Name _____

Date _____

All About Squid

A squid is an ocean-dwelling invertebrate. This means that squid live in salt water and do not have a backbone. Squid are related to the octopus, cuttlefish, and nautilus, which all belong to a group of mollusks known as cephalopods. Cephalopod means "head–foot," which describes a squid perfectly. Their feet, which are the tentacle structures, are directly attached to their head. The top part of a squid is called a mantle, and this is where most of their organs are located. In other words, from top to bottom, the squid's body plan is mantle, head, and then feet/tentacles.

There are over 300 species, or different kinds, of squid. The smallest squid is less than 2.5 cm (1 inch) long, while the largest can be around 15 m (50 ft) long! Squid do not exactly swim in the water. They move instead by jet propulsion. They take in water through their mantle and then push it out of a structure called a siphon. As they push the water out, the force propels them forward through the water.

No matter how big or how small, squid are predatory carnivores and hunt for their food. They use their two long tentacles, which have sucker cups, to reach out in the water and grab their prey. Once they catch something, the tentacles bring it to their eight shorter arms. These eight arms are covered in sucker cups to hold the prey in place. The squid then uses the beak inside its mouth to tear the food into smaller pieces. Squid eat fish, shrimp, crabs, and sometimes even other squid!

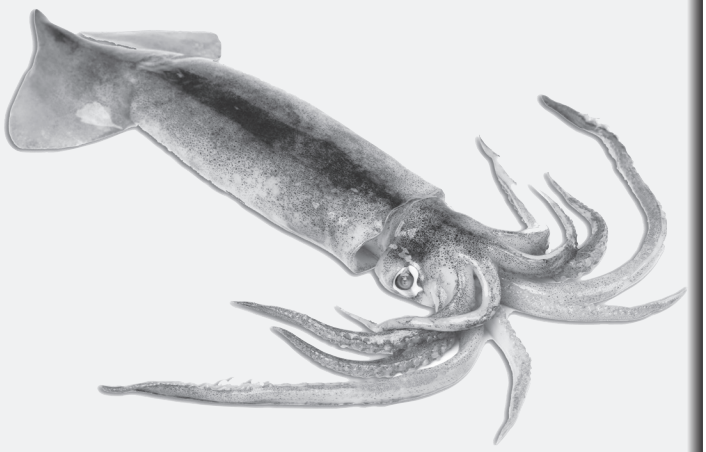
A squid's body is very soft and is vulnerable to predators. Some animals that hunt squid include sharks, whales, fish, penguins, seals, and even humans.

Have you ever ordered calamari at a restaurant? Calamari is fried squid!

Squid have different structures that help them survive in their habitat. A squid has an internal structure called an ink sac. An ink sac is just like it sounds, a structure filled with ink! If a predator approaches, the squid will release a lot of black ink into the water, creating a black cloud that tastes horrible to predators. This ink cloud usually confuses the predator and allows the squid to swim away and hide.

Squid also have the ability to change color and blend in with their surroundings. They have special cells called chromatophores, which help the squid change color when it feels scared or threatened by a predator. By camouflaging themselves, they have a better chance at surviving in their environment.

Squid have been around for millions of years and are well adapted to their ocean environment. Later in this lesson, you will take a closer look at a squid and the other structures it has to help it survive during its lifetime.



Credit: Jiang Zhongyan/Shutterstock.com

Questions

1. How many tentacles/arms does a squid have?

2. What do the tentacles/arms do for the squid?

3. In your own words, explain how squid can avoid being eaten.

4. Why do scientists classify squid as “cephalopods”?

5. How are chromatophores helpful to squid?

6. Construct an argument, using evidence from this reading, that squid have internal and external structures that help them survive, grow, and reproduce.

Nombre _____

Fecha _____

Todo acerca del calamar

El calamar es un invertebrado que vive en el mar. Esto significa que el calamar vive en agua salada y que no tiene columna vertebral. Los calamares están relacionados con los pulpos, las sepias y los nautilos, todos los cuales pertenecen a un grupo de moluscos conocidos como cefalópodos. Cefalópodo significa "cabeza pie" y describe a la perfección a un calamar. Los pies, que son las estructuras de tentáculos, están unidos directamente a la cabeza. La parte superior del calamar se llama manto y es donde se encuentra la mayoría de los órganos. En otras palabras, desde arriba hacia abajo, el cuerpo del calamar consta de manto, cabeza y tentáculos o pies.

Hay más de 300 especies o tipos de calamares. El calamar más pequeño mide menos de 2.5 cm de largo, mientras que los más grandes pueden medir unos 15 m de largo. Los calamares no son precisamente nadadores. Más bien, se mueven por propulsión a chorro. Ingieren agua por el manto y luego la expulsan a través de una estructura llamada sifón. Al expulsar el agua, la fuerza lo impulsa hacia delante entre el agua.

Sin importar qué tan grandes o pequeños sean, los calamares son carnívoros depredadores y cazan su alimento. Utilizan sus dos tentáculos largos, que tienen ventosas, para extenderse por el agua y sujetar a su presa. En cuanto atrapan algo, los tentáculos lo llevan a los ocho brazos más cortos. Estos ocho brazos están cubiertos por ventosas que sujetan e inmovilizan a la presa. El calamar luego utiliza un pico localizado dentro de su boca para romper el alimento en trozos más pequeños. Los calamares comen peces, camarones, cangrejos y, en ocasiones, ¡incluso otros calamares!

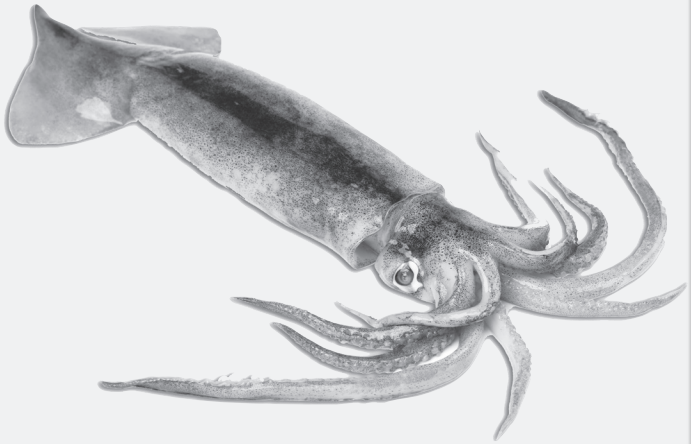
El cuerpo de un calamar es muy suave y vulnerable a los depredadores. Algunos animales que cazan calamares son tiburones, ballenas, peces, pingüinos, focas e incluso los seres humanos.

