

# CRETACEOUS ALBERTA

1. This exhibit is based on a discovery made in Dry Island Buffalo Jump Provincial Park.
2. What type of dinosaur was found at this site, and how many individuals were there?  
Albertosaurus; 22 individuals were found in this bonebed.
3. How did the dinosaur bones end up in a bonebed?  
The carcasses were swept downstream by the water and caught in a logjam formed by hundreds of trees.

# SCIENCE HALL

## What Is A Fossil?

1. Amber may contain the bodies of insects and is the fossilized resin of ancient trees.
2. Plant or animal material may be reduced to a thin carbonaceous film that outlines a fossil on a rock.
3. The infilling of spaces in bone, shell or wood after the original organic material has decayed is called permineralization.
4. Moulds form when an object makes an impression in soft sediment that later hardens into rock, leaving only a cavity.

## Changing Earth

1. Explain the process of continental drift.  
Earth's continents rest on a sea of molten rock. The heat of the Earth's core creates a convection motion of the molten rock and causes the continents to be in a constant state of movement.

## Changing Life

1. What is the theory of evolution?  
Species change through time and give rise to new species. The plants and animals that adapt to their changing environments pass along these successful traits to their descendants over millions of years.

GO PAST THE PREPARATION LAB TO LORDS OF THE LAND (NAYLOR HALL)

# LORDS OF THE LAND

Draw a line to complete the statement.

- |  |  |
|--|--|
| Theropod means                               | articulated skeleton                     |
| The <i>Gorgosaurus</i> is an                 | death pose                               |
| The biggest theropod on display is           | "beast-foot"                             |
| The <i>Ornithomimus</i> is in a              | holotype specimen                        |
| We can tell theropods ate meat by their      | two feet                                 |
| "Black Beauty"                               | <i>T. rex</i>                            |
| Theropods walked on                          | teeth and claws                          |
| The <i>Atrociraptor marshalli</i> skull is a | was discovered along the Crowsnest River |

CONTINUE UP THE NEXT RAMP AND PROCEED TO THE RIGHT, THROUGH THE TIME TUNNEL.



# THE BURGESS SHALE

Match the definition on the left by writing its number beside the correct answer on the right.\*

DEFINITIONS	TERMS
<b>A</b> The Burgess Shale has yielded more than this number of fossils.	<u>  L  </u> <i>Priapulida</i>
<b>B</b> The Burgess Shale creatures are enlarged this many times.	<u>  I  </u> Molting
<b>C</b> The animals lived in shallow seas during the Cambrian Period, this many years ago.	<u>  M  </u> <i>Hallucigenia</i>
<b>D</b> This was a member of our own phylum because it had a stiff rod down its back.	<u>  G  </u> The Canadian Rockies
<b>E</b> This was the largest predator in the Burgess Shale.	<u>  D  </u> <i>Pikaia</i>
<b>F</b> This animal had the head of an insect and the body of a fish.	<u>  K  </u> <i>Marrella</i>
<b>G</b> The Burgess Shale is a layer of rock high in these mountains.	<u>  E  </u> <i>Anomalocaris</i>
<b>H</b> This person found the first fossils of the Burgess Shale	<u>  B  </u> Twelve (12)
<b>I</b> This is the term for shedding an external skeleton.	<u>  C  </u> 505 million
<b>J</b> He was the author of <i>Wonderful Life - The Burgess Shale and the Nature of History</i> .	<u>  A  </u> 200,000
<b>K</b> This is the most common Burgess Shale creature with feathery legs.	<u>  F  </u> <i>Nectocaris</i>
<b>L</b> These were carnivorous worms armed with spines and hooks on a retractable snout.	<u>  H  </u> Charles D. Walcott
<b>M</b> Armed with protective spines on its back, early studies misinterpreted this animal's spines as stilt-like walking legs.	<u>  J  </u> Stephen J. Gould

\*The information for this section is found in writing before the Burgess Shale glass floor and in the study hall just beyond the glass floor. Some answers are repeated during the recording in the glass-floored area.

