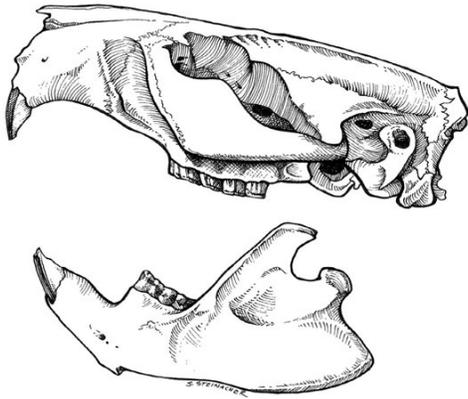


A. Skull Detective

Teeth, Eyes & More



Skull Detective

Grade Levels: Grades 3 - 6

Duration: 1 hour or two 30 minute sessions

Science Standards: A1 and C2

Skills: observing, inferring, classifying

Vocabulary: canines, carnivore, cranium, herbivore, incisors, molars, omnivore, predator, prey

- Fist-sized ball
- Skulls worksheet copied from guide (1/ student)
- Skulls worksheet transparency (to be created by teacher using skulls worksheet)

Objectives

The learner will be able to:

- Make observations about dentition using food samples.
- Describe how an animal's teeth can tell us what the animal eats.
- Identify animals as herbivores, carnivores, or omnivores by looking closely at skulls.
- Describe how eye position indicates whether an animal is a predator or prey.
- Identify additional skull features: muscle attachment, nasal cavity, auditory bullae

Methods

Using demonstrations to illustrate types of teeth and the placement of the eyes, students will learn that there are many things they can tell about an animal by looking carefully at its skull.

Background

Refer to 'About Skulls' section.

Materials

- Skull collection
- Food samples (carrots, granola or popcorn, beef jerky)

Procedures

1. Introductory questions

What is your favorite animal? (List these on the board and circle the mammals.)

What do the animals that are circled have in common? (Four limbs, hair, live young, warm blooded, mammary glands.)

Do any of these mammals live here in _____ ?

Explain to students that they will be learning about the animals living in their region by taking a look at their own skulls. **Since we are mammals, let's start with us. We are going to be having a snack and see what we can learn about mammal teeth in the process. We will also have student volunteers help us to learn about how the eye location tells us something about what the animal eats/or is eaten by.**

2. You are what you eat

Before passing out samples of beef jerky, granola or popcorn and carrots to each student, explain that they will be making observations about which teeth are used to bite and chew each type of food.

- Ask the students to identify their own teeth. (incisors, canines, premolars and

molars.)

- Ask the students to pay attention to which teeth they use to bite and then chew each food type.
- Also have them observe how their jaws move (up/down or side-to-side).

Student observations

There will be some variation, but in general students observe the following:

- When eating a **carrot**, it is easiest to use **incisors** to bite it in half. (Baby carrots work best for this activity. When the carrots are too large, students will use their molars instead.)
- When eating the **jerky**, we use **canines** to tear the jerky in pieces. (Stringy, tough jerky works best for this activity. Students will tear the jerky with canines, rather than nip it in half with incisors.)
- The **granola/popcorn** is chewed using the **molars**. Students will see that the jaw moves side-to-side rather than in an up-down motion. A loose attachment of the upper/lower jaw allows for side-to-side movement (chewing motion) for grinding up food.

Teeth as tools

Teeth are like tools, designed to do specific tasks. Incisors are used for nipping, chiseling and grooming. Canines are used for holding and tearing meat.

What are animals called who eat only plants?

(Herbivores) **Only animals?** (Carnivores) **Both plants and animals?** (Omnivores) Emphasize the three types of animals by using colored pieces of chalk and circling the animals on the board the students named at the beginning of the lesson. Use green for herbivores, red for carnivores, and blue for omnivores.

3. Wolf & Moose game: The eyes have it!

Peripheral vision: Ask for three volunteers. Two students stand back-to-back. They will become a moose, with an eye placed on either of the head. To represent this, have the pair each close one eye. The third volunteer will act as a wolf,

with both eyes facing forward.