¿Alguna vez has ordenado calamari en un restaurante? ¡Calamari es calamar frito!

Los calamares tienen varias estructuras que los ayudan a sobrevivir en su hábitat. Un calamar tiene una estructura interna llamada saco de tinta. Un saco de tinta es precisamente lo que parece ser: una estructura llena de tinta. Si un depredador se acerca, el calamar libera gran cantidad de tinta negra en el agua, creando una nube negra que tiene un sabor muy desagradable para los depredadores. Esta nube de tinta por lo general confunde al depredador y permite que el calamar huya y se esconda.

Los calamares también tienen la habilidad de cambiar de color y confundirse con su entorno. Tienen células especiales, llamadas cromatóforos, que ayudan al calamar a cambiar de color si tiene miedo o es amenazado por un depredador. Al camuflarse, tienen una mejor oportunidad de sobrevivir en su entorno.

Los calamares han existido durante millones de años y están bien adaptados a un entorno marino. Más adelante, en esta lección, estudiarás con mayor detalle al calamar y las otras estructuras que tiene para sobrevivir.



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Preguntas

1. ¿Cuántos tentáculos o brazos tiene un calamar? _____

2. ¿Para qué le sirven los tentáculos o brazos al calamar? _____

3. Con tus propias palabras, explica cómo el calamar puede evitar ser comido. _____

4. ¿Por qué los científicos clasifican a los calamares como “cefalópodos”? _____

5. ¿De qué manera son útiles los cromatóforos para el calamar? _____

6. Elabora un argumento, utilizando evidencia de esta lectura, de que los calamares tienen estructuras internas y externas que los ayudan a sobrevivir, crecer y reproducirse. _____

Name _____

Date _____

How Many Stomachs Does It Take?

Different animals have specialized internal and external structures that help them survive in specific environments. External structures are found on the outside the body. Internal structures are found inside the body.

Think about the structures of the human digestive system. You take in food through the mouth, where digestion starts. It passes down the esophagus and into the stomach, where it is mixed with digestive liquids. The food then moves through the intestines, where nutrients are absorbed into the body. But not all animals have such a straightforward digestive path. Take cows, for example. Did you know that cows have more than one stomach? In fact, they have four! These stomachs allow a cow's digestive system to break down the tough food it eats.

Here's how a cow's digestive system works. As with humans, digestion starts in a cow's mouth, where food is briefly chewed into small pieces. When swallowed, the food moves to the cow's first stomach, where it begins to be broken down by digestive juices. The first stomach has large muscles to break the food into pieces. Once the first stomach makes the food pieces small enough, they can move into the second stomach. Sometimes the food pieces are too large for the first stomach to break apart; when this happens, the food is pushed back into the mouth. Have you heard the expression "chewing the cud"? This is when a cow rechews its food and swallows it again. This can happen several times until the pieces are small enough to move into the second stomach. In the second stomach, bacteria break food down into even smaller pieces. The third stomach filters the food and stores it until the fourth stomach has enough space. In the fourth stomach, more digestive juices continue the breakdown of food into particles. Finally, the food moves to the small intestine, where nutrients, or energy, can be absorbed for the cow to perform its daily tasks. It takes one to three days for this entire process, depending on what a cow eats.

The next time you see a cow, think about how amazing its internal structures are.

Questions

1. What is the importance of the digestive system? What would happen if animals didn't have this system?

2. What does "chewing the cud" mean?

3. Other animals have multiple stomachs. Make a prediction about what other animals might benefit from having many stomachs. Explain your answer.

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Nombre _____

Fecha _____

¿Cuántos estómagos se necesitan?

Distintos animales tienen estructuras internas y externas especializadas que los ayudan a sobrevivir en entornos específicos. Las estructuras externas se encuentran por fuera del cuerpo. Las estructuras internas se encuentran dentro del cuerpo.

Piensa en las estructuras del aparato digestivo humano. Ingieres alimentos por la boca, donde comienza la digestión. Desciende por el esófago hacia el estómago, donde se mezcla con líquidos digestivos. El alimento pasa después por los intestinos, donde el cuerpo absorbe los nutrientes. Sin embargo, no todos los animales tienen una vía digestiva tan directa. Considera las vacas, por ejemplo. ¿Sabías que las vacas tienen más de un estómago? De hecho, ¡tienen cuatro! Estos estómagos permiten que el aparato digestivo de la vaca descomponga los alimentos duros que come.

He aquí cómo funciona el aparato digestivo de una vaca. Al igual que sucede con los seres humanos, la digestión comienza en la boca de la vaca, donde el alimento es masticado brevemente en trozos pequeños. Al deglutirse, el alimento pasa al primer estómago de la vaca, donde comienza a ser descompuesto por los jugos digestivos. El primer estómago tiene músculos grandes para romper el alimento en pedazos. Después de que el primer estómago ha reducido lo suficiente el tamaño de los trozos de alimento, estos pueden avanzar al segundo estómago. Algunas veces, los trozos de alimento son demasiado grandes para que pueda romperlos el primer estómago; en estos casos, el alimento es empujado de vuelta a la boca. ¿Has oído la palabra "rumiar"? Esto es cuando una vaca vuelve a masticar el alimento y tragarlo por segunda vez. Esto puede suceder varias veces, hasta que los trozos tengan el tamaño para pasar al segundo estómago. En el segundo estómago, las bacterias descomponen el alimento en pedazos aún más pequeños. El tercer estómago filtra el alimento y lo guarda hasta que el cuarto estómago tenga espacio suficiente. En el cuarto estómago, más jugos digestivos continúan con la descomposición del alimento en partículas. Por último, el alimento avanza al intestino delgado, donde los nutrientes, o energía, pueden absorberse para que la vaca realice sus tareas diarias. Este proceso tarda de uno a tres días, dependiendo de lo que la vaca coma.

La próxima vez que veas una vaca, piensa en lo sorprendentes que son sus estructuras internas.

Preguntas

1. ¿Cuál es la importancia del aparato digestivo? ¿Qué sucedería si los animales no tuvieran este aparato?

2. ¿Qué significa "rumiar"?

3. Hay otros animales que tienen varios estómagos. Haz una predicción de qué otros animales podrían beneficiarse de tener varios estómagos. Explica tu respuesta.