## PALAEOZOIC ERA

### Short answer

1. What Alberta resource is locked in rock layers that accumulated 375 to 365 million years ago? *Petroleum*
2. What was this period of time called? *Devonian Period*

GO DOWN THE SPIRAL STAIRCASE.

## PALAEOZOIC ERA continued

3. What was the major shift for life during the Palaeozoic Era? *moving onto land*
4. What progressed first onto land?
- A plants
  - B amphibians
  - C insects
5. What plant fossil is the first evidence of life on land? *A plant spore, named Cooksonia.*
6. In what three ways did plants develop during the Devonian and Carboniferous?
- They increased in size, complexity and diversity.*
7. What group of animals were the first to colonize land? *Invertebrates*
8. Name two examples from this group. *Millipedes, centipedes, cockroaches, dragonflies*
9. During which period does our fossil evidence indicate that animals first lived on land?
- Silurian Period*
10. Why are insects considered to be a very successful group? *1. The number of their species. There are more species of insects than all other species of animals combined.*
- 2. The length of time that this group has existed. Insects have been on the Earth for 400 million years.*
11. The first vertebrates, or animals with backbones, that lived partially on land were
- A amphibians
  - B insects
  - C reptiles

## PALAEOZOIC ERA continued

12. Fill out the following table.

Early vertebrates that lived on land:

	Animal	Description of egg shell	Reproductive area
First	<i>amphibians</i>	<i>soft/permeable</i>	<i>water</i>
Second	<i>reptiles</i>	<i>hard</i>	<i>land</i>

13. During what period did reptiles begin to overshadow amphibians? *Permian*
- 
14. What reptile lived during the period described in the previous question and is often mistaken for a dinosaur? *Dimetrodon*
- 

## MESOZOIC ERA—TRIASSIC GIANT

1. What is the name of the specimen on display in this gallery and how large is it?  
*Shonisaurus sikanniensis; 21 metres long*
2. How long did it take to prepare the skeleton once it was brought to the Royal Tyrrell Museum?  
*Over four years*
3. What parts of the skeleton are on display in this exhibit?  
*Ribs, vertebrae, humerus, shoulder girdle, skull*
4. What is the significance of this specimen? *It is the fossilized remains of the world's largest marine reptile (30% larger than any previously known ichthyosaur).*

# DINOSAUR HALL

1. Name three dinosaurs on display that lived during the Jurassic Period.  
*Camarasaurus, Allosaurus, Camptosaurus, Ornitholestes, Stegosaurus*
2. Which two dinosaurs are shown in a Late Cretaceous confrontation?  
*Euoplocephalus and Albertosaurus*
3. Ceratopsians (horned dinosaurs) originated in *Eastern Asia*  
during the middle to late Jurassic Period, about *157*  
million years ago.
4. What are some theories as to the primary role of ceratopsian frills and horns? *Species recognition, defense against predators, make them appear larger to deter predators or other males during breeding confrontations.*
5. Which ceratopsian on display is named after a Museum palaeontologist, and where was it discovered?  
*Centrosaurus brinkmani was named after Dr. Don Brinkman and it was discovered in Dinosaur Provincial Park.*
6. Ceratopsian dinosaurs are divided into two groups based on differences in the frill and the facial horns. Name the two groups and list one example from each group.  
*Centrosaurines – had larger nasal horns, shorter orbital horns and shorter frills.*  
*Examples: Centrosaurus, Albertaceratops, Styracosaurus and Pachyrhinosaurus.*  
*Chasmosaurines – had shorter nasal horns, longer orbital horns and larger frills.*  
*Examples: Chasmosaurus, Anchiceratops and Triceratops.*
7. What is the scientific name for the group of dinosaurs commonly known as “raptors”?  
*Dromaeosaurs*
8. Scientists group duckbill dinosaurs into two subfamilies based on skull features. What are these subfamilies? *Crested duckbills and non-crested duckbills.*  
\_\_\_\_\_
9. During the Late Cretaceous, the interior of North America was covered by a shallow inland waterway. What was it called and how far did it extend? *Bearpaw Sea; stretched from the Gulf of Mexico to the Arctic Ocean*
10. Name three types of animals that lived in this aquatic environment?  
*Baculites, mosasaurs, plesiosaurs, ammonites, clams*

