It's All in the Teeth

Grades: 6-10
Subject: science
Skills: observation, estimation, calculation
Duration: 30-40 minutes
Vocabulary: diastema, lingual crest, incisor, premolar, molar, cusp, infundibula

Objectives:

Students will be able to: 1) describe the differences between calves/fawns and adult Moose/deer jaws and distinguish between the two.
2) estimate the age of adult Moose/deer.
3) identify the different cheek teeth of a Moose/deer.
4) identify the different parts of a cheek tooth of a Moose/deer.

Method:

Students compare Moose jaws to keys to estimate the age of Moose/deer by tooth wear.

Background:

The lifespan of a Moose or deer is approximately twenty years or more in the wild. When you see a Moose or deer in Algonquin Provincial Park how can you tell how old it is? The age of deer and Moose is extremely difficult, if not impossible, to tell from only observation. Unless it is that year's calf or fawn, age of deer and Moose can not be determined by its outward physical appearance. Some people believe that you can tell the age of male Moose or deer by the size of their antlers and the number of points, but this method is unreliable and misleading, as antler size merely tells how healthy an animal is, not how old. (Very young and very old animals may have the same antler size). As well, animals of the same age may have different size antlers, depending on their diet, health, and genetics. (Even if this was an indicator of age it would not be of use in aging female animals).

A good way to determine the age of a Moose or deer is by tooth development and wear. Like humans, Moose or deer replace their "baby teeth" at a set rate. By the time a Moose is 1½ years old

it has all its adult teeth. White-tailed Deer take a little longer to get their adult teeth. By about 1½ years deer will start to lose their third premolar and by 2½ years they have all their adult teeth. Once a Moose or deer has all its adult teeth, estimating aging can be done by tooth wear. Diet and soil type can accelerate tooth wear and estimating age becomes less reliable with older animals. Despite this, tooth wear is still a valuable tool for field researchers and biologists to quickly estimate the age of an animal.

Moose and deer have two groups of teeth. The front teeth (incisors) are used for collecting food. The back teeth, or cheek teeth (molars and premolars), are used for chewing and grinding food. Between the incisors and molars is an open space along the jaw, called the diastema, which contains no teeth. See **Fig.1**.
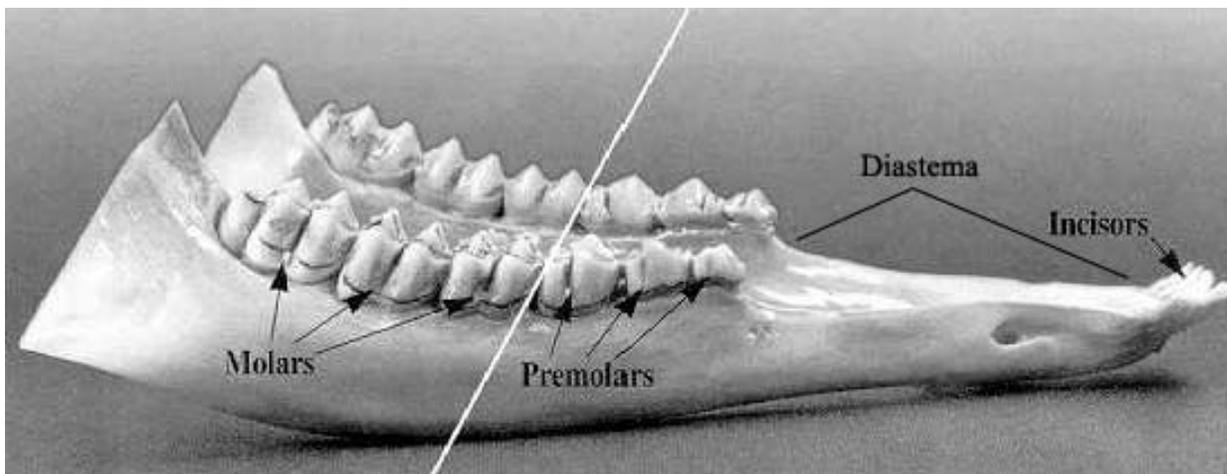