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Name _____

Date _____

Surviving in the Desert

Cacti are a group of plants that adapted to desert conditions. There are many varieties of cacti. Cacti do not have broad, flat leaves like most other plants. Instead, cacti leaves are so tiny you'd have to use a microscope to see them. These microscopic leaves are specially adapted to reduce water loss. Because they are so small, there is very little area from which water can leave the plant. Cacti also have modified leaves that look like needles, spines, or short hairs. These structures have several purposes. The needles and spines protect the plant from hungry and thirsty desert animals. One encounter with a cactus would teach most animals to steer clear! Spines and hairs gather water from mist, fog, and dew and channel that water to the roots. The spines do not allow any water to pass through.

It is not only the leaves of cacti that are modified for desert conditions. Cacti have thick, fleshy stems that are usually shaped like cylinders or thick paddles. These fleshy stems serve several functions. The stems of a cactus are green. It is in the stems that cacti make most of their food through photosynthesis. The stems also store water. When conditions are wet, the roots absorb water, which enters the stems. The stems swell. A waxy coating on the outside of the stem keeps the water from evaporating. When conditions are dry, the plant can absorb the water from the stems to keep itself alive.

The roots of cacti also are adapted to help the plants survive in dry conditions. Many cacti have very shallow roots that spread out far and wide from the base of the plant. When rain falls, the roots quickly take in water. When conditions are very dry, roots may break off so water does not move from the plant through the roots into the dry soil.

Questions

1. The Venus flytrap gets most of its nutrients from insects. When an insect lands on the thick, fleshy leaves, tiny hairs make the leaves snap shut. Digestive juices dissolve the insect, and the leaves absorb the nutrients. How are the functions of the leaves of cacti and Venus flytraps different?

2. Baobab trees are found in a hot, dry climate. These trees are shaped like bottles, with a wide bottom and thin trunk. The wide bottom can hold over 300 liters (79 gallons) of water. How is the bottle-like structure of the Baobab similar to the fleshy stem of the cactus?

3. Cacti have structures that are adapted for very dry conditions. Think about plants in a rain forest, where the conditions are very wet year-round. What adaptations might a plant need to survive in the rain forest?

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Nombre _____

Fecha _____

Sobrevivir en el desierto

Los cactus son un grupo de plantas adaptadas para vivir en condiciones desérticas. Hay muchas variedades de cactus. Los cactus no tienen hojas planas y anchas como la mayoría de las otras plantas. Las hojas de los cactus son tan pequeñas que necesitarías un microscopio para verlas. Estas hojas microscópicas están adaptadas especialmente para reducir la pérdida de agua. Dado que son tan pequeñas, tienen muy poca superficie por donde el agua puede escapar de la planta. Los cactus también tienen hojas modificadas que parecen agujas, espinas o pelos cortos. Estas estructuras tienen varios propósitos. Las agujas y las espinas protegen a la planta de los hambrientos y sedientos animales del desierto. Un encuentro con un cactus le enseñaría a la mayoría de los animales a mantenerse lejos. Las espinas y los pelos capturan agua de la bruma, la neblina y el rocío, y canalizan el agua hacia las raíces. Las espinas no permiten el paso del agua.

No solamente las hojas de los cactus están adaptadas para las condiciones desérticas. Los cactus tienen tallos gruesos y carnosos en forma de cilindros o palas gruesas. Estos tallos carnosos tienen varias funciones. Los tallos de los cactus son verdes. Es en los tallos donde los cactus producen la mayor parte de su alimento por medio de la fotosíntesis. Los tallos también almacenan agua. Cuando las condiciones son húmedas, las raíces absorben agua, que entra en los tallos. Los tallos se hinchan. Un recubrimiento ceroso en el exterior del tallo evita que el agua se evapore. Cuando las condiciones son secas, las plantas pueden absorber el agua de los tallos para mantenerse viva.

Las raíces de los cactus también se han adaptado para ayudar a las plantas a sobrevivir en condiciones secas. Muchos cactus tienen raíces poco profundas que se extienden a gran distancia desde la base de la planta. Cuando llueve, las raíces absorben el agua con rapidez. Cuando las condiciones son muy secas, las raíces pueden desprenderse para que el agua no se mueva a través de ellas desde la planta hasta el suelo seco.

Preguntas

1. La venus atrapamoscas obtiene la mayoría de sus nutrientes de insectos. Cuando un insecto se posa sobre las hojas gruesas y carnosas, pelos diminutos hacen que las hojas se cierren. Los jugos digestivos disuelven el insecto y las hojas absorben los nutrientes. ¿En qué difieren las funciones de las hojas de los cactus y de las venus atrapamoscas?

2. Los baobabs son árboles que crecen en clima cálido y seco. Estos árboles tienen forma de botella, con una base ancha y un tronco delgado. La base ancha puede almacenar más de 300 litros de agua. ¿En qué se parece la estructura en forma de botella del baobab con el tallo carnoso del cactus?

3. Los cactus tienen estructuras adaptadas a condiciones muy secas. Piensa en las plantas de una selva tropical, donde las condiciones son muy húmedas todo el año. ¿Qué adaptaciones podría requerir una planta para sobrevivir en la selva tropical?

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Take-Home Science

Dear Family,

Our class is beginning an inquiry science unit. Inquiry science is all about questions, active explorations, drawing, writing, and recording what you see and do to build an understanding of science. Young children are natural scientists. Scientists question everything. Once scientists answer one question, they move without blinking to the next question.

Take-Home Science is an exciting part of our program because it's one way we can better connect home and school. With everyone working together, we can reinforce the science concepts that your student is exploring in the classroom. Here's how Take-Home Science works.

Your student will bring home an investigation sheet that explains an activity related to the science unit the class is studying. The activity is designed so that everyone in the household—younger and older children alike—can work together to learn about science.

A section of the investigation sheet explains the science words and ideas that will be explored during the activity. These science words and ideas are not new to your student because the activity follows a lesson in which those same concepts were explored.

The activities are simple and can be completed within 20 minutes using items normally found in the home. A section of the investigation sheet is for your student to complete and bring back to school. In class, students will have the opportunity to share their experiences and results with one another.

The activities are intended to be quick, informal, and fun. Enjoy!

GO EXPLORING!