Explain to the students you will be walking around the classroom in a circle and asking both the wolf and the moose whether they are able to see you from every direction. It is important to clarify that **the moose and wolf should not turn their heads to see you.**

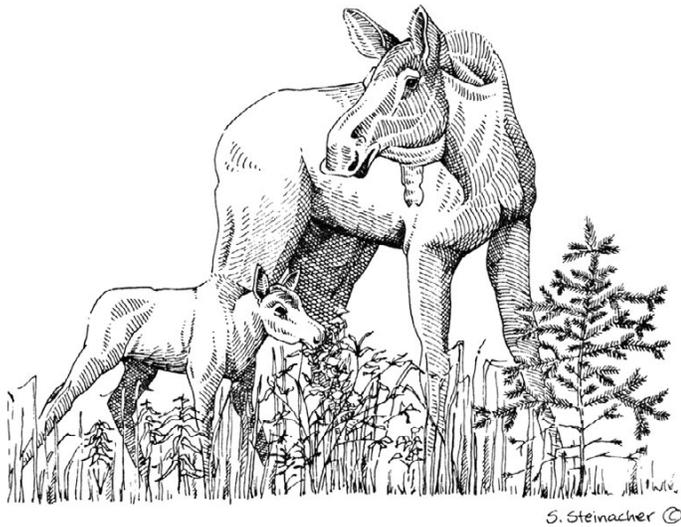
As you walk around the room slowly, ask the moose, **Do you see me, Moose?** Then, **Do you see me, Wolf?**

Continue to ask several times as you make your way around the room. You may also kneel down to change vantage point as well. When standing behind the wolf, he/she will not be able to see you, while the moose will be able to see you from all directions.

Ask the students, **Why was the moose able to see me from all directions?** (Its eyes are placed on either side of its head, giving it better peripheral vision than the wolf.)



Binocular vision: Have the moose volunteers return to their seats, and ask the wolf to stand several feet away from you. Throw a small ball to him/her. The wolf catches the ball. Then, ask the wolf to close one eye. Throw the ball again. This time, the wolf might not catch it. Ask, **Was it easier to catch the ball with both eyes open?** (Yes) **Why?** When both eyes are facing forward, it allows an animal to focus on an object with both eyes. This is called **binocular vision** and provides depth perception.



Ask the students, **Why does an animal such as a wolf have binocular vision, while an animal such as a moose has greater peripheral vision?**

A wolf is a predator and it catches its food. A **predator** needs to be able to determine how far away its prey is before it can lunge/leap to catch it. A **prey** animal, such as a moose, is eaten by predators and relies partially on its ability to see danger when it is coming. Being able to see almost 360 degrees gives a prey animal a chance to escape from its predators.

4. Skull exploration

Before passing out skulls explain that skulls are extremely fragile. They should stay at their table groups and pass skulls carefully from one person to another. Pass out skulls that include examples of all three groups (herbivores, carnivores, omnivores). Students may work with a partner or in small table groups to make observations.

Instruct students to look at the teeth and eye placement of several skulls. It is important to tell students that they do not need to identify the skull; observations about the individual skulls are much more important than simply putting a name to them. Students will be identifying skulls during another session.

Guide with questions

Is your animal an herbivore, carnivore or omnivore?

Herbivores: lack canine teeth. **Carnivores:** canines present, molars are also sharp with shearing teeth upper/lower jaw (carnassial). **Omnivores:** canines present, molars have wider,

Do the incisors look similar on all of the herbivore skulls?

Rodent skulls have orange enamel on the incisors, which is harder than the posterior portion of the tooth composed of dentine. As a result, the incisors are self-sharpening. Rodent teeth also grow throughout their lives. Think about what beavers eat. Sharp incisors are certainly important for eating wood. It is also important that the teeth continue to grow as they are worn down.

Deer and moose skulls lack upper incisors. They rely on the bony upper-palette and lower incisors to cut vegetation and strip leaves from branches. The lack of upper incisors allows ungulates (hoofed mammals) to take in more vegetation quickly before retreating to a more protected spot to chew their cud.

Why are the canine teeth on a carnivore so long?

(For piercing and holding its prey.)

Can you tell whether this skull is from a predator by looking at the orbits? How?

(The orbits are facing forward for binocular vision.)

Is this a predator that hunts at night? How can you tell?

(Nocturnal animals have large eyes and large orbits.)

5. Wrap-Up

Ask students to share something they learned about mammals and/or skulls today. If time permits complete the skulls worksheet using an overhead while students fill in the diagrams on their own sheet. This worksheet can also be completed at the beginning of your next session with skulls, providing a quick review for the students.

