



Anthropology Activity, Grade 11

Anthropology for for Grade 11 Students at the Toronto Zoo



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Curriculum Connections

Introduction to Anthropology, Psychology, and Sociology, Grade 11, University/College Preparation (HSP3M)

Self and Others

Foundations of Anthropological, Psychological, and Sociological Thought

- demonstrate an understanding of the major questions related to “self and others” that are posed by anthropologists (e.g., What are the cultural patterns that help to define the self?),

Forces That Influence and Shape Behaviour

- identify and assess the major influences that contribute to an individual’s personal and social development (e.g., heredity, environment, race, gender);
- explain why behaviour varies depending on context and on the individuals involved (e.g., at work, within a family, in sports, in a crowd, in a large city or small town).

Research and Inquiry Skills

Overall Expectations

- use appropriate social science research methods effectively and ethically;
- effectively communicate the results of their inquiries.

Understanding the Foundations of Inquiry in Anthropology, Psychology, and Sociology

- correctly use the terminology of anthropology, psychology, and sociology (e.g., *functionalism, behaviouralism, feminism*);
- define the concepts that are central to anthropology (e.g., evolution, diffusion, culture);

Using Research Skills

- describe the steps involved in social science research and inquiry, including developing and testing a hypothesis;
- demonstrate an understanding of various research methodologies for conducting primary research (e.g., interviews, surveys and questionnaires, observations); demonstrate an ability to locate and select relevant information from a variety of print and electronic sources (e.g., books, periodicals, television, Internet sites, CD-ROMs);
- evaluate the relevance and validity of information gathered through research;
- demonstrate an ability to organize, interpret, and analyse information gathered from a variety of sources.

Communicating Results

- record information and key ideas from their research, and document sources accurately, using correct forms of citation (e.g., those recommended by the American Psychological Association);
- effectively communicate the results of their inquiries, using a variety of methods and forms (e.g., graphs, charts, diagrams, lab reports, oral presentations, written reports, essays, newspaper-style articles, video presentations).

Teacher Background Resource

Why Study Primates?

Humans are primates and as such, we are more genetically related to members of the order Primates than any other creatures on earth. Therefore the study of primates enable us to learn more about basic human primate nature, and helps us speculate about the evolutionary origins of our humanity.

Primateology

To date the majority of work done on primates and primate evolution has been based on anatomical investigations and paleontological records. Dates can be estimated using rocks or sediments, and the interpretation of evolutionary relationships relies on similarities and differences between specimens. Modern molecular techniques have enabled scientists to determine genetic relationships. Comparisons of genes, or proteins produced by genes enable scientists to propose family trees and theorize how closely related living species are to each other and how long ago they diverged from a common ancestor.

Over the past 25 years primatology has dramatically changed, shifting from a purely descriptive methodology to a more analytical framework. Behaviourism is the idea that primates behaviour consists primarily of reflexes which are innate or taught behaviours. This view has been replaced by **mentalism**, the study between neural stimuli and response. Mentalism assumes that biological continuity between human and nonhuman primates may be reflected in mental processes such as awareness and conscious action. The new primatology focuses on the relationship between social behaviour and the genetic contribution of primates to future generations. Primatologists observed the behaviour of primates in order to learn about the relationships between primate species and their environment, habitat exploitation, social organization, anatomy and biomechanics.

Taxonomic Classification

The order Primates is believed to be about 70 million years old. Primates belong to the kingdom **Animalia** and have a notochord placing them into the phylum **Chordata**, and an associated vertebral column placing them into the subphylum **Vertebrata**. They are also warm-blooded, possess hair, a four-chambered hear and nurse their young from breasts which places them into the class **Mammalia**.

The Primate order is defined by a set of evolutionary traits referred to as the "Primate Pattern". These attributes include the following:

1. A shortened snout containing at least three types of teeth: canines, premolars and molars.
2. Eye sockets that face forward and have overlapping fields of vision referred to as binocular vision
3. Fingernails and toenails
4. Prehensile (**grasping**) digits on both hands and feet
5. Collarbones (**clavicles**)
6. Progressive elaboration of brains with the cerebral cortex region the most affected
7. Tendency towards vertical posture
8. Trend towards longer lives with longer periods of infancy, childhood and adulthood

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Within the order Primates there are two suborders, **Strepsirrhini** and **Haplorhini**.

The **Strepsirrhini** include the most ancient primates such as lemurs, galagos, pottos and lorises.

The second suborder **Haplorhini** contains the tarsiers, monkeys and apes including humans.