Credit: Cathy Keifer/Shutterstock.com

Take-Home Science

Observing the Great Outdoors

Bird Characteristics

Location: In your backyard or at a local park.
Challenge: Determine how unique external structures help the plants and animals survive in their environment.
Who: You and any other person who will help (like brothers, sisters, parents, or friends).

1. What to look for: Three different living things in your neighborhood. Include at least one plant.

2. What to record: Complete the table on the next page to record specific external structures, or characteristics, you observe on each plant or animal. Predict what you think the function of that structure is and then research to find the answer.

3. What to report: Bring your completed chart to class. Be prepared to share what you have discovered during your observations and research.

Credit: Calin Tatu/Shutterstock.com

Vocabulary

Characteristic: A feature that helps identify a person or thing.

External structure: A part found on the outside of an organism's body that aids in survival.

Function: A purpose or job; how something works or operates.

Did You Know?

■ All living things have unique structures and characteristics that help them grow and survive in their environment. Color is one of these characteristics.

■ Many animal species have clear differences between males and females. In birds, males are often much more colorful than females. This vibrant coloring is used to attract a mate for reproduction. Female birds are usually brown or gray. Why might female birds be brown rather than colorful, like the males? Hint: Think about the nest.

■ Even plants use color to their advantage. The petals on many flowers are vibrant in color. The plants make these colorful flowers to attract pollinators like bees, butterflies, birds, and other animals. These animals stop by different flowers to take a drink of nectar and spread pollen in the process. This leads to plant reproduction.

Take-Home Science

Name _____

Date _____

Observing the Great Outdoors

Observe the plants and animals in your backyard or neighborhood park. Look carefully at their external structures. What do you think these special structures are for? Record your observations and predictions in the chart below, then use books or the Internet to find out if you were right. Make sure you include at least one structure of a plant! Bring the completed chart to school to share with your classmates. An example has been done for you.

Living thing	Picture of living thing	External structure	I think the purpose is...	Research
Hummingbird		Long beak	To drink out of flowers	Hummingbirds drink nectar from tubular flowers and need a long beak to reach the nectar.

Ciencia para llevar a casa

Querida familia:

Nuestra clase está comenzando una unidad de ciencia inquisitiva. La ciencia inquisitiva se trata de preguntas, exploraciones activas, dibujos, redacciones y grabaciones de lo que ven y hacen para crear un mayor entendimiento de la ciencia. Los niños pequeños son científicos naturales. Los científicos cuestionan todo. Cuando los científicos responden una pregunta, pasan sin titubear a la siguiente.

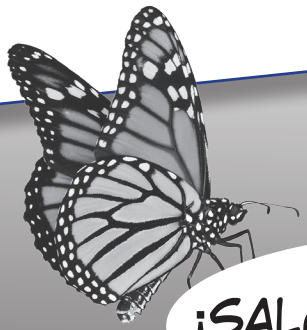
Ciencia para llevar a casa es una parte emocionante de nuestro programa porque es una forma en que podemos conectar mejor la escuela y nuestro hogar. Si todos trabajan juntos, podemos reforzar los conceptos científicos que el alumno explora en el aula. Así funciona la ciencia para llevar a casa.

El alumno llevará a casa una hoja de investigación que explica una actividad relacionada con la unidad de ciencia que la clase está estudiando. La actividad está diseñada para que todos los miembros de la familia (hijos más pequeños y más grandes por igual) puedan trabajar juntos para aprender sobre ciencia.

Una sección de la hoja de investigación explica la terminología científica y las ideas que se explorarán durante la actividad. Esta terminología científica y las ideas no son nuevas para el alumno, ya que la actividad sigue una clase en la que se exploraron esos mismos conceptos.

Las actividades son simples y se pueden completar en 20 minutos con artículos que se hallan normalmente en una casa. Una sección de la hoja de investigación está dedicada para que el estudiante la complete y la lleve a la escuela. En clase, los alumnos tendrán la oportunidad de compartir sus experiencias y resultados con los compañeros.

Las actividades deben ser rápidas, informales y divertidas. ¡A disfrutar!



¡SALGAN A EXPLORAR!

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Ciencia para llevar a casa

Observación de la naturaleza

Características de las aves

Lugar: el jardín de tu casa o un parque de tu localidad.
Desafío: determinar cómo las estructuras externas particulares ayudan a las plantas y a los animales a sobrevivir en su entorno.
Quién: tú y cualquier persona que te ayudará (por ejemplo, hermanos, hermanas, padres o amigos).

1. Qué buscar: tres organismos vivos en tu vecindario. Incluye al menos una planta.

2. Qué registrar: llena la tabla de la siguiente página para registrar las estructuras externas específicas, o características, que observes en cada planta o animal. Predice lo que crees que es la función de esa estructura y luego investiga para encontrar la respuesta.

Qué informar: lleva la tabla con datos a la clase. Prepárate para compartir lo que has descubierto en tus observaciones e investigaciones.

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Vocabulario

Característica: un rasgo que ayuda a identifica a una persona o cosa.

Estructura externa: una parte localizada en el exterior del cuerpo de un organismo que lo ayuda a sobrevivir.

Función: un propósito o una tarea; cómo funciona u opera algo.

¿Sabías qué...?

■ Todos los organismos vivos tienen estructuras y características particulares que los ayudan a crecer y sobrevivir en su entorno. El color es una de estas características.

■ Muchas especies de animales tienen diferencias claras entre los machos y las hembras. En las aves, los machos con frecuencia son mucho más coloridos que las hembras. Estos colores vivos sirven para atraer a una pareja para la reproducción. Las aves hembras por lo general son pardas o grises. ¿Por qué las aves hembras serían pardas en lugar de coloridas, como los machos? Sugerencia: piensa en el nido.

■ Incluso las plantas utilizan el color para su beneficio. Los pétalos de las flores tienen colores vivos. Las plantas utilizan estas flores coloridas para atraer polinizadores, como abejas, mariposas, aves y otros animales. Estos animales se detienen en distintas flores para beber néctar y esparcen polen al hacerlo. Esto conduce a la reproducción de la planta.

Ciencia para llevar a casa

Nombre _____

Fecha _____

Observación de la naturaleza

Observa las plantas y los animales en tu jardín o en el parque de tu vecindario. Mira con atención sus estructuras externas. ¿Para qué crees que sean esas estructuras especiales? Anota tus observaciones y predicciones en la siguiente tabla y, luego, usa libros o Internet para averiguar si tenías razón. Asegúrate de incluir, como mínimo, una estructura de una planta. Lleva la tabla con tus datos a la escuela para compartirla con tus compañeros de clase. Se ha preparado un ejemplo para ti.