Additional thoughts for students to chew on

Here are some questions to help guide students to observe other skull features and describe their functions.

Is this a male or female deer skull?

The male deer has antlers and female deer do not have antlers. Antlers are shed each year, but the point of attachment is still visible on the skull.

Does this animal have strong jaw muscles for tearing meat?

The weasel family (mustelidae) is known for its biting strength. The skulls show a pronounced sagittal crest where the muscles attach. The upper and lower jaws come together in a very

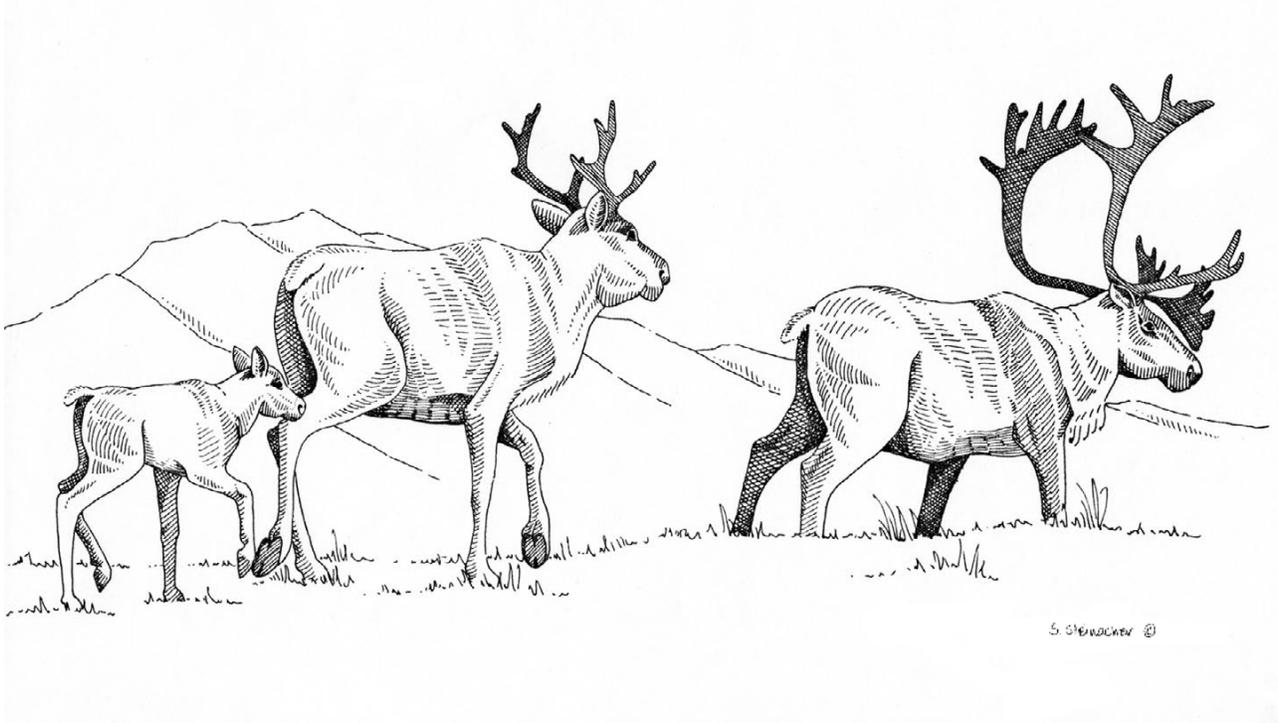
tight fit. This eliminates the side-to-side motion of the jaw, giving more power for biting down.

Does this animal have a good sense of hearing? How can you tell?

