

ACTIVITY GUIDE

Here are activities associated with the Royal Tyrrell Museum Virtual Visit program.

Below is an activities-by-grade chart to help you decide which are the best activities for your class.

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2	Dino Ditties	●	●	●										
3	My Little Trilobite	●	●	●	●									
5	Wetlands Word Search				●	●	●	●						
6	Mesozoic Time Scramble				●	●	●	●	●					
8	Beastly Bones				●	●	●	●	●	●				
11	Designer for a Day						●	●	●	●	●	●	●	●
13	Deltas of Doom!								●	●	●	●	●	●
17	Buckets of Time								●	●	●	●	●	●

ACTIVITY 1

Dino Ditties

Recommended for grades K – 2

Sing some songs about ancient creatures, and learn a little more about them at the same time!

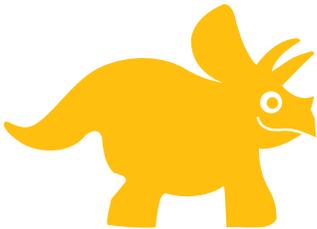
All sung to the tune of “I’m a Little Teapot.”



Tyrannosaurus rex

I’m *Tyrannosaurus rex* the king,
I like to eat most anything
With my great big teeth and scary roar
I’m the king of the dinosaurs

(Fingers make a crown on head)
(Look around hungrily)
(Fingers make teeth and jaws)
(Walk in a circle proudly)



Triceratops

I’m *Triceratops* the three-horned face,
I’m eating ferns all over the place.
If you try to eat me, I’ll poke you
Don’t try it, if I were you!

(Put up three fingers on head)
(Bend down and nibble around)
(Poke three finger horns out)
(Shake finger at *T. rex*)



Sauropod

I am a gigantic sauropod,
I’ve got a big long neck and bod.
I could squish you with my great big feet
Go find somebody else to eat.

(Walks around like a giant)
(Hold out arm for long neck)
(Stomp feet)
(Shake finger at *T. rex*)



Mammal

I’m a little mammal underground,
I hope there are no dinos around.
They are way too big for me to fight,
So I’ll go eat their eggs at night.

(Be small and hide)
(Look around scared)
(Turn around)
(Sneak dinosaur egg)

ACTIVITY 2

My Little Trilobite

Recommended for grades K – 3

Build your own trilobite, and learn more about these ancient creatures that lived in the seas 500 million years ago.

Instructions

1. Provide a copy of the trilobite on the following page to each student
2. Have each student write their name on the back of the trilobite.
3. Students then cut out their trilobite along the outside edge
4. Have each student decorate their trilobite by gluing on appendages, antennae, horns, spikes, tentacles or whatever they wish. Some recommended supplies include:
markers, crayons or pencil crayons, glitter, pipe cleaners,
construction paper, tissue paper, glue, googly eyes
5. Have each student introduce their trilobite to the class and tell them a little more about it.
Or, create a seascape on the wall for the trilobites to live on!

Trilobite Facts

The name trilobite means “three-lobed”; as you can see, they have three distinct “rows” in their bodies that run from tip to tail.

Trilobites first appear in the fossil record 520 million years ago and they went extinct at the end of the Permian Period, 251 million years ago. That’s 30 million years before the first dinosaur appeared.

Trilobites were early arthropods, which are creatures with an exoskeleton. That’s a skeleton on the outside of their body! We are familiar with arthropods today such as insects, and crustaceans like lobsters and crabs.

There were over 20,000 different species of trilobites that evolved over millions of years.