Organismo vivo	Imagen del organismo vivo	Estructura externa	Creo que el propósito es...	Investigación
Colibrí		Pico largo	Beber de las flores	Los colibríes beben néctar de flores tubulares y necesitan un pico largo para alcanzar el néctar.

Name _____

Date _____

Unusual Animal Senses

Animals use their senses to survive in their environment. Because environments vary greatly, so do the ways that animals have adapted to use their senses.

Bloodhounds are dogs with an extremely keen sense of smell. Sometimes called "a nose with a dog attached," bloodhounds can smell more than 1,000 times better than humans. Their noses have about 230 million scent receptors in an area about the size of a handkerchief. These amazing sniffers can be trained to detect people even 300 hours after the person has passed by. How do they do it? When a bloodhound sniffs an object, air carries odors through the nose. The odors get stuck in mucus and stimulate the scent receptors. The brain analyzes the smell and makes an "odor image." The dog can identify this image and follow it. Some dogs have been able to follow an odor trail for more than 209 kilometers (130 miles)!

A platypus is an odd-looking animal. In fact, when scientists first saw these animals, they thought someone was playing a joke on them. A platypus has a bill and webbed feet like a duck, a tail like a beaver, and a furry body that looks like an otter. They also have a unique way to hunt prey—electroreception. Within the skin of their bills are electroreceptors that can detect weak electrical fields generated by their prey. Platypuses actually close their eyes, ears, and noses when they start to hunt and let this sixth sense take over.

Bats also have an extra sense. This sense is called echolocation, and it helps bats detect prey in the dark. Echolocation starts with some bats producing sounds through their vocal cords, much like humans do. Other bats produce the sound through their nose. These sounds are high pitched; in fact, these sounds are so high that humans can't hear them. The sound waves produced by these sounds travel through the air. They bounce off objects they encounter, including prey. Bats determine how far away prey is by how long it takes a sound to bounce back. The bats can even determine how large something is and what direction it is moving.

Questions

1. You've read that people use bloodhounds and their highly developed sense of smell to find people. How might the dog use this sense to help it survive?

2. How might closing off eyes, ears, and nose be an advantage when the platypus hunts by electroreception?

3. How is sound used in echolocation?

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Sentidos inusuales de los animales

Los animales utilizan sus sentidos para sobrevivir en su entorno. Dado que los entornos varían considerablemente, lo mismo sucede con las formas en que los animales se han adaptado para utilizar sus sentidos.

Los sabuesos son perros con un sentido del olfato muy agudo. En ocasiones descritos como "una nariz pegada a un perro", los sabuesos pueden oler más de 1000 veces mejor que los seres humanos. Sus narices tienen cerca de 230 millones de receptores olfativos en un área aproximadamente del tamaño de un pañuelo. Estos asombrosos olfateadores pueden ser entrenados para detectar personas hasta 300 horas después de que la persona ha pasado por un lugar. ¿Cómo lo hacen? Cuando un sabueso olfatea un objeto, el aire transporta los olores por la nariz. Los olores se atoran en la mucosa y estimulan los receptores olfativos. El cerebro analiza el olor y forma una "imagen de olor". El perro puede identificar esta imagen y seguirla. Algunos perros han sido capaces de seguir un rastro de olor por más de 209 kilómetros.

El ornitorrinco es un animal de aspecto extraño. De hecho, cuando los científicos vieron estos animales por primera vez creyeron que alguien les estaba haciendo una broma. Un ornitorrinco tiene pico y patas palmeadas como los de un pato, cola como la de un castor y un cuerpo peludo similar al de una nutria. Además, tienen una manera única de cazar presas: electrorrecepción. En la piel del pico hay electrorreceptores que pueden detectar los débiles campos eléctricos generados por sus presas. Los ornitorrincos cierran los ojos, los oídos y la nariz cuando comienzan a cazar y dejan que este sexto sentido tome el control.

Los murciélagos también tienen un sentido adicional. Este sentido es el de ecolocalización y ayuda a los murciélagos a detectar presas en la oscuridad. En algunos murciélagos, la ecolocalización comienza con la producción de sonidos en las cuerdas vocales, de manera similar a como lo hacen los seres humanos. Otros murciélagos producen el sonido con la nariz. Estos sonidos tienen una frecuencia alta; de hecho, los sonidos son tan agudos que los seres humanos no pueden oírlos. Las ondas sonoras producidas por estos sonidos viajan por el aire. Rebotan en los objetos que encuentran, incluidas las presas. Los murciélagos determinan a qué distancia está la presa por el tiempo que el sonido tarda en regresar. Los murciélagos incluso pueden determinar el tamaño de un objeto y en qué dirección se mueve.

Preguntas

1. Has leído que las personas utilizan a los sabuesos y su altamente desarrollado sentido del olfato para encontrar personas. ¿Cómo podría usar el perro este sentido para sobrevivir?

2. ¿De qué manera el hecho de cerrar los ojos, los oídos y la nariz podría ser una ventaja cuando el ornitorrinco caza por electrorrecepción?

3. ¿Cómo se usa el sonido en la ecolocalización?

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Name _____

Date _____

Did You See That?

The eyes and the brain work together to help animals experience sight. The eyes detect light and focus it to form images. The images are processed by the brain, and an animal "sees."

There are two types of cells that detect light. Both are located on the retina. Rods can detect low levels of light, but not color. That is why you only see shades of gray at night or when you are in a dark room. Cones need a lot of light to be activated. They help us see color. Humans have three kinds of cones, each of which sees a different color. Some cones see blue. Others see green or red. The number of cones in the eye affects the amount of color seen. Many animals have three cones and see color much the same way that humans do. Birds have four cones in their eyes. They see color much better than humans. An undersea animal called the mantis shrimp has the most complex eyes of all animals. Their eight cones can detect ten times more color than a human!

Different animals see color differently. Dogs, cats, rabbits, and mice see in in shades of yellow, blue, and grey. They distinguish objects based on their hue. People who can only see in these colors suffer from a color vision deficiency called deuteranopia, which means red–green color blindness.

Most animals can be classified by where their eyes are placed on their head. Some animals, such as monkeys, hawks, wolves, and monkeys, have forward-facing eyes. The eyes are close together on the front of the face. Forward-facing eyes allows organisms to judge depth and distance.