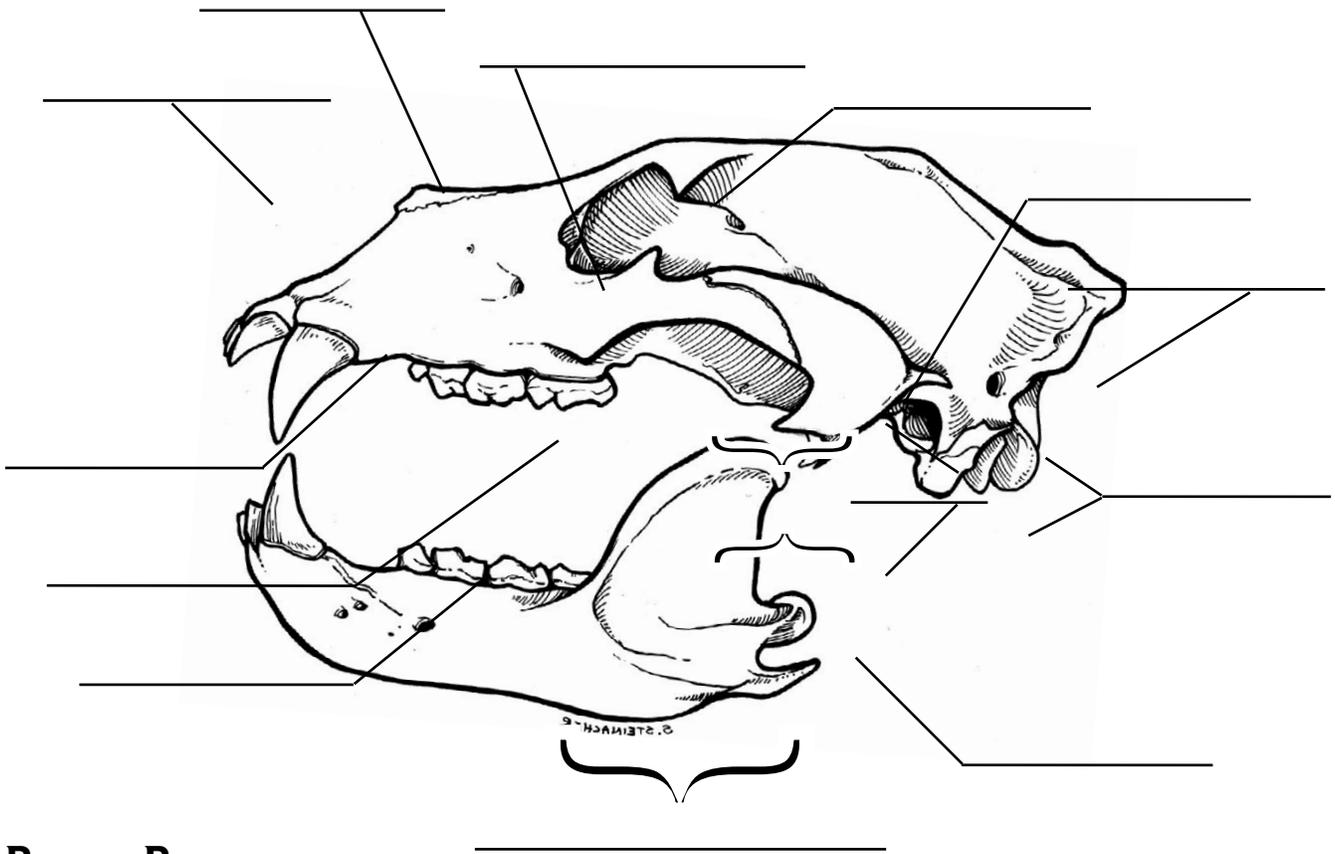
The auditory bullae are the bony structures that encase the inner ear. Inflated auditory bullae indicate a well developed sense of hearing.

Does this animal rely strongly on its sense of smell?