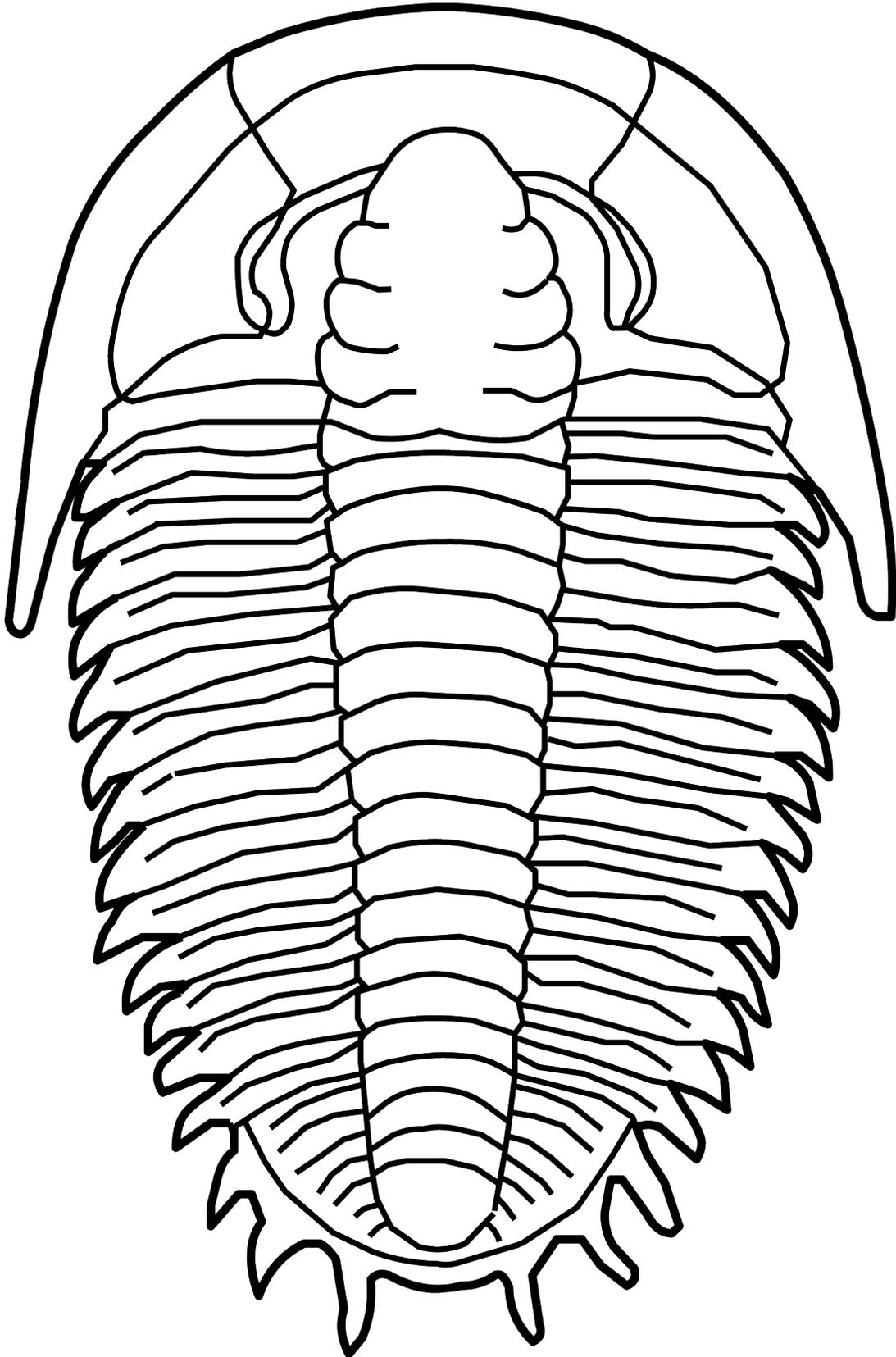
Some were the size of a dime, and some were over half a metre long.

All trilobites lived in the oceans. Their fossils have been found all over the world, with the best specimens discovered in Russia and Morocco.

A few species of trilobites swam, but mostly they walked along the sea floor.

The closest living relative to the trilobite is likely the bizarre “horseshoe crab”, though some palaeontologists think they may be more closely related to spiders or scorpions.

A trilobite had to shed its shell, or “moult”, to grow larger. Much the same way that scorpions, snakes, and tarantulas do.



ACTIVITY 3

Wetlands Word Search

Recommended for grades 3 – 6

Millions of years ago, many parts of Alberta were covered by vast swamps, not entirely different from some of the wetlands today.

Look for the words below related to ancient wetlands. They can run vertically, horizontally, diagonally, and even backwards!

P F R W O H E C P V H X V A S O P D V S
H Z A J Z H L L M X S S T F N M U D N D
Z O Y Z D Z I L F C O A C X A N I G H N
N I O U P Z T Y R L I M R W I S F N H A
H A M Z K I R H Q V L V S T B M V V S L
V J J L E X E A C S U H M S I X Y D F T
O V D O Q N F N Y N B F D O H R G T X E
I F S E L I D O C O R C H X P I X G X W
P J N O E O C O A L F W J Y M H E Z K C
H M Y Z H A F P D N A E N G A U C S Q A
J Q K M M A W F S T H Z R E A G M T F C
P H D A B S D Z E D J P J N R T G C F D
T M X U H P M R B B P I C D S F U E D D
O N X M S K R Y O W F I E Z S K V S P B
E A D M V P J V O S A J J G G X B N L F
C T E R V A O U V U A L K S C S Z I I C
T L S W Q F C D B U I U H E Y T E S J B
V E Q Z R E T A W H S E R F W R H I R S
A D N L R A A G G E K A A S E M E K Z T
O E M E T S Y S O C E I D M O R G K A K

Word Bank

AMPHIBIANS	CYCADS	COAL	CROCODILES	DELTA
ECOSYSTEM	FERNS	FERTILE	FISH	FRESHWATER
HADROSAUR	INSECTS	MUD	OXYGEN	SOIL
SWAMP	WATER	WETLANDS		

ACTIVITY 4

Mesozoic Time Scramble

Recommended for grades 3 – 7

The animals of the Mesozoic are in a scramble! Figure out which animals belong to which time period, and in the process, create your own Mesozoic timeline.

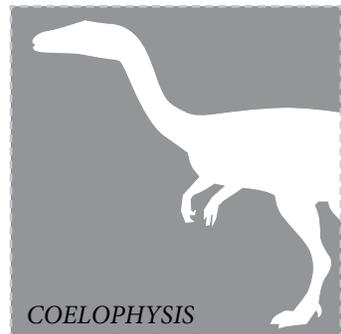
Fossils found in the badlands of Alberta come from the Cretaceous Period, the last of three periods in the Mesozoic Era. The word “Mesozoic” means “middle life”, and stretched from about 252 million years ago to 66 million years ago. It is often referred to as the “Age of Dinosaurs.”

