

For Students

What can a skull tell us?

Animal: _____

Investigate the teeth

How many incisors (sharp, flat-edged, front teeth)?

How many canines (pointed, fang-like teeth)?

How many molars (broad, flat teeth)?

Are most of the teeth sharp or flat?

What do you think the animal eats?

Do you think the animal is an herbivore (eats plants), a carnivore (eats meat), an insectivore (eats insects), or an omnivore (eats a variety of foods)?

Why do you think so?

Investigate the eyes

Where are the eye sockets located on the head- the side, front, or in between?

Do you think this animal is a predator, prey, or possibly both?

Why do you think so?

Are the eyes large compared to the rest of the skull?

Are the eye socket bones open or closed?

Investigate the nose

Is the nasal opening big or small?

Is the nasal cavity large compared to the rest of the skull?

Does it go deep into the skull or is it shallow?

Do you think the animal has a good sense of smell?

Why do you think so?

For Educators

What can a skull tell us?

Animal skulls can be powerful teaching tools because they provide three-dimensional physical examples of animals' dietary and sensory adaptations. They allow biologists to act like "detectives", using their observational skills to infer how an animal lived and where it fits into its ecosystem. The following images are of a black bear skull. Looking closer at the size of the skull, the teeth, eyes, nose, and mouth, can help explain how black bears survive in their habitats across North America.

There are many options for providing skulls that your students can use to make observations during this investigation:

1. Pictures of skulls.
2. Links to 3D images online (see Additional Resources below).
3. Print your own 3D model. Schools, libraries, and community centers may have a 3D printer in your area.
4. Borrow a skull replica from your state wildlife resources agency. Some states have an educational box loan program—boxes that contain skulls, pelts, and other items for educational purposes.
5. Buy a skull replica from a local or online source, such as Acorn Naturalist or Nature Watch.

Considerations for Teaching with Skulls and Skull Replicas:

1. The "For Students: What can a skull tell us?" page can be used just for an American black bear skull or for analyzing the skulls of other animal species as well. Feel free to make multiple copies.
2. Decide if you want to inform your students of the animal species of the skull prior to them examining it, or if you want students to guess the animal's identity after they make their observations. Students can fill in the blank of the *Animal* name per your instructions.

Additional Resources for Skull Observations:

- Black bear skull - [Black Bear Skull - Download Free 3D model by RISD Nature Lab \(@RISDNaturelab\) \[85f5ec1\]](#)
- Grizzly bear skull - [Grizzly bear / CAS:MAM:3243 - 3D model by California Academy of Sciences \(@calacademy\) \[58ebfd1\]](#)
- Polar bear skull [Collection – How to Read a Mammal Skull | Smithsonian National Museum of Natural History](#)

For Educators

What can a skull tell us?

Animal: American black bear (*Ursus americanus*)



Photo credit: Kerry Wixted

Teeth

Their variety of teeth makes black bears highly adaptable to different foods. They are omnivores and eat plants and animals. Most of the black bear diet consists of vegetation, and only about 15% of the diet comes from animal protein. This will vary by season and food availability. Ultimately, black bears are opportunists and will consume calories where and when available. American black bears may eat foods such as plants, roots, insects, birds, small mammals, fish, and reptiles.

Incisors are primarily used for biting and cutting food. They are used to clip grasses, dandelions, and clover from the forest floor. Incisors are used to strip leaves and buds directly off branches and woody shrubs. They also use incisors to forage for grubs, insects, and larvae.

Canine teeth are used for tearing open rotting logs to search for insects, slashing at prey, and defending against other animals. Black bears will occasionally hunt small animals (such as young deer or elk) and fish. Black bears will use their canines to grasp, bite, and kill prey. They will occasionally eat birds and reptiles, but these are not a typical food source for black bears. They also do not usually eat large mammals. Black bears, however, can use their canines to defend themselves against predators.

Black bear **molars** function primarily like human teeth to crush and grind tough plant material such as roots, berries, acorns, and nuts. Because their diet consists largely of vegetation, these teeth allow black bears to efficiently process tough fibers and extract vital calories. The small pre-molars are versatile and help with the variety of food they eat.

Additionally, you may have noticed the gap between the teeth. This is the diastema and makes it easier to strip leaves from twigs.

For Educators

What can a skull tell us?

Animal: American black bear (*Ursus americanus*)



Photo credit: Kerry Wixted

Eyes

Looking at the eye sockets (orbits) of a black bear provides a number of insights into its diet and habits. Unlike specialized apex predators like wolves, which have deeply recessed, forward-facing orbits for tracking prey, black bears have eyes set wider apart on the side of the skull. This provides a wide field of view to scan for threats and forage for food.

While not as forward-facing as human eyes, their placement still allows for enough binocular vision to navigate their environment and judge distances. Having this depth perception allows bears to successfully dig and forage for food.

A black bear's eye socket is of the "open" type. Unlike humans or dogs, they lack a complete bony ring that completely closes off the back of the eye, which is a common trait among many animals that eat meat. The advantage of this feature is that the powerful jaw muscles, that start at the back of the skull, can bypass the eyes, permitting a wider gape and stronger bites without crushing the eyeball.

Their orbits are relatively small compared to their massive skull and braincase. This confirms that while they have good daylight and decent night vision, their eyesight takes a backseat to their extraordinary sense of smell.

For Educators

What can a skull tell us?

Animal: American black bear (*Ursus americanus*)



Photo credit: Kerry Wixted

Nose

The size and shape of an animal's nasal structure can indicate how much they use their sense of smell. The larger nasal opening and the larger and longer nasal cavity of the black bear are evidence of a stronger sense of smell. This more developed olfactory system allows them to find food by smelling it instead of only by sight. Their reliance on smell is illustrated in their habits of digging deep in rotten logs for insects, finding small berries and acorns, and walking miles to find the food that they sense. It can also help with smelling predators that approach them. A strong sense of smell can also attract bears to human foods, therefore, to help keep bears and people safe, it is important for people to secure strong smelling items when being in the same areas that bears live.