On the other hand, animals such as chickens, deer, rabbits, and horses have eyes on the sides of their heads. These animals are not as good at judging depth and distance, but they have a very wide field of vision.

Questions

1. Sharks, bulls, and stingrays only see in black and white. Use what you learned in this article to explain the structure of these animals' eyes.

2. Imagine that you are watching a hawk hunt a rabbit. Explain how the position of each animal's eyes could help it survive.

3. Many mammals can only detect visible light. But there are other kinds of light. Some animals can also detect ultraviolet or infrared light. What might be the advantage of this kind of adaptation?

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Nombre _____

Fecha _____

¿Viste eso?

Los ojos y el cerebro trabajan juntos para ayudar a los animales a ver. Los ojos detectan luz y la enfocan para formar imágenes. Las imágenes son procesadas por el cerebro y el animal "ve".

Hay dos tipos de células que detectan luz. Ambas se encuentran en la retina. Las barras pueden detectar bajos niveles de luz, pero no color. Es por esta razón que solamente ves tonos de gris de noche o en una habitación oscura. Los conos requieren de mucha luz para activarse. Nos ayudan a ver colores. Los seres humanos tienen tres tipos de conos, cada uno de los cuales percibe un color diferente. Algunos conos perciben el azul. Otros perciben el verde o el rojo. La cantidad de conos en el ojo afecta la cantidad de color que se percibe. Muchos animales tienen tres tipos de conos y ven los colores de manera muy similar a como lo hacen los seres humanos. Las aves tienen cuatro tipos de conos en los ojos. Ven los colores mucho mejor que los seres humanos. Un animal submarino, conocido como camarón mantis, tiene los ojos más complejos de todos los animales. Sus ocho tipos de conos pueden detectar hasta diez veces más colores que un ser humano.

Los distintos animales ven los colores de manera diferente. Los perros, gatos, conejos y ratones ven en tonos de amarillo, azul y gris. Distinguen los objetos por su tonalidad. Las personas que únicamente pueden ver estos colores padecen un defecto de la visión cromática llamado deuteranopía, que significa una ceguera al color rojo y verde.

La mayoría de los animales pueden clasificarse por la posición de los ojos en la cabeza. Algunos animales, como los monos, halcones y lobos, tienen ojos que apuntan hacia el frente. Los ojos están uno cerca del otro en el frente de la cabeza. Los ojos orientados hacia el frente permiten que los organismos determinen la profundidad y la distancia.

En cambio, los animales como las gallinas, los venados, los conejos y los caballos, tienen los ojos en los costados de la cabeza. Estos animales no son muy buenos para determinar la profundidad y la distancia, pero tienen un campo visual muy amplio.

Preguntas

1. Los tiburones, los toros y las rayas solamente ven en blanco y negro. Utiliza lo que aprendiste en este artículo para explicar la estructura de los ojos de los animales.

2. Imagina que observas a un halcón cazando una liebre. Explica cómo la posición de los ojos de cada animal puede ayudarlo a sobrevivir.

3. Muchos mamíferos únicamente pueden detectar la luz visible. Sin embargo, hay otros tipos de luz. Algunos animales también pueden detectar la luz ultravioleta o infrarroja. ¿Cuál podría ser una ventaja de este tipo de adaptación?

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Teacher Sheet: Science in the News Article Report

To help students understand a concept, it is often helpful to associate it with an event or phenomenon. Depending on the topic, students may be able to draw connections to recent events in the news or to historical events in your area. Using a literacy tool like an article report is a helpful way to bring in literacy, reading comprehension, and science topics at any grade level.

Science in the News articles can be assigned at any point during a unit to assist students in seeing the "real-world connection" to a particular concept. These articles should be provided by the teacher in lower grades, but students in grades 3–5 may be ready for the challenge of selecting their own articles independently. The following guidelines will help you find appropriate articles. If you ask students to locate their own articles, you may wish to provide some of these guidelines along with the specific requirements for the assignment. Students at all grades are provided with an article report sheet to help them analyze their article and draw connections between it and the unit concepts. For students in grades 3–5, a rubric is provided in this appendix to help them to evaluate an article for bias and credibility.

1. Choose a topic that aligns with content

- Look for an article that will be engaging to students. It might be helpful to use local news sources or current events. Try to find a topic that students will be able to relate to and find interesting. For example, students will find greater interest in relating chemical reactions to cooking than in a laboratory setting.

2. Seek appropriate articles

- Typical news sites contain text that is likely too complex for elementary students. Use a search engine to find websites that provide kid-friendly news. Many of these websites align their content by grade level and cover a variety of topics.
- Though news is more frequently updated on websites, it is also possible to use text sources, such as kid-friendly newspapers or magazines.

3. Determine the credibility of the source

- It is very important to choose an article from a credible source to avoid bias and false news. Use the credibility rubric to assess sources before selecting articles.

4. Read the article

- Once you have chosen an article of interest, read it to determine its connection to the unit content. Take note of any new or unfamiliar terms so they can be reviewed later.

Differentiation Strategy If you are selecting the article, consider editing the text to differentiate instruction.

5. Ask students to read the article and complete an article report sheet. Remind them to:

- Provide information about where the article was found.
- Answer questions about the current event and draw connections to what they have learned during the unit.

Science in the News: **Article Report**

Name: _____

Date: _____

Title of article: _____

Author: _____

Date published: _____

Source: _____

Type of news: ___ Local ___ National ___ International

1. Summarize your article. What happened? When did it happen? Who was involved? Where did it happen? Why did it happen? _____

2. Why is this article important? _____

3. What did you learn from this article? Was anything surprising? _____

Name: _____

Date: _____

Write one question you have after reading the article. _____

_____

_____

_____

How does this article relate to the topics covered in this unit? _____

_____

_____

_____

Science in the News: Article Credibility Rubric

Directions: Use the rubric to determine the credibility of your Science in the News article.

Criteria	3	2	1	Rating
Author	The author's name is easy to find.	Author's name is not easy to find.	The author's name cannot be found.	
Source/ Publisher	The source of the article is well-known and contains many news reports.	The source of the article does not contain many news reports. I have never heard of the publisher.	The source of this article does not have many news reports.	
Update frequency	This event occurred recently.	This event occurred within the past five years.	This event occurred many years ago.	
Opinion/ Bias	The article reports on an event and does not provide opinion.	The article contains facts, but also the author's opinion.	The article contains the author's opinion and presents information that may not be fact.	
Science Impact	Scientific findings and results appear to be accurate and has strong evidence for support.	The scientific findings might be exaggerated and do not have evidence. I do not understand the scientific findings.	The science discussed in the article is incorrect and there is no evidence.	