The end of the Mesozoic Era is marked by the “K/Pg Extinction Event”, or “K/Pg Boundary”. K stands for “Cretaceous” (the letter C was already being used for another time period), and Pg stands for “Palaeogene”, which is the first period in the Cenozoic Era, the “Age of Mammals”. Before the K/Pg boundary we find dinosaur fossils, after the boundary we do not.

Instructions

Each animal below lives in one of the three periods, but it’s up to you to discover where they belong.

1. Cut out the timeline on the following page.
2. Glue the timeline together, matching the tabs for the time periods correctly.
3. Cut out the dinosaur silhouette boxes below.
4. Read the hints beside the boxes, then glue each animal onto their appropriate place on the timeline.
5. Colour your timeline however you’d like.



TRIASSIC

252 MYA – 201 MYA

glue matching
dinosaur here

NAME MEANS
“hollow form”
A small, primitive
theropod
Ancestor of
Tyrannosaurus rex

glue matching
dinosaur here

NAME MEANS
“flat lizard”
A primitive saurpod or
“long-necked” dinosaur
A bipedal vegetarian

glue to backside
of Jurassic

JURASSIC

201 MYA – 145 MYA

glue matching
dinosaur here

NAME MEANS
“ancient wing”
One of the first
feathered dinosaurs
The size of a magpie

glue matching
dinosaur here

NAME MEANS
“roofed lizard”
A well-armoured
vegetarian
Usually travelled
alone or in pairs

glue to backside
of Cretaceous

CRETACEOUS

145 MYA – 66MYA

glue matching
dinosaur here

NAME MEANS
“Alberta Lizard”
A member of the
theropod family
Cousin of
Tyrannosaurus rex

glue matching
dinosaur here

NAME MEANS
“near-crested lizard”
A member of the
hadrosaur family
Crest on head was likely
used for communication

the extinction event that marks the
end of the Age of Dinosaurs

ACTIVITY 5

Beastly Bones

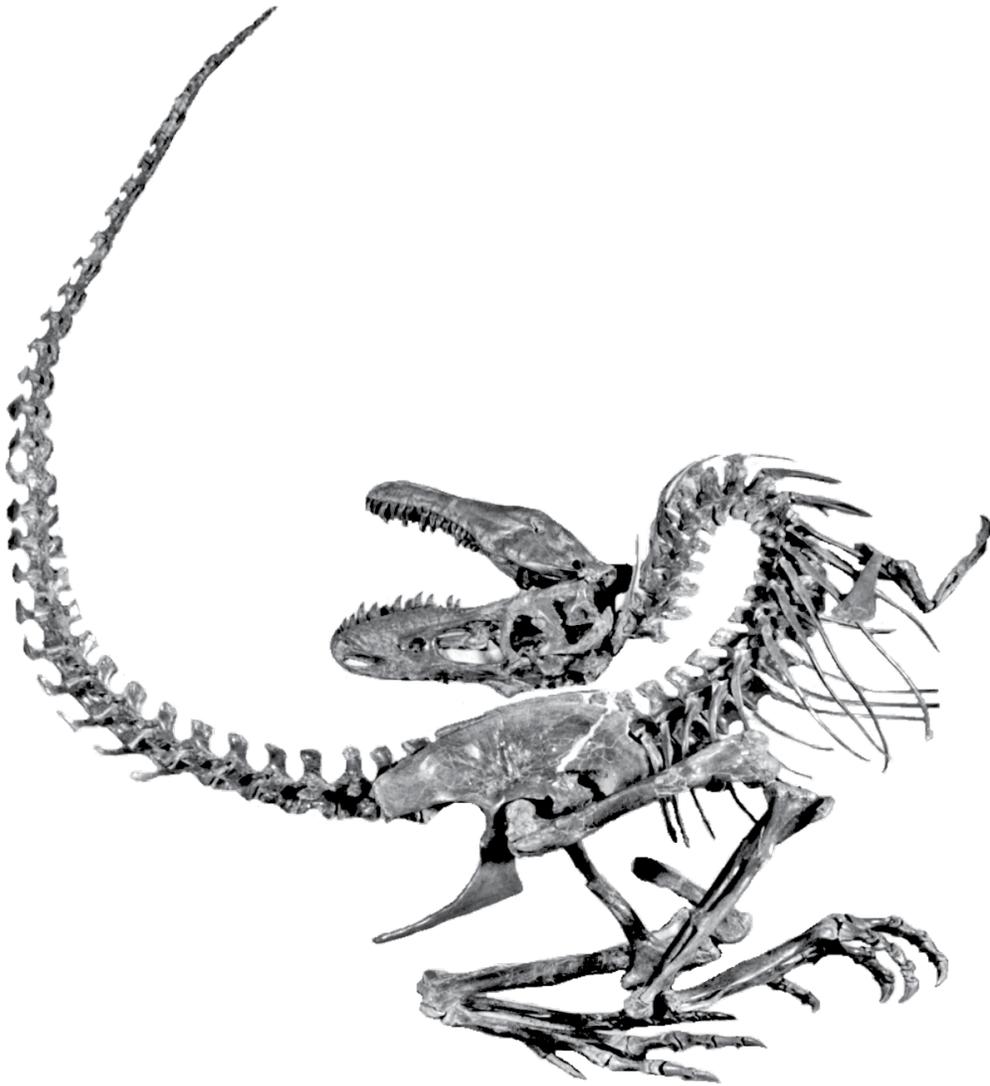
Recommended for grades 3 – 8

Most fossils are discovered as isolated bones. But some rare specimens are found with all their bones in the same place they were when the animal was alive. This is known as “articulation.”