Suborder Haplorrhini

- **Tarsiiform** primates
 - tarsiers of south Asia
- **Simiiform** primates
 - **Platyrrhini** - New World monkeys
 - **Catarrhini**
 - **Cercopithecidae** - Old World monkeys
 - **Hominoidea** – lesser apes (gibbons) and great apes (including humans)

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Where Primates Live and Modes of Locomotion

Most primates reside in tropical areas living primarily in forested regions, and some have moved from the forest regions in to grassland plains known as savannas. The specific environment including the flora, fauna and climate, in which a primate lives within its range is referred to as its **habitat**. Primates living in tropical forests coexist in their habitats by feeding at different times, eating different foods or foraging in different levels of the trees.

There are six main types of locomotive patterns used by primates; (i) **vertical clinging and leaping**, (ii) **arboreal quadrupedalism** whereby the animal is primarily high in trees using grasping hands and feet and a tail to maintain balance, (iii) terrestrial quadrupedalism whereby the animals arms tend to be longer than the legs such as in the **knucklewalking** gorilla or (iv) **terrestrial quadrupedalism** of the baboon, (v) **brachiation** is a suspensory form of locomotion where the primate uses an arm-over-arm swinging motion (vi) **bipedalism** walking upright on two legs.

Stride patterns of all mammals fall into three basic categories:

- **Plantigrade** species are those that place the full length of their foot on the ground during each stride. Humans and bears are examples.
- **Digitigrade** species walk with most of the length of their digits, but not the soles of their feet, in contact with the ground. Dogs and cats are examples.
- **Unguligrade** species walk on their tiptoes, often on hooves. Deer and horses are examples.

Social Organization

Primate species live in a variety of social groups. Across species group size can vary from one individual like in orangutans to over 800 individuals as in mandrills. Some species such as chimpanzees and spider monkeys live in a fission-fusion social organization where groups split up into different subgroups of different sizes and then reunite at various points in time. Some baboon species live in multi-level social organizations. Typically, as primates approach sexual maturity one or both sexes will disperse from the natal group.

For more information on the diversity of primate social organization, please see the following resources:

https://www2.palomar.edu/anthro/behavior/behave_2.htm

<https://www.nature.com/scitable/knowledge/library/what-influences-the-size-of-groups-in-58068275>

Primate communication

Motor patterns involved in communication behaviours tend to be distinct and shared by every member of a species in the appropriate age/sex category. An example of a motor patten is the lowering of the eyelids or the raising of the eyebrows. This is a widespread signal of aggression in Old world Monkeys. Experience and social learning does not appear to affect this aspect of communication. Primates often elicit **response elements, signals** or displays through vocalization, gestures facial expressions and body posture and movement, for group communication exchanges. The intensity of the behaviours and the posture accompanied by that behaviour are often good indicators whether the signal is aggressive or neutral. One must be careful with the interpretation of signals and displays since this requires knowledge of the context in which they occur and the group in which they are observed.



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Glossary of Terms

- adaptation** Inherited, adjustment of a species to a particular environment.
- alpha male** The most dominant adult male in a primate group.
- analogous** Traits that are similar because of similar function, but have separate evolutionary origin.
- anthropoid** A primate suborder that includes all monkeys, apes, and humans.
- arboreal** Tree-dwelling.
- autonomic** Self-controlling, functionally independent.
- biotype** A group of individuals possessing the same genotype.
- bipedal** Locomotion by walking on two feet.
- brachiation** Arm-over-arm locomotion through arboreal habitats the is used by gibbons and some of the New World monkeys.
- cerebral cortex** Outside part of the brain that forms the basis of higher functions in mammals, also called the neocortex or cerebral hemispheres.
- clades** Branch of an evolutionary tree that consists of all of the species descended from one common ancestor.
- clavicle** Collarbones.
- consort behaviour** Courtship. The exclusive social pairing of a male and female for mating.
- consort pair** A male and a female that engage in repetitive bouts of copulation, grooming and following behaviours.
- culture** The mental blueprint or system of knowledge that individuals learn and carry in their memories that provides the meaning of perceptions and organizes our value systems and behaviours.
- display** Stereotyped series of motor acts and body alterations that has emotional and communicative function.
- dominance** The ability to intimidate others.
- ecology** The study of the interdependence and relationships between organisms and their environments.
- extant** Still alive opposite of extinct
- fitness** The relative genetic contribution of an individual to future generations. Genotypes with the highest number of viable offspring are the most fit.
- genotype** The genetic constitution of an individual.
- gestation** Period of prenatal development between conception and birth.