1. Do you think this news article is credible? Explain why or why not. _____

_____

_____

All About Squid

A squid is an ocean-dwelling invertebrate. This means that squid live in salt water and do not have a backbone. Squid are related to the octopus, cuttlefish, and nautilus, which all belong to a group of mollusks known as cephalopods. Cephalopod means "head–foot," which describes a squid perfectly. Their feet, which are the tentacle structures, are directly attached to their head. The top part of a squid is called a mantle, and this is where most of their organs are located. In other words, from top to bottom, the squid's body plan is mantle, head, and then feet/tentacles.

There are over 300 species, or different kinds, of squid. The smallest squid is less than 2.5 cm (1 inch) long, while the largest can be around 15 m (50 ft) long! Squid do not exactly swim in the water. They move instead by jet propulsion. They take in water through their mantle and then push it out of a structure called a siphon. As they push the water out, the force propels them forward through the water.

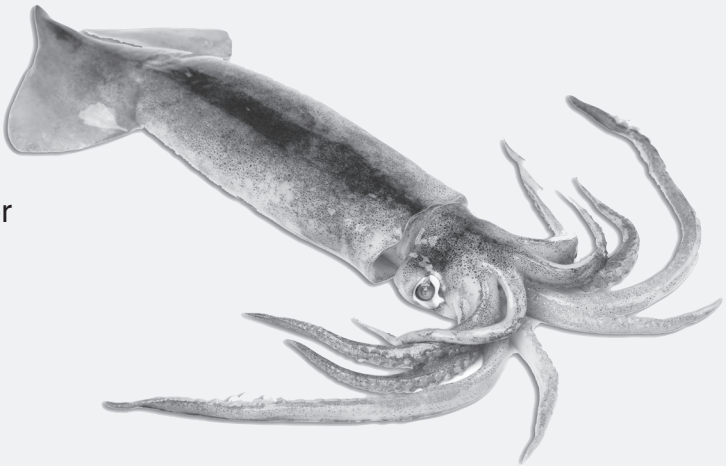
No matter how big or how small, squid are predatory carnivores and hunt for their food. They use their two long tentacles, which have sucker cups, to reach out in the water and grab their prey. Once they catch something, the tentacles bring it to their eight shorter arms. These eight arms are covered in sucker cups to hold the prey in place. The squid then uses the beak inside its mouth to tear the food into smaller pieces. Squid eat fish, shrimp, crabs, and sometimes even other squid!

A squid's body is very soft and is vulnerable to predators. Some animals that hunt squid include sharks, whales, fish, penguins, seals, and even humans. Have you ever ordered calamari at a restaurant? Calamari is fried squid!

Squid have different structures that help them survive in their habitat. A squid has an internal structure called an ink sac. An ink sac is just like it sounds, a structure filled with ink! If a predator approaches, the squid will release a lot of black ink into the water, creating a black cloud that tastes horrible to predators. This ink cloud usually confuses the predator and allows the squid to swim away and hide.

Squid also have the ability to change color and blend in with their surroundings. They have special cells called chromatophores, which help the squid change color when it feels scared or threatened by a predator. By camouflaging themselves, they have a better chance at surviving in their environment.

Squid have been around for millions of years and are well adapted to their ocean environment. Later in this lesson, you will take a closer look at a squid and the other structures it has to help it survive during its lifetime.



Credit: Jiang Zhongyan/Shutterstock.com

Questions

1. How many tentacles/arms does a squid have? *(A squid has eight tentacles/arms.)*

2. What do the tentacles/arms do for the squid? *(The tentacles/arms help the squid to reach to grab prey. The tentacles/arms have sucker cups that hold prey in place.)*

3. In your own words, explain how squid can avoid being eaten. *(Squid have an ink sac that allows them to release black ink into the water. This ink confuses potential predators and gives a squid a chance to swim away.)*

4. Why do scientists classify squid as "cephalopods"? *("Cephalopod" means "head-foot," which applies to a squid because their head is directly connected to their eight feet.)*

5. How are chromatophores helpful to squid? *(Chromatophores allow a squid to change color and blend in with its surroundings, which is helpful when the squid is trying to hide from a predator.)*

6. Construct an argument, using evidence from this reading, that squid have internal and external structures that help them survive, grow, and reproduce. *(Students' arguments will vary. Students should cite evidence from the reading, specifically related to structures, to support their argument.)*

How Many Stomachs Does It Take?

Different animals have specialized internal and external structures that help them survive in specific environments. External structures are found on the outside the body. Internal structures are found inside the body.

Think about the structures of the human digestive system. You take in food through the mouth, where digestion starts. It passes down the esophagus and into the stomach, where it is mixed with digestive liquids. The food then moves through the intestines, where nutrients are absorbed into the body. But not all animals have such a straightforward digestive path. Take cows, for example. Did you know that cows have more than one stomach? In fact, they have four! These stomachs allow a cow's digestive system to break down the tough food it eats.

Here's how a cow's digestive system works. As with humans, digestion starts in a cow's mouth, where food is briefly chewed into small pieces. When swallowed, the food moves to the cow's first stomach, where it begins to be broken down by digestive juices. The first stomach has large muscles to break the food into pieces. Once the first stomach makes the food pieces small enough, they can move into the second stomach. Sometimes the food pieces are too large for the first stomach to break apart; when this happens, the food is pushed back into the mouth. Have you heard the expression "chewing the cud"? This is when a cow rechews its food and swallows it again. This can happen several times until the pieces are small enough to move into the second stomach. In the second stomach, bacteria break food down into even smaller pieces. The third stomach filters the food and stores it until the fourth stomach has enough space. In the fourth stomach, more digestive juices continue the breakdown of food into particles. Finally, the food moves to the small intestine, where nutrients, or energy, can be absorbed for the cow to perform its daily tasks. It takes one to three days for this entire process, depending on what a cow eats.

The next time you see a cow, think about how amazing its internal structures are.