The specimen below is of an articulated *Gorgosaurus* on display at the Museum.

Over 95% of the animal’s bones are present, which is unusual, even in articulated specimens.

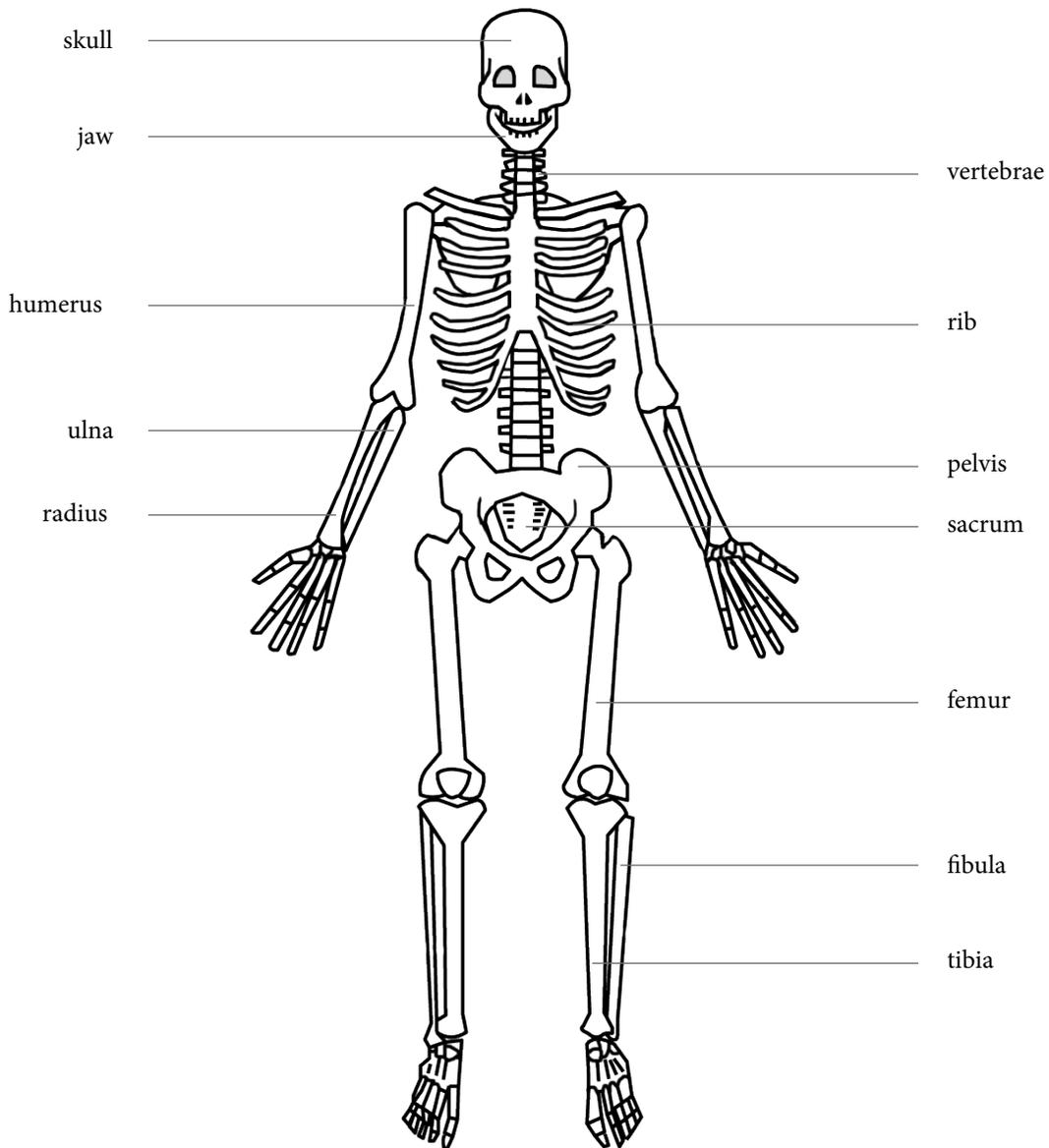
This *Gorgosaurus* was discovered in Dinosaur Provincial Park in 1991, in this “death pose.” Some carnivorous dinosaurs and their descendants, modern birds, are found in this position of the head and tail curved back, and mouth wide open. There is still debate among scientists as to the cause of the death pose, but most agree the animals died in water, and with little resistance, the strong ligaments in the neck and tail contract the muscles into this dramatic position.