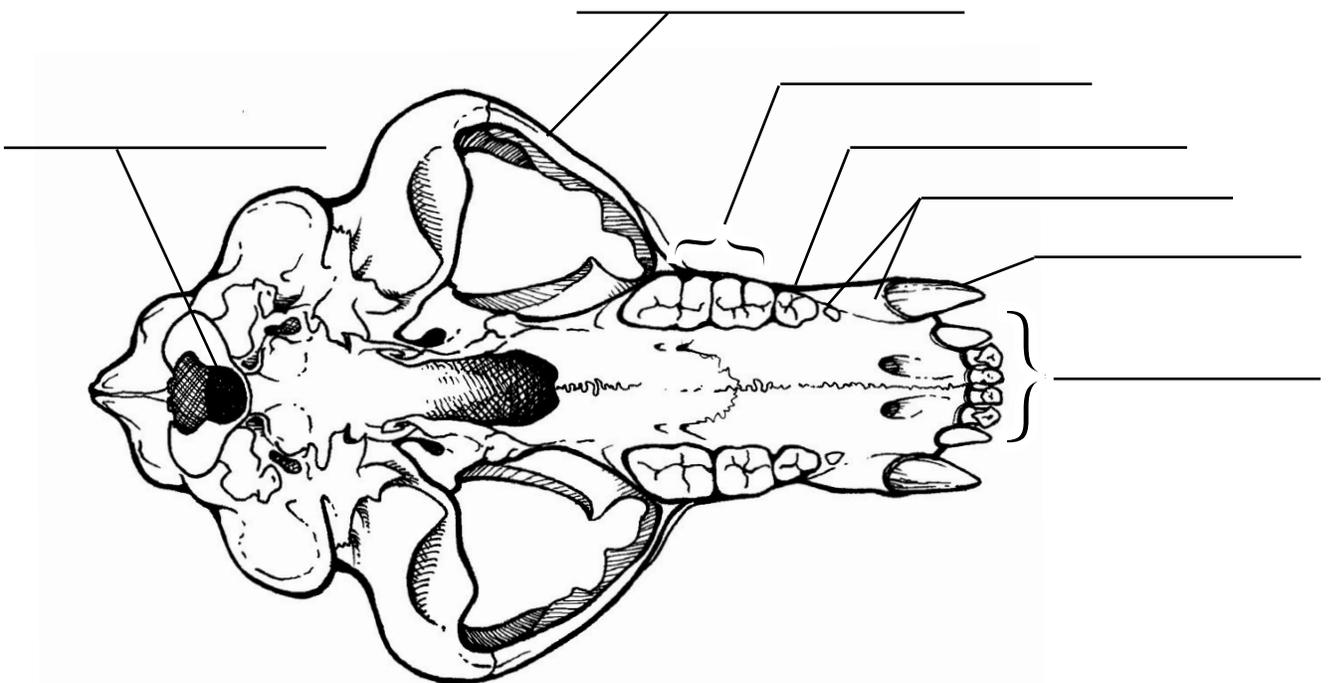
The size of the nasal passage indicates an animal's sense of smell. There are intricate structures within the nasal cavity providing structure for the membranes that sense odor. For example, lynx have short nasal passages, indicating a weaker sense of smell than members of the canine family, like coyotes or wolves.