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grooming The process of cleaning the hair or skin of oneself or another animal.

Hominidae The family that contains living humans and their ancestral bipedal relatives.

homologous Structures or traits that have a common origin by descent from a common ancestor. Their function may or may not be similar.

homology Identification of evolutionary lines of descent and recognition of common ancestry.

inclusive fitness Total genetic contribution of a set of related individuals to succeeding generations.

knuckle-walking Quadrupedal walking with fingers flexed so that the upper body is supported on the dorsal surfaces of middle or distal phalanges (fingers).

mentalism Assumes that biological continuity between human and nonhuman primates may be reflected in mental processes such as awareness and conscious action.

monogamous Having only one mate.

morphology All the features that make up the form and structure of an organism or any of its parts.

mutation An alteration of the genetic material that is heritable and produces a change in the genotype.

natural selection A differential in fertility such that some individuals contribute a greater number of viable offspring to future generations than others. Those with adaptive advantages tend to survive and reproduce their kind more successfully than those lacking such adaptations.

New World North America, Central America, the Caribbean, and South America.

niche The way an organism exploits a particular microenvironment, including the range of environments the organism can tolerate.

Old World Europe, Africa, Australia and Asia.

phenotype The body or functional form of a trait. A result of an interaction between genotype and environment.

pheromone Chemical substance produced by an animal, which acts as a signal in communication with others.

phylogenetic Characteristics that are derived from an individual's ancestors.

phylogeny The evolutionary lineage of an organism.

polyandry A family grouping pattern that includes multiple adult males.

polygyny A family grouping pattern that includes multiple adult females.

prehensile Grasping.

primitive Similar to the ancestral form.

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quadrupedal Walking on four feet.

response element A stereotyped behaviour elicited by an environmental stimulus.

signal A stereotyped movement used in communication.

socio-biology The presumption that animals behave in ways that promote their genotype and the study of this phenomenon.

specialized Adapted for a specific function.

species A population(s) that interbreeds in nature, and produces fertile offspring.

subordinate The loser of a social conflict.

taxon A unit of classificatory scheme.

taxonomic classification The identification and assignment of names to species.

terrestrial Living on the ground.

territory An areas to which a troop has exclusive claims, often established by defending it against intruders.

uterine group The mother child group.



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PRE-ZOO ACTIVITY

ANOTHER CULTURED APE?

TIME

20-30 minutes

OBJECTIVE

To introduce students to the area of primatology and stimulate thinking about primate behaviour in the wild and in a zoo setting.

EXPECTATIONS

By the end of the activity, students will

- define culture
- describe some behaviours of primates in the wild
- predict some behaviours of primates in a zoo
- reflect on validity and implications of scientific research

MATERIALS

- article "*The other cultured ape, this time with red hair*" by Carol Kaesuk Yoon. *This article can be purchased from the Toronto Star at www.thestar.com/static/archives/search/html for \$2.95.*
- question handout
- teacher answer sheet

ACTIVITY

1. Students read Toronto Star 2003-01-03 article, "*The other cultured ape, this time with red hair*" by Carol Kaesuk Yoon
2. Students answer questions based on the article.

NOTE

*this article cites original research from the journal *Science*. The reference for this work can be found in the Resources section/appendix if more detailed information is required.



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PRE-ZOO ACTIVITY

Name: _____

ANOTHER CULTURED APE?

Read the Toronto Star article, "*Another cultured ape, this time with red hair*" by Carol Kaesuk Yoon and answer the following questions.

1. According to the article, how do scientists define culture? Do you agree with this definition? Why or why not?

- 2a). Describe four behaviours researchers have observed in orangutans in the wild.

- 2b). What conclusions did the international team of scientists reach regarding these behaviours?

3. According to the article, "*Some scientists also object, on principle, to use of the heavily freighted term culture, which long has been denoted something peculiarly human*". Why do you think some scientists object to using the term "culture" to describe primate behaviour?



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4. Why is it difficult to decipher the causes of primate behaviour differences in the wild? Give an example.

5. It is clear more field research is needed to understand orangutan behaviour. What threats in the wild may prevent this research?

- 6a). What are the differences and similarities between the wild - an orangutan natural habitat, and a zoo setting?

- 6b). Given the behaviours you described in question 2 and your answer to 6a), predict orangutan behaviour in a zoo setting.

Answers

ANOTHER CULTURED APE?