Beastly Bones

Instructions

1. Cut out the pieces on the next page.
2. Reconstruct the skeleton by gluing the pieces onto a separate sheet of paper.
3. Many of the bones in *Gorgosaurus* have the same names as bones found in a human body. Compare the skeletons, then label as many of the dinosaur's bones as you can.



ACTIVITY 7

Designer for a Day

Recommended for grades 5 – 12

Create your own exhibit for the Royal Tyrrell Museum! One of the old exhibits needs to be replaced, and you've been commissioned to design a new gallery space.

Can you come up with an exhibit that is educational, entertaining, and well designed?

Instructions

Split the class into groups of three or four. Each group will choose, or be assigned, a topic to investigate. Some suggested topics can be found below. Each group will create a plan for a new exhibit for the Museum, to be presented to the class.

Designing a new gallery space consists of three major steps:

1. Research evidence and information on your topic.
 - Where will you find your information?
 - How do you ensure the information you use is accurate and reliable?
 - What information will you include, and will you divide it up into sub-topics?
2. Draft a plan for the exhibit, using the provided template.
 - How will you arrange the exhibit given the information you have?
 - What sort of displays will you have? Will they be interactive, or static?
 - What sort of technology might you include in your exhibit?
3. Present the new exhibit to the class.
 - Outline the information you chose to include and why.
 - Explain the unique elements of your design.
 - Be prepared to answer questions!

Suggested Topics

Ice Age Survivors

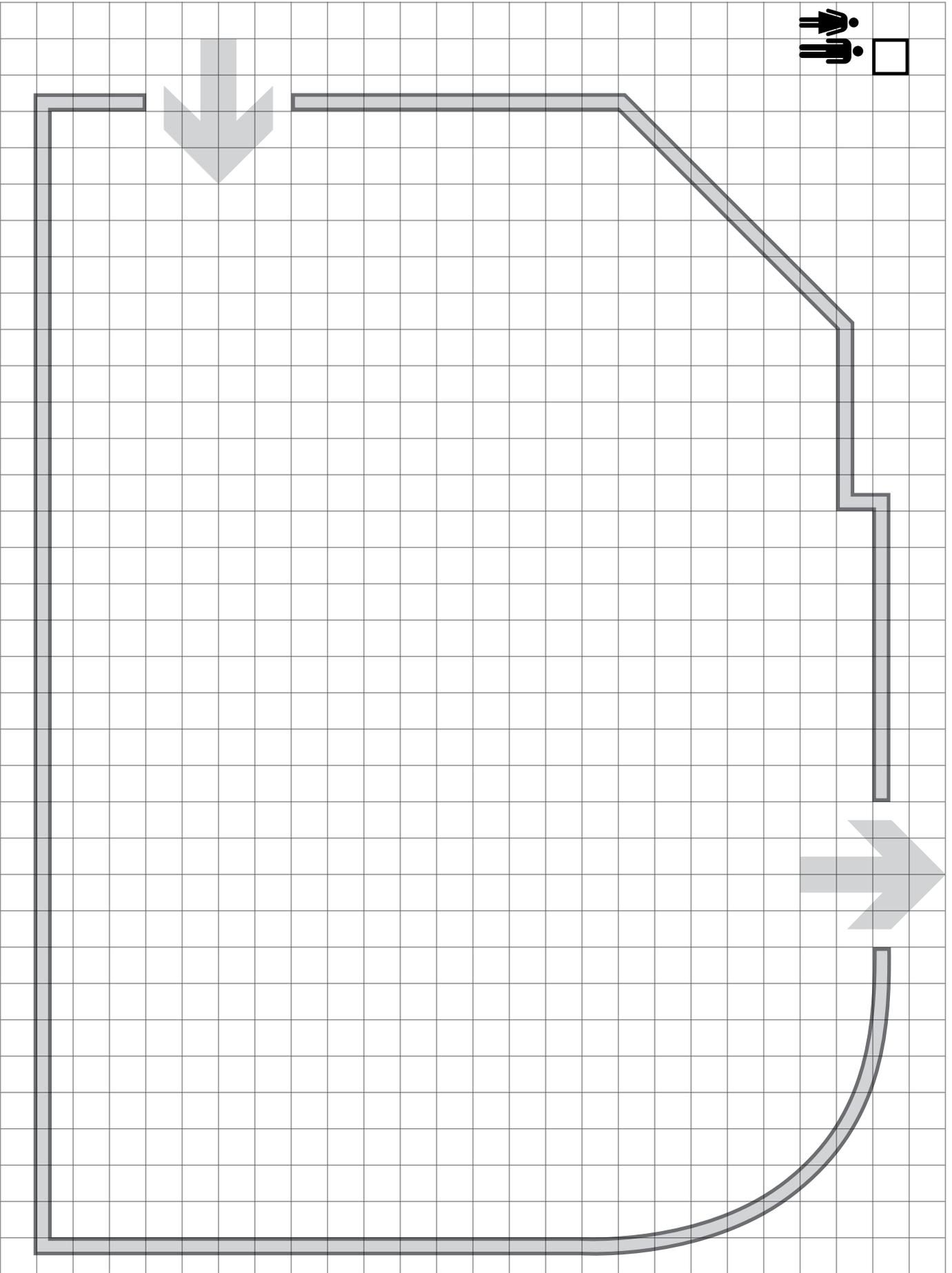
What animals evolved and lived during the last ice age? Which ones died out and which ones are still with us today? What do scientists think caused the ice ages? What adaptations helped animals survive the extreme changes in conditions?