## DINOSAUR HALL continued

11. Which two well-known dinosaurs on display lived at the end of the Age of Dinosaurs?  
*Triceratops and Tyrannosaurus rex*
12. When dinosaurs went extinct at the end of the Cretaceous Period, which group of animals became very successful? *Mammals*

## MAMMAL HALL

1. What is the name and the age of the first period of the Cenozoic Era? \_\_\_\_\_  
*Tertiary Period, 65 - 1.8 million years ago*

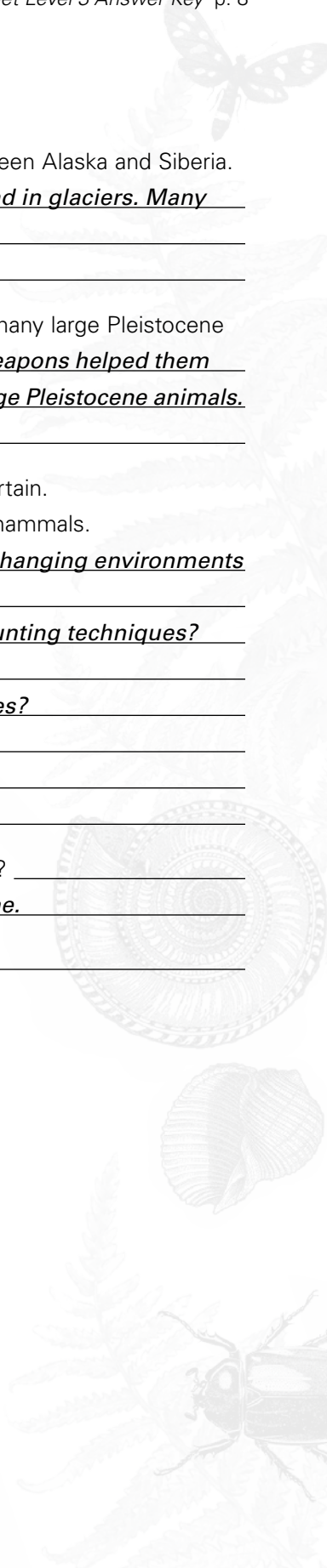
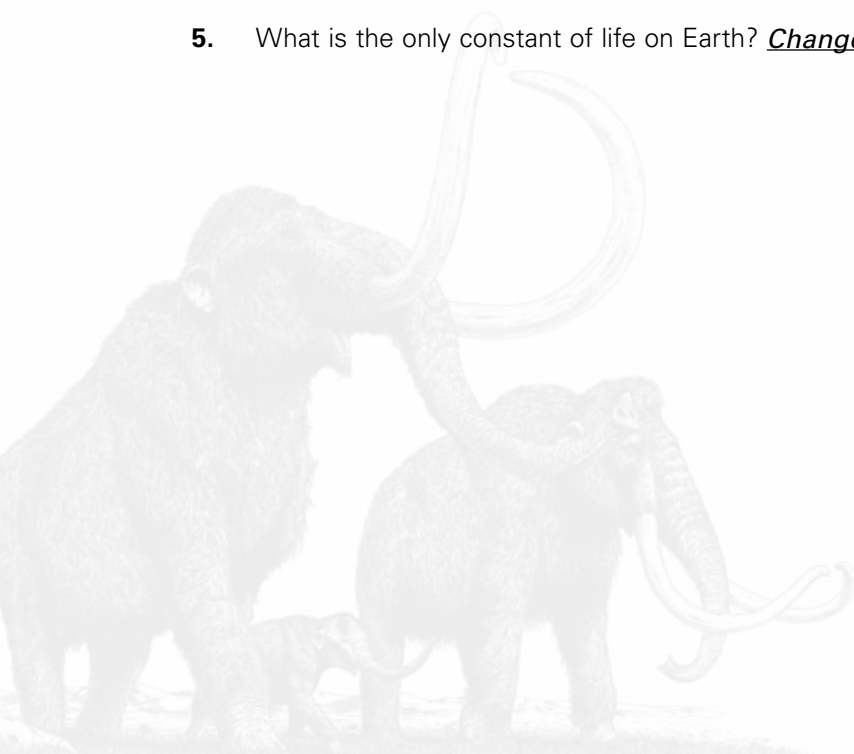
2. Fill in the following table:

Type of Mammal	Characteristics of Offspring	Example
Monotremes	<i>egg</i>	<i>platypus</i>
<i>Placental</i>	Live	<i>mouse, whale or bear</i>
<i>Marsupials</i>	<i>carried in pouches</i>	Kangaroo or opossum

3. List three uses for horns. *Self-defence, fighting for territory or a mate, and digging for food.*
4. How did the grass-eating mammals adapt to open grassland? *Lost some of their toes - remaining toes developed hard cover (hooves).*
5. What are the names of the two groups of grass-eaters? Give an example for each.
1. *Odd - toed ungulates – Horse or Rhino*
2. *Even - toed ungulates – Camel or Deer*
6. Name a tiny fossil thermometer and explain how it is used to demonstrate climate change through geologic time. *Fossil pollen shows a decrease in tropical vegetation. The direction of the coil on small fossil shells indicates cooler temperatures. Fossil plankton show changes in their adaptation to a cooling climate.*

# ICE AGES

1. During the Pleistocene, the sea level was low, exposing the sea floor between Alaska and Siberia. Why was this, and how did it affect the animals? Water was frozen on land in glaciers. Many species crossed the resulting land bridge known as the Bering Strait.  
\_\_\_\_\_
2. Which new predator to North America may have caused the extinction of many large Pleistocene mammals? Humans were the new species. Stone and bone tools and weapons helped them to be efficient hunters, perhaps even causing the extinction of many large Pleistocene animals.  
\_\_\_\_\_
3. The cause of the Great Extinction at the end of the last ice age is still uncertain. State the four questions we still have about the disappearance of ice age mammals.
  1. Were the ice age animals so specialized that they couldn't adapt to changing environments after the glaciation?  
\_\_\_\_\_
  2. Did humans wipe out entire populations with their weapons and hunting techniques?  
\_\_\_\_\_
  3. Did animals migrating from Asia outcompete North American species?  
\_\_\_\_\_
  4. Did animals entering North America bring new deadly diseases?  
\_\_\_\_\_
4. In general, how do modern animals compare in size to Pleistocene animals? Modern animals are slightly smaller than the animals of the Pleistocene.  
\_\_\_\_\_
5. What is the only constant of life on Earth? Change  
\_\_\_\_\_



# SUMMING UP

Fill in the shaded boxes in the chart.

ERAS	PERIODS	AGE (Years Ago)	DOMINANT GROUP OF ANIMALS
CENOZOIC	Quaternary	1.8 million to Present	<i>Mammals</i>
	<i>Tertiary</i>	65 – 1.8 million	
MESOZOIC	<i>Cretaceous</i>	140 – 65 million	<i>Reptiles</i>
	<i>Jurassic</i>	205 – 140 million	
	<i>Triassic</i>	250 – 205 million	
PALAEOZOIC	Permian	290 – 250 million	<i>Amphibians</i>
	Carboniferous	355 – 290 million	
	<i>Devonian</i>	420 – 355 million	
	<i>Silurian</i>	440 – 420 million	<i>Invertebrates</i>
	Ordovician	500 – 440 million	
	Cambrian	545 – 500 million	
PRECAMBRIAN		4.5 billion years to 545 million years	Life began on Earth