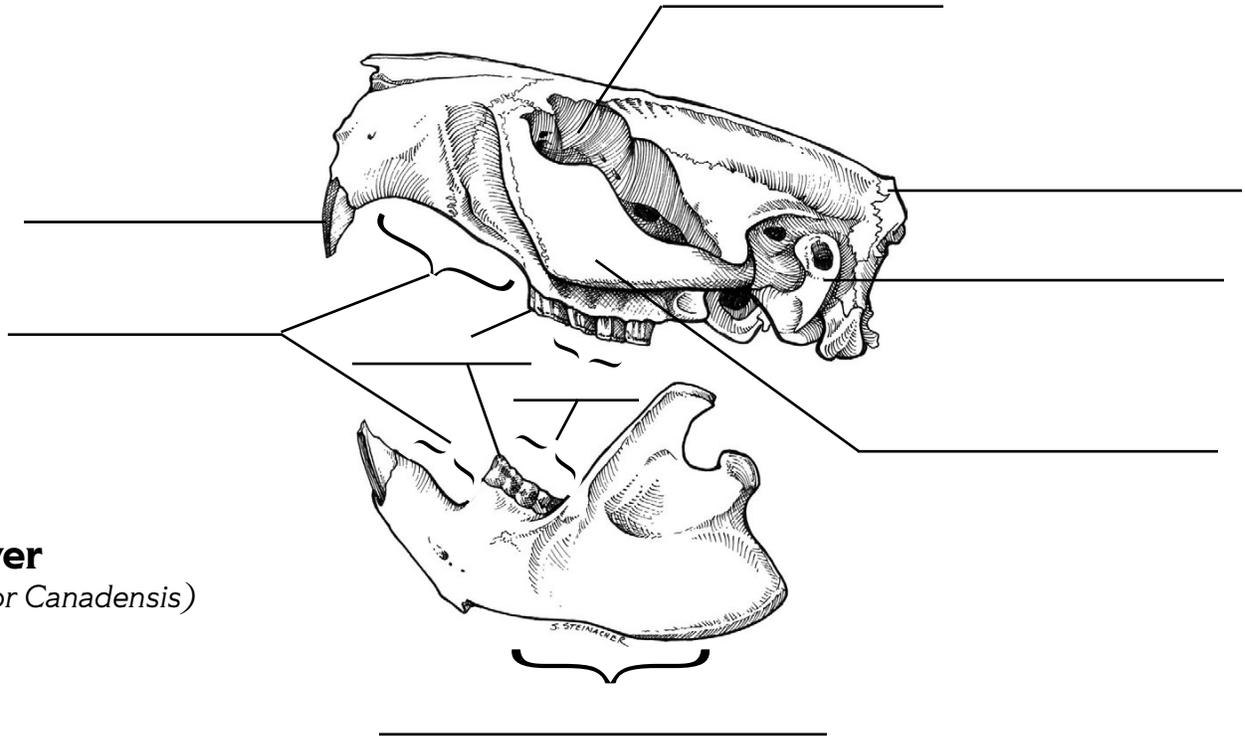
Skulls Worksheet #1



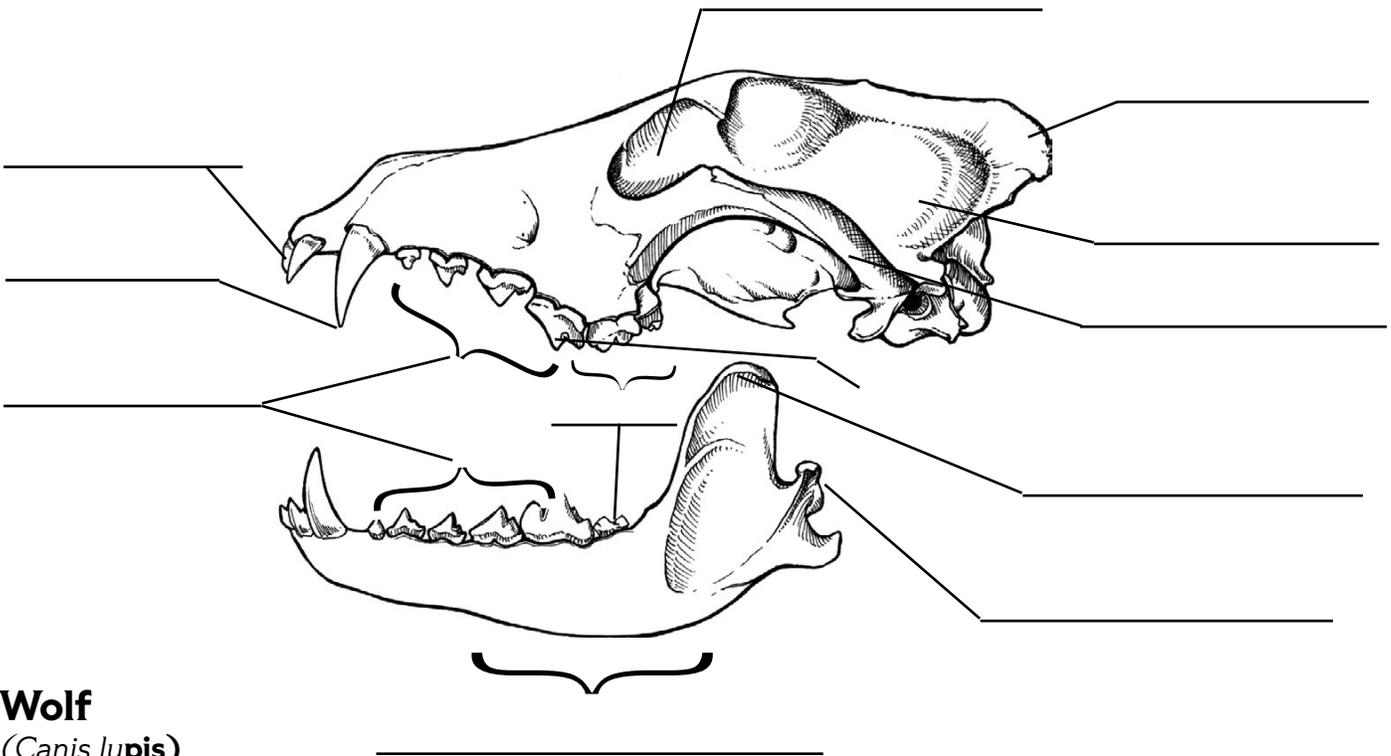
Brown Bear
(*Ursus arctos*)



Skulls Worksheet #2



Beaver
(*Castor Canadensis*)



Wolf
(*Canis lupis*)