Dinosaurs at Large

What do we know about dinosaurs? What different kinds are there? How do we think they lived, and what was their environment like? Where do we find fossil remains of dinosaurs? What did they eat and who ate them?

The Bearpaw Sea

During the Cretaceous Period, much of North America was covered by a shallow sea. What evidence is there to prove this? What animals used to live in the Bearpaw Sea? How did they interact with one another, and are any creatures around today that resemble them?



ACTIVITY 7

Deltas of Doom!

Recommended for grades 7 – 12

A reader's theatre script for a junior or senior high class. Learn more about ancient environments in Alberta, and the animals that lived in them.

There are four speaking parts in this script. Choose one student to read each part, while the remainder of the students can be split up into the rest of the cast and silently act out the stage directions written in italics, which the teacher can read aloud.

Cast

Speaking Roles

- NARRATOR:** An omnipotent, disembodied voice that speaks across the ages.
- THE SEA:** A lively character with stormy quirks.
- THE RIVER:** A surfer dude who is very laid back and easygoing.
- GRANDPA:** A grouchy old edmontosaur (ed-MON-toe-Sore) who's seen it all.

Non-Speaking Roles

- GIANT SHARK** (one)
- SEDIMENTS** (group of three) mud, sand and clay.
- MUSEUM VISITORS** (at least three)
- HERD OF EDMONTOSAURS** (at least four)
- TREE** (one)
- SCAVENGERS** (at least two)

Questions

Here are some follow-up questions for classroom discussion and review:

- What is a delta?
- How can we tell where deltas formed millions of years ago?
- Why are deltas likely to flood?
- What conditions are necessary for fossilization?
- What happened to the Bearpaw Sea?
- Do you think events like those that occurred in the story still happen to animals today? Why or why not?
- What do you think the environment was like in Alberta 68 million years ago? Was it warmer or cooler? Wet or dry? Why do you think it was different from today?

NARRATOR: It is dawn; the sun rises over a vast swampy land. It is 68 million years before the first shopping mall will open. Here on the shores of the Bearpaw Sea, dinosaurs play out their parts and live their lives, never dreaming that one day, some of their bones will be on display in a museum.

(Enter; the SEA)

SEA: I am the Bearpaw Sea. I cover what will become Saskatchewan and most of Alberta. I am shallow, tropical, and home to huge reef communities that hum with life like underwater cities. Usually I am sweet and gentle, but sometimes I rage and froth with giant hurricanes or tsunamis that pound the shoreline! Hahahahaha! Oh pardon me, I got excited there. Many rivers feed me with fresh water. Places where the rivers join me are called deltas; they are wide channels that deposit many types of sediment. I just love sediments, they make me so...sedimental.

(Enter; the RIVER)

RIVER: Dude man, I am the river. I always take the path of least resistance to my ultimate destination, the sea. I cruise down from the newly forming Rocky Mountains and on the way I like, carry all kinds of sediments. I usually like to take it easy and check out the scenery as I flow along, but when there's a lot of rain, whoah dude! Being a river can be totally intense!

(The HERD OF EDMONTOSAURS rise, yawn and stretch.)

GRANDPA: I am Grandpa Eddie. I'm the oldest dinosaur in my herd of edmontosaurs. I've seen some crazy stuff in my day, you bet your boots! One time a *T. rex* bit me right on the tail, but I got away. Our herd has lived in this area for generations. Every year we come up here to lay eggs and raise our young, then after 6 months we head down along the beach to our other feeding grounds. And today, is the day we get going.

(GRANDPA leads the HERD OF EDMONTOSAURS in a procession along the beach.)

NARRATOR: They call to each other as they lumber along with cow like voices. The young edmontosaurs bounce along with enthusiasm on their first great migration. The adults keep a careful watch on the forest in case predatory raptors or theropods are lurking there. Others keep the youngsters away from the sea, which is home to other dangerous predators.

GRANDPA: Okay everybody, try to keep up! Soon we'll be crossing a river where we can get a drink of water and have a rest.

NARRATOR: The sky begins to darken with storm clouds and a strong wind picks up. Heavy rains falling in the mountains begin to swell the river.

RIVER: Whoah! Dude! All this rain is making me go all psycho! I'm turning into a swollen monster! I'm bursting over the banks and uprooting trees! I'm out of control man! Somebody stop me!

(TREE and SEDIMENTS; clay, sand and mud get washed downstream by the raging RIVER.)

NARRATOR: But instead of calming down, the rains get worse and worse. The herd of edmontosaurs begin to panic as the ground beneath their feet gets soggy and turns to mud.

GRANDPA: Okay everyone back there! Stop pushing! We just need to get past the river and there's a safe rocky area where we can rest!

NARRATOR: But the herd cannot hear wise old Grandpa Eddie over the roar of the ocean that is starting to pound the beach with huge waves.