Questions

1. What is the importance of the digestive system? What would happen if animals didn't have this system? *(The digestive system breaks down food, so its nutrients can be absorbed. These nutrients fuel animals' daily activities. Without a digestive system, animals would not have energy to perform daily tasks.)*

2. What does "chewing the cud" mean? *(If food is too large to move from the first to the second stomach, cows will move the food from the first stomach back into their mouth for rechewing, or chewing the cud. This helps break down food into smaller pieces to help get it ready for the second stomach.)*

3. Other animals have multiple stomachs. Make a prediction about what other animals might benefit from having many stomachs. Explain your answer. *(Answers will vary. Accept all answers that show reasoning for the answer.)*

Surviving in the Desert

Cacti are a group of plants that adapted to desert conditions. There are many varieties of cacti. Cacti do not have broad, flat leaves like most other plants. Instead, cacti leaves are so tiny you'd have to use a microscope to see them. These microscopic leaves are specially adapted to reduce water loss. Because they are so small, there is very little area from which water can leave the plant. Cacti also have modified leaves that look like needles, spines, or short hairs. These structures have several purposes. The needles and spines protect the plant from hungry and thirsty desert animals. One encounter with a cactus would teach most animals to steer clear! Spines and hairs gather water from mist, fog, and dew and channel that water to the roots. The spines do not allow any water to pass through.

It is not only the leaves of cacti that are modified for desert conditions. Cacti have thick, fleshy stems that are usually shaped like cylinders or thick paddles. These fleshy stems serve several functions. The stems of a cactus are green. It is in the stems that cacti make most of their food through photosynthesis. The stems also store water. When conditions are wet, the roots absorb water, which enters the stems. The stems swell. A waxy coating on the outside of the stem keeps the water from evaporating. When conditions are dry, the plant can absorb the water from the stems to keep itself alive.

The roots of cacti also are adapted to help the plants survive in dry conditions. Many cacti have very shallow roots that spread out far and wide from the base of the plant. When rain falls, the roots quickly take in water. When conditions are very dry, roots may break off so water does not move from the plant through the roots into the dry soil.

Questions

1. The Venus flytrap gets most of its nutrients from insects. When an insect lands on the thick, fleshy leaves, tiny hairs make the leaves snap shut. Digestive juices dissolve the insect, and the leaves absorb the nutrients. How are the functions of the leaves of cacti and Venus flytraps different? *(Cacti have leaves modified to help protect the plant. Venus flytraps have leaves modified to digest insects to provide nutrients for the plant.)*

2. Baobab trees are found in a hot, dry climate. These trees are shaped like bottles, with a wide bottom and thin trunk. The wide bottom can hold over 300 liters (79 gallons) of water. How is the bottle-like structure of the Baobab similar to the fleshy stem of the cactus? *(Both structures store water for the plant to use when conditions are dry.)*

3. Cacti have structures that are adapted for very dry conditions. Think about plants in a rain forest, where the conditions are very wet year-round. What adaptations might a plant need to survive in the rain forest? *(Answers will vary. Students should suggest adaptations that keep plants from becoming waterlogged or "drowning.")*

Unusual Animal Senses

Animals use their senses to survive in their environment. Because environments vary greatly, so do the ways that animals have adapted to use their senses.

Bloodhounds are dogs with an extremely keen sense of smell. Sometimes called "a nose with a dog attached," bloodhounds can smell more than 1,000 times better than humans. Their noses have about 230 million scent receptors in an area about the size of a handkerchief. These amazing sniffers can be trained to detect people even 300 hours after the person has passed by. How do they do it? When a bloodhound sniffs an object, air carries odors through the nose. The odors get stuck in mucus and stimulate the scent receptors. The brain analyzes the smell and makes an "odor image." The dog can identify this image and follow it. Some dogs have been able to follow an odor trail for more than 209 kilometers (130 miles)!

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Bats also have an extra sense. This sense is called echolocation, and it helps bats detect prey in the dark. Echolocation starts with some bats producing sounds through their vocal cords, much like humans do. Other bats produce the sound through their nose. These sounds are high pitched; in fact, these sounds are so high that humans can't hear them. The sound waves produced by these sounds travel through the air. They bounce off objects they encounter, including prey. Bats determine how far away prey is by how long it takes a sound to bounce back. The bats can even determine how large something is and what direction it is moving.

Questions

1. You've read that people use bloodhounds and their highly developed sense of smell to find people. How might the dog use this sense to help it survive? *(Answers will vary. Students will likely suggest that the dog could use its sense of smell to track prey or avoid predators in order to eat and survive.)*

2. How might closing off eyes, ears, and nose be an advantage when the platypus hunts by electroreception? *(Answers will vary. Students may suggest that by eliminating signals to the brain from these other senses, the platypus will be more aware of the signals from electroreception.)*

3. How is sound used in echolocation? *(Waves from high-pitched sounds produced by bats move away from the bat. The waves bounce off other objects and travel back to the bat. The bat can interpret these sounds to determine where prey is, how large it is, and how it is moving.)*

Did You See That?

The eyes and the brain work together to help animals experience sight. The eyes detect light and focus it to form images. The images are processed by the brain, and an animal "sees."

There are two types of cells that detect light. Both are located on the retina. Rods can detect low levels of light, but not color. That is why you only see shades of gray at night or when you are in a dark room. Cones need a lot of light to be activated. They help us see color. Humans have three kinds of cones, each of which sees a different color. Some cones see blue. Others see green or red. The number of cones in the eye affects the amount of color seen. Many animals have three cones and see color much the same way that humans do. Birds have four cones in their eyes. They see color much better than humans. An undersea animal called the mantis shrimp has the most complex eyes of all animals. Their eight cones can detect ten times more color than a human!

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On the other hand, animals such as chickens, deer, rabbits, and horses have eyes on the sides of their heads. These animals are not as good at judging depth and distance, but they have a very wide field of vision.

Questions

1. Sharks, bulls, and stingrays only see in black and white. Use what you learned in this article to explain the structure of these animals' eyes. *(Because these animals can only see in black and white, their eyes must not have any cones.)*

2. Imagine that you are watching a hawk hunt a rabbit. Explain how the position of each animal's eyes could help it survive. *(Hawks have forward-facing eyes. This eye position provides good depth and distance perception, helping them hunt and catch prey. The rabbit has eyes on the sides of the head. This allows the rabbit a wide range of view. It could see a hawk approaching and escape.)*

3. Many mammals can only detect visible light. But there are other kinds of light. Some animals can also detect ultraviolet or infrared light. What might be the advantage of this kind of adaptation? *(Answers will vary. Students should infer that being able to see different types of light may help them survive in different environmental conditions.)*