Fig. 1

The first three teeth on each side of the jaw are called premolars. Moose and deer grow two sets of premolars. The first set or 'baby teeth' in Moose calves last until the animal is approximately 14 months old. At this point, permanent, adult premolars start to push out the baby teeth. For deer the process is a little longer, as fawns start to lose their baby teeth around 18 months. An important

characteristic of the first set of premolars in both Moose and deer, is that the third premolar has three crowns, or cusps. **See Fig. 2**. With permanent teeth all of the premolars have just two crowns.

Third molar starting to erupt
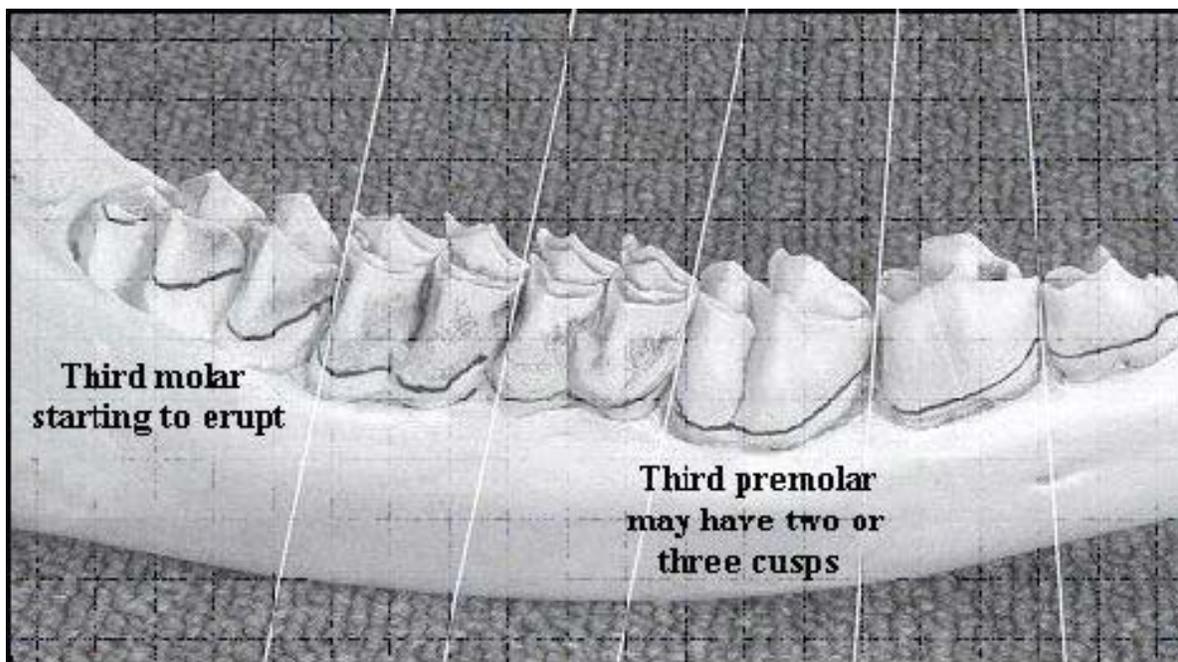
Third premolar may have two or three cusps