(Several young from the HERD OF EDMONTOSAURS are caught in a wave and washed out to SEA where they are devoured by a GIANT SHARK.)

SEA: I am really rocking now! Hahahaha! Rock you like a hurricane! Hahahaha!

NARRATOR: Trapped between the pounding waves on one side and an impassable swamp on the other, the wet, frightened herd has no choice but to slog on. They are almost at the delta where the river flows into the bear paw sea.

GRANDPA: Now just hang in there folks, we're almost at the river. Whoah Nelly! I ain't ever seen the river like that before, it's out of control! Slow down! Pull back! Turn around!

(GRANDPA EDDIE frantically tries to turn the herd around but he is pushed toward the river by the surging HERD OF EDMONTOSAURS.)

RIVER: Whoah duckbilled dudes! Back off, I'm outta control right now, I can't slow down, and you don't want to mess with me right now! Run, save yourselves! There's no way you can make it across me, I'm a big muddy mess!

NARRATOR: Grandpa Eddy and the dinosaurs at the front of the herd try to stop, but the stampeding multitudes behind them push them into the swirling vortex of mud, water and death!

(GRANDPA and most of THE HERD are pushed into the RIVER, where they drown.)

GRANDPA: Help me! Blub blub!

RIVER: Oh no! My totally raging waters have swallowed over half of the herd and now their drowned bodies are like floating in me. That's so sick, man!

(The SEA sends waves crashing relentlessly onto the beach.)

SEA: Destroy! Yes! Yes! Yes! Hahahaha!

(Over half THE HERD is swept up in the raging RIVER, their bloated bodies are piled up in the delta, covered with THE SEDIMENTS, mud, clay and sand.)

NARRATOR: The panicked bellows of the survivors are drowned out by the crashing waves, thunder claps and pounding rain. The survivors manage to huddle on patches of high ground as the world around them turns to mud...

(After the storm passes, SCAVENGERS gather to pluck out the guts and eyeballs of the rotting carcasses. GRANDPA'S CORPSE has sunk deep into THE SEDIMENTS, where minerals have already begun to seep into his remains THE SEA and THE RIVER are calm once more, almost apologetic.)

SEA: Oh my good gracious, I don't know what comes over me sometimes, really. As I said, I'm normally sweet and gentle, but I do occasionally lose my temper. Mmmm, the water's nice today; would you like to come for a little swim?

RIVER: Dude man that was crazy. I hardly remember what happened, what a party! I think I'm gonna take it easy now and just go with the flow.

(Buried beneath the SEDIMENTS, sand, clay and mud, GRANDPA'S DEAD BODY speaks its last.)

GRANDPA: Well, doesn't this just beat all. I live for 50 years, survive all kinds of predators and disasters just to end up dead and packed into the mud. Now I'll never roam no more. Sigh.

NARRATOR: But it's not really the end for Grandpa Eddie, actually, his new adventure is just beginning. His soft tissues like skin, brains and muscles rot away, leaving just his bones lying under the sediments. Slowly, over thousands of years, minerals in the earth around him seep into his bones and replace every molecule with minerals in a process called permineralization. Eventually an exact replica of his skeleton but made of stone lies in the ground. He has become a fossil. Now let's fast forward to the present day and see what has become of our players who first met in the Cretaceous Period, millions of years ago...

SEA: As for me, I dried up millions of years ago. The shifting of the North American plate left me high and dry. What used to be the Bearpaw Sea is now, sniff sniff, the prairies of North America. Boo hoo it's just not fair, I was so sweet and gentle. All that's left of me are fossils of marine reptiles and shells of ammonites found across the Great Plains. The beautiful reefs that used to live in my warm waters are now oil reservoirs deep underground where oil and gas are drilled. It's too much to bear. But who knows, maybe if global warming melts the ice caps and the sea level rises, there could be an inland sea here again. Hahahahaha!

RIVER: Dude, take it easy, living and dying, and coming and going are all just part of the cosmic flow, man. I don't exist as a river any more, but traces of where I used to flow are still found in the layers of sedimentary rock that I helped shape millions of years ago, cuz, like nothing ever really goes away man, we just leave our mark and move on. Yeah. How about you Grandpa Eddie, what are you up to these days?

(GRANDPA EDDIE is now a mounted skeleton on display. Several MUSEUM VISITORS stop to look at him.)

GRANDPA: I've got a career in show business, can you believe it? I'm on display at the Royal Tyrrell Museum of Palaeontology! Every day, lots of them little hairless apes come and look at me. I was shy at first, what without my skin and all, but I've gotten used to it, I'm happy to teach them young upstarts a thing or two about us dinosaurs. You know, we ruled this here Earth for over 160 million years! We figured out a thing or two. First of all, don't mess with Mother Nature; and number two, look out for asteroids.

(ALL CHARACTERS freeze.)

NARRATOR: The sun goes down on the fossil of Edmontosaurus mounted in the museum. The badlands glow with a rosy hue as the prairie sky goes to sleep once more.

ACTIVITY 8

Buckets of Time

Recommended for grades 7 – 12

In Dinosaur Provincial Park, one of the Museum's palaeontologists dug up three fossil-rich buckets of sediments in the same spot. How can we use the data from these buckets to learn about the ancient past?

