE



3. A growing spiral spreads out farther as it moves outward.

TRUE or FALSE



4. The sunflower and seashell are examples of growing spirals.

TRUE or FALSE

5. A vortex spiral can be seen in air and water, such as tornadoes and hurricanes.

TRUE or FALSE

6. A helix is a flat spiral that stays on one level.

TRUE or FALSE

False — a helix climbs upward or downward like a spring



7. DNA, a vine, and curly hair all show the shape of a helix.

TRUE or FALSE

8. All spirals grow randomly with no order or pattern.

TRUE or FALSE

False — all spirals follow a rule and show order and design



9. The vortex spiral stays still and never moves.

TRUE or FALSE

False — a vortex spiral is made by moving air or water, like a tornado or hurricane

10. Helix spirals can twist upward or downward, making them three-dimensional shapes.

TRUE or FALSE

Styles of Spirals Cryptogram

A	B	C	D	E	F	G	H	I	J	K	L	M
7	25	3	16	12	20	24	21	9	4	1	19	11

N	O	P	Q	R	S	T	U	V	W	X	Y	Z
17	23	18	8	6	13	15	10	5	14	26	2	22

Hint: Use the key code above to solve the encrypted message

A L L S P I R A L S
 7 19 19 13 18 9 6 7 19 13

F O L L O W A R U L E
 20 23 19 19 23 14 7 6 10 19 12

E A C H I U R N
 12 7 3 21 15 10 6 17

B U I L D S O N
 25 10 9 19 16 13 23 17

I H E O N E B E F O R E
 15 21 12 23 17 12 25 12 20 23 6 12

I I I O G R O W .
 9 15 15 23 24 6 23 14



Spirals in Weather and Water

Circle the letter of the best answer to each question.

1. What is a vortex?
 - A. A straight flow of air or water
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 - A. Nature's motion is random and chaotic
 - ☒ B. Spirals help energy move in organized, balanced ways
 - C. Air and water never mix
 - D. Spirals are only found in living things

Spirals in Plants



Match the Word to the Definition



a. spiral b. seed c. phyllotaxis d. floret e. fiddlehead f. leaf g. succulent

c

The spiral plan that helps plants arrange leaves, petals, or seeds evenly around a stem.

d

The small part in the center of a daisy or sunflower that grows in curved rows.

a

A curved shape that winds around a center point, often seen in flowers or leaves.

g

A thick, fleshy plant that stores water, like the aloe.

b

The small part of a plant that can grow into a new plant.

e

The curled-up beginning of a fern before it unrolls into a leaf.

f

The flat green part of a plant that collects sunlight for energy.

Spirals in Animals & People



Did You Know?

The human cochlea makes about two and a half turns, while a guinea pig's cochlea coils about four full turns inside its ear!

Directions: Read the text below. Then answer the questions that follow.

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Even on the smallest level, spirals play an important role in life. The instructions that build every plant, animal, and person are stored in a molecule called DNA, which twists into a double spiral called a helix. This tiny spiral is found in every living organism on Earth.

Whether in the curl of a tail, the turn of an ear, or the twist of a microscopic strand of DNA, the spiral shape helps nature stay organized, balanced, and strong.

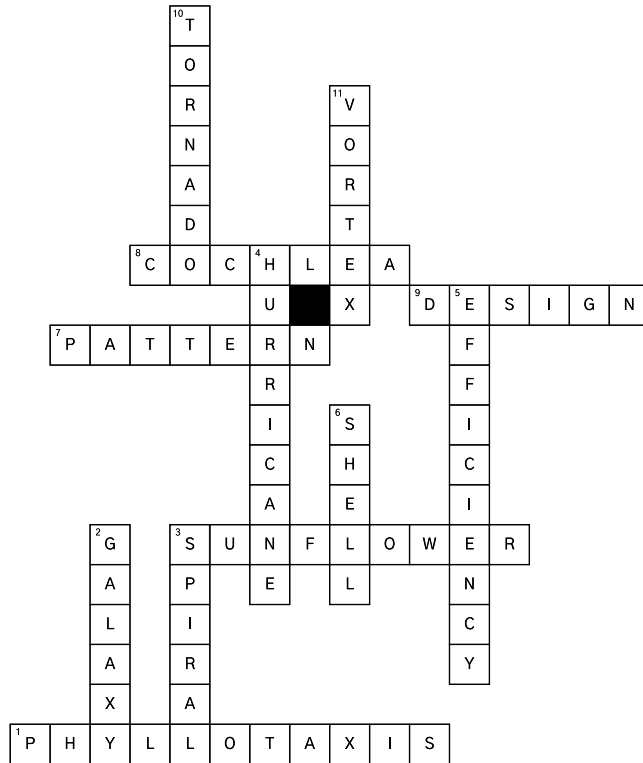
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B. Protein
C. Water
D. Oxygen
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A. Human
B. Cat
☒ C. Guinea pig
D. Dog





Spiral Crossword

sunflower
vortex
design
pattern
efficiency
spiral
phyllotaxis
galaxy
cochlea
shell
hurricane



Across:

1. The spiral pattern in which leaves, petals, or seeds are arranged on a plant.
3. A plant whose seeds form a spiral pattern that follows a mathematical design.
7. A repeated design or arrangement found in nature or art.
8. The spiral-shaped part of the inner ear that helps us hear.
9. The purposeful arrangement of parts that work together in balance and order.