Fig. 2

The fourth, fifth and sixth cheek teeth are the molars. Moose and deer grow only one set of molars. By their first fall, six-month old Moose and deer only have one molar. Thus, six-month old animals only have four cheek teeth. By a Moose or deer's second fall, the second and third molars have appeared although the third molar may not have fully grown in. Each molar has two crowns, or cusps, except the third molar which has three. See **Fig. 3**. By the time a Moose or deer is 2½ years old all premolars and molars are fully erupted. Therefore, in order to determine the age of animals in older age classes tooth wear needs to be looked at.
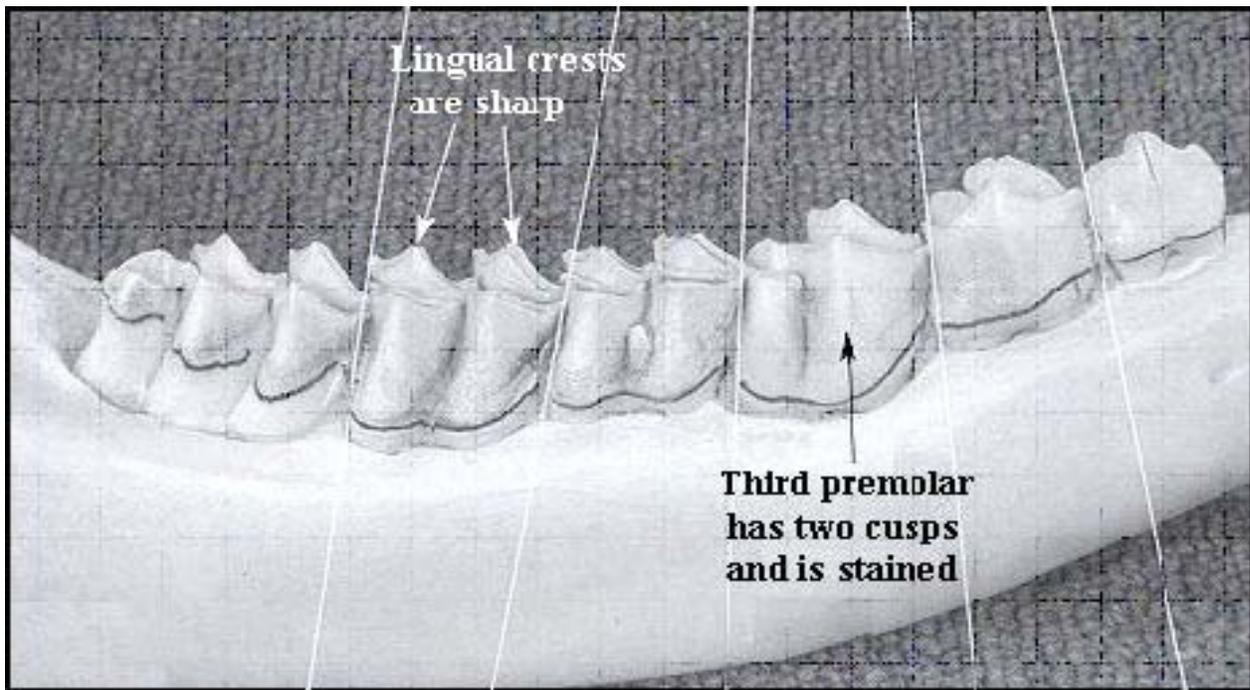
Lingual crests are sharp

Third premolar has two cusps and is stained

Fig. 3

While it is possible to determine whether a Moose or deer is six months old, and even 1½ years old by looking the incisors and the cheek teeth of the lower jaw, it is really the later that harbour the most reliable clues for aging older animals. As Moose and deer age their teeth are worn down by constant chewing of the cud. By the time Moose and deer reach around eleven years old their teeth are practically worn down. To determine an animal's age the teeth are measured above the gum line. There are several variables that can affect the level of accuracy with this method, such as heredity, availability of food, minerals, and grit.

Just as some humans have better teeth than others, so do some Moose and deer, and this is largely due to heredity. Also important to teeth wear is the availability of high quality food. A Moose or

deer with an adequate diet of nutritious food is more likely to be healthier and have better teeth. Minerals in the soil also contribute to tooth wear. The more mineral rich the soil is, the tendency is that antlers are larger, bones are stronger and teeth are stronger and take longer to wear down. Another major factor is dust, sand, grit and gravel mixed in with food that causes greater tooth wear.