The first bucketful was taken from deep, muddy sediments, dated at 72 million years old.

The second bucketful was taken from the silty deposits below, dated at 70 million years old.

The third bucketful was taken from sandy sediments, dated at 68 million years old.

First Bucket: muddy, 72 million years old

- 4 Crocodile teeth
- 4 Fish vertebrae
- 2 Fish scales
- 1 Duckbill dinosaur bone fragment
- 0 Turtle shell fragments
- 1 Theropod (carnivore) tooth
- 49 Shark teeth
- 0 Salamander bone fragments

Second Bucket: silty, 70 million years old

- 8 Crocodile teeth
- 20 Fish vertebrae
- 21 Fish scales
- 18 Duckbill dinosaur bone fragments
- 18 Turtle shell fragments
- 7 Theropod teeth
- 20 Shark teeth
- 5 Salamander bone fragments

Third Bucket: sandy, 68 million years old

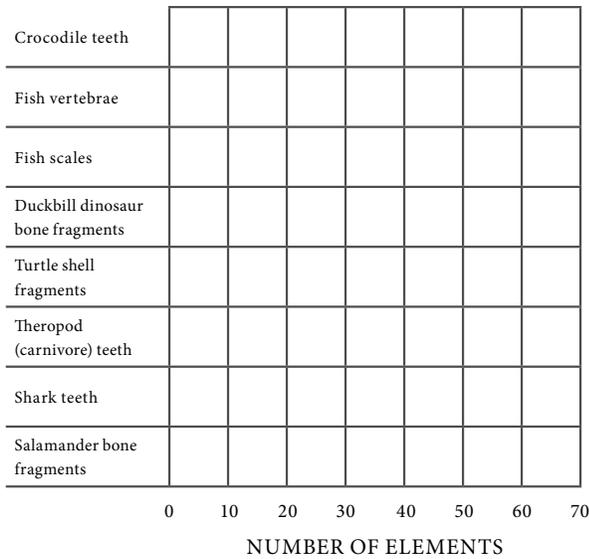
- 10 Crocodile teeth
- 7 Fish vertebrae
- 7 Fish scales
- 32 Duckbill dinosaur bone fragments
- 26 Turtle shell fragments
- 16 Theropod teeth
- 1 Shark tooth
- 65 Salamander bone fragments

Buckets of Time

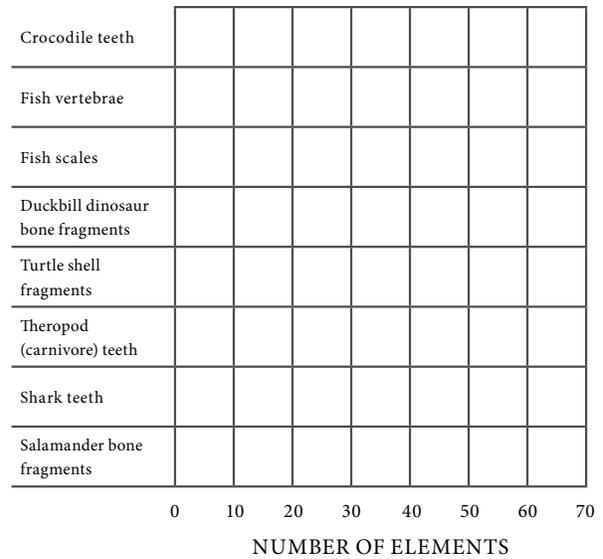
Instructions

Using the information from the previous page, build a bar graph for each of the buckets to illustrate the total amounts of the different kinds of fossils.

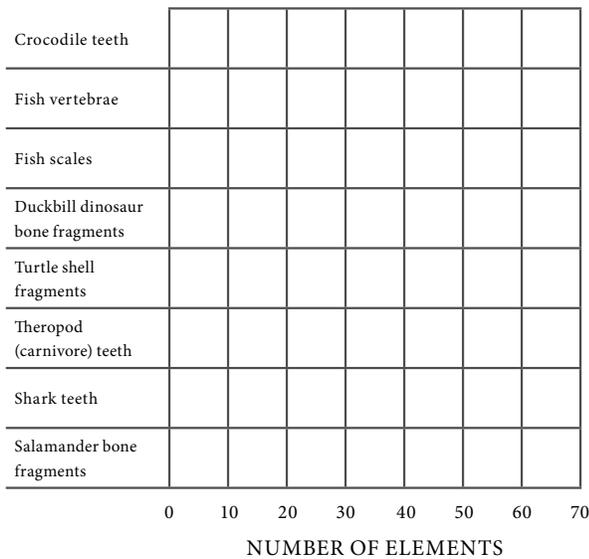
BUCKET ONE (72 MYA)



BUCKET TWO (70 MYA)



BUCKET THREE (68 MYA)



Conclusion

The evidence reveals that there was a change in the populations and communities in that area over a period of several million years. Based on the evidence charted, answer to the following questions:

1. What do you think caused the changes in the populations represented?
2. What kind of changes do you think occurred in the environment?
3. What can we learn about ancient life from fossils?
4. What can we learn from the sediments fossils are found in?