Down:

2. A giant system of stars, gas, and dust held together by gravity.
3. A curve that circles around a center and moves outward or inward.
4. A large storm that forms over warm ocean water and spins in a spiral.
5. Doing something with no waste of space, energy, or movement—like a spiral design.
6. A hard outer covering that often grows in a spiral shape.
10. A fast-spinning column of air that reaches from clouds to the ground.
11. A spinning motion of air or water, like a tornado or whirlpool.





Spiral Word Scramble

Unscramble the words.

Unscramble the words.

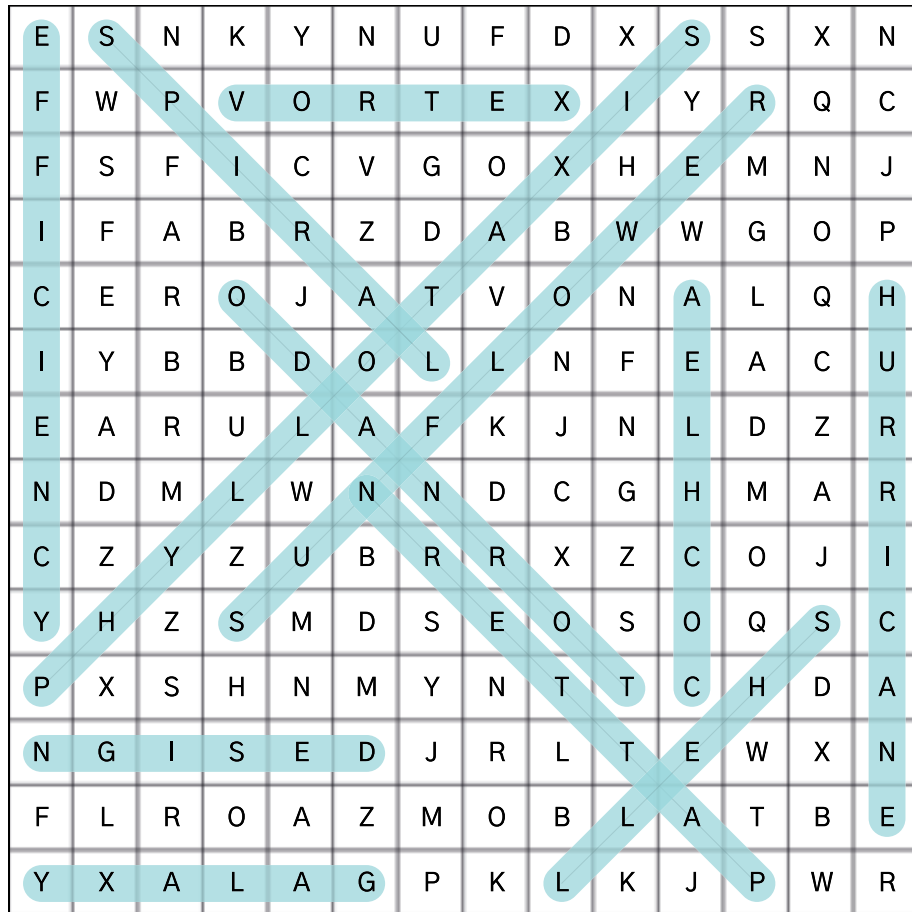
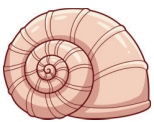
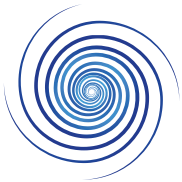
- | | | | |
|----------------|-------------------|-----------------|--------------------|
| 1. arspil | <u>spiral</u> | 11. leoa | <u>aloe</u> |
| 2. slelh | <u>shell</u> | 12. nvie | <u>vine</u> |
| 3. aptnrte | <u>pattern</u> | 13. lysipxthoal | <u>phyllotaxis</u> |
| 4. gtrohw | <u>growth</u> | 14. yagaxl | <u>galaxy</u> |
| 5. esde | <u>seed</u> | 15. tordaon | <u>tornado</u> |
| 6. luoensfrw | <u>sunflower</u> | 16. oipolrlwh | <u>whirlpool</u> |
| 7. cecoalh | <u>cochlea</u> | 17. nurerahci | <u>hurricane</u> |
| 8. ydsai | <u>daisy</u> | 18. msotr | <u>storm</u> |
| 9. ernf | <u>fern</u> | 19. dgnise | <u>design</u> |
| 10. addehlfeid | <u>fiddlehead</u> | 20. anuert | <u>nature</u> |

Word Box

spiral	seed	phyllotaxis	aloe
tornado	hurricane	growth	storm
vine	fiddlehead	daisy	pattern
fern	sunflower	galaxy	cochlea
shell	nature	whirlpool	design

Spiral Word Search

Up, Down or Diagonal



TORNADO
EFFICIENCY
HURRICANE
PATTERN
SPIRAL
GALAXY

PHYLLOTAXIS
SUNFLOWER
COCHLEA
DESIGN
VORTEX
SHELL