Materials:

✓	Items Required	Quantity
	male Moose photo	one
	female Moose photo	one
	male White-tailed deer photo	one
	femal White-tailed deer photo	one
	'Teeth Through the Ages' handout	one per student
	jaw photos	one per group
	Moose and deer age data sheet	one per student
	pen/pencil	one per student
	graph paper	one per student

Procedure:

1) Brainstorm what techniques could be used to determine the age of a human, e.g. height, weight, hair colour, skin texture/appearance, teeth, voice etc. Discuss the reasons for the unreliability of these methods (and any other techniques student might come up with)
2) Explain that like humans, it is very difficult, or impossible to effectively age animals just by physical appearance alone.
3) Brainstorm what techniques could be used to determine the age of animals, e.g. size, weight, plumage/colouration, antler size, teeth.
4) If no one has suggested antler size ask the students if they were wildlife researchers how they would determine the age of a Moose or a deer? This should elicit a response of antler size. At this point display the picture of a Moose and deer with a large set of antlers. Ask students to estimate how old the two animals might be and how they determined that. Then display

the picture of a Moose and deer with smaller antlers. Ask them to estimate how old the two animals might be and how they determined that. Once everyone has had a try at estimating the age and how they determined it, explain that you can not tell by antler size how hold a Moose or deer is. Antler size is just an indication of health and diet, so animals of the same age can have different sized antlers, and animals of differing ages can have the same sized antlers.

5) Ask the question again to students how they would determine the age of a Moose or deer.

6) Explain that, like humans, some mammals have a set of baby teeth which they lose after a period of time, and then acquire adult teeth. For each species this growth and loss of baby teeth and growth of adult teeth occurs at specific intervals in their life. Because of this, wildlife researchers are able to determine if certain animals are juveniles or adults. Both Moose and deer have very distinct times at which their baby teeth are replaced by their adult teeth. This allows wildlife researchers to effectively age sub-adult animals. Once Moose and deer have all their adult teeth it becomes a little more difficult to age the animals, but the cheek teeth are still an effective way to age animals in the field. Ask students how you would then age an animal by its teeth once it has all of its adult teeth.

7) Once tooth wear has been suggested give students the 'Teeth Through the Ages' handout and go over the different stages of growth, replacement and wear in Moose and deer teeth.

8) Explain to the students that they are now going to be wildlife researchers and will try to estimate the age of a number of Moose or deer through tooth wear.

9) Divide the class into groups. Give each group a copy of 'Teeth Through the Ages', and each member of the group a data entry sheet.

10) Randomly hand out one jaw to each group. Explain that the numbers on the photos correspond with the numbers on the data entry sheet and are not the age of the animals.

11) Explain that using the tooth wear key, the group must estimate the age of each jaw. Once a jaw has been aged rotate the jaw to the next group until all jaws have been aged.

ONTARIO PARKS

THE FRIENDS OF ALGONQUIN PARK
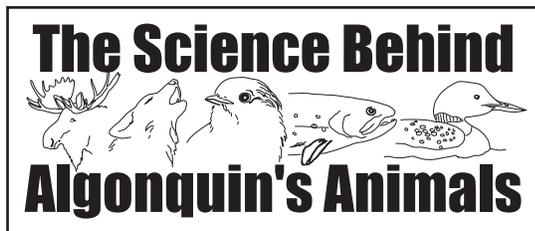
Ontario

Variations:

Get permission from your local Ontario Ministry of Natural Resources District Office to have your students visit a Moose or deer check station during hunting season to practice aging Moose or deer in the field.

Extensions:

1) Have students find out how wildlife researchers determine the age of other animals.
2) Have students research the process of how to effectively age Moose and deer using the cementum method.

Evaluation:

Ask students to:
1) Create a graph from the data obtained from aging all the jaws.
2) Age five jaws without using the key.
3) Discuss why aging by tooth wear is only an estimate of age and not an accurate measurement.
4) Brainstorm what factors might cause tooth wear to occur faster in different animals.
5) Brainstorm how you could accurately age Moose or deer.