1. According to the article, how do scientists define culture? Do you agree with this definition? Why or why not?

Cultured is defined as patterns of behaviour learned from interacting with others in a group.

- 2a). Describe four behaviours researchers have observed in orangutans in the wild.

1. Bronx cheer before bedtime
2. use sticks to hunt and kill insects
3. extract seeds from the stinging fruit of the Neesia tree
4. masturbation using sticks
5. use of "leaf napkin" to wipe faces
6. make a pillow with twigs

- 2b). What conclusions did the international team of scientists reach regarding these behaviours?

These behaviours are taught within a group and the types and frequencies of behaviours vary between groups of orangutans in the wild. Therefore, orangutans exhibit culture.

3. According to the article, "*Some scientists also object, on principle, to use of the heavily freighted term culture, which long has been denoted something peculiarly human*". Why do you think some scientists object to using the term "culture" to describe primate behaviour?

Answers will vary, some include the following:

Some scientists may believe that

- a) "culture" is a human attribute that divides human and non-human primates since human primates have a larger cognitive capacity
- b) observations of primate behaviour are subject to interpretation and therefore conclusions are unreliable

4. Why is it difficult to decipher the causes of primate behaviour differences in the wild? Give an example.

It is difficult to decipher the causes of primate behaviour because underlying causes, such as genetic differences and/or ecological differences (between habitats) may account for the differences in primate behaviour. For example, chimpanzees that extract ants from ant nests in eastern and western Africa were thought to use different methods, but a new study suggests these chimps use either/or depending on how aggressive the ants they are hunting are.

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5. It is clear more field research is needed to understand orangutan behaviour. What threats in the wild may prevent this research?

Loss of habitat due to a) illegal logging, b) fire
Instability of social condition due to civil war

- 6a). What are the differences and similarities between the wild - an orangutan natural habitat, and a zoo setting?

Differences:

- enclosed surroundings, no freedom to roam
- people around and are watching
- controlled feeding and grooming
- vet care
- no predators in the zoo

Similarities:

- surrounded by flora and fauna indigenous to natural habitat
- remain in natural social groupings
- type of food/same nutritional value but the orangutan must travel to find it
- same light, temperature

- 6b). Given the behaviours you described in question 2 and your answer to 6a), predict orangutan behaviour in a zoo setting.

Answers will vary

ZOO ACTIVITY

**THE BEHAVIOUR AND MORPHOLOGY PROFILE:
A PRIMATE COMPARATIVE STUDY**

TIME

4 hours

OBJECTIVE

To study the morphology and behaviour of primates in a zoo setting and prepare students for the post-zoo activity.

EXPECTATIONS

By the end of this activity, students will

- identify and describe the key morphological features of different primates
- observe and record data on primate behaviour

MATERIALS

- pens/pencils
- clip boards
- handouts for class
- assessment tool

ACTIVITY

1. The activity involves describing the morphology and behaviour of 3 kinds of primates: human, ape, and monkey. The teacher assigns each student one species of ape and one species of monkey ***see note below**
2. For Part A, students visit the pavilions for each designated primate and follow the directions on the handout. For Part B, students also compare primate skulls using the figures provided or by visiting the online 3D skull collection.

Primates at the zoo*

Group	Common Name	Scientific Name	Zoo Location
APE	Sumatran orangutan	<i>Pongo pygmaeus abeli</i>	Indomalaya Pavilion
	Western lowland gorilla	<i>Gorilla gorilla gorilla</i>	African Rainforest Pavilion
	White-handed gibbon	<i>Hylobates lar</i>	Indomalaya Pavilion
MONKEY	Olive baboon	<i>Papio anubis</i>	Africa Savanna
	Common marmoset	<i>Callithrix jacchus</i>	Americas Pavilion
	Golden-lion tamarin	<i>Leontopithecus rosalia</i>	Americas Pavilion
	White-faced saki monkey	<i>Pithecia pithecia</i>	Americas Pavilion
	Spider monkey	<i>Ateles geoffroyi</i>	Outdoor Americas Exhibit (Seasonal)

*please note the zoo also has ring-tailed lemurs in the African Rainforest Pavilion

- **ZOO ACTIVITY**

**THE BEHAVIOUR AND MORPHOLOGY PROFILE:
A PRIMATE COMPARATIVE STUDY**

A behaviour and morphology profile is a study technique that allows two or more species of animals to be compared in a zoo environment. The purpose of this profile is to observe the physical characteristics, types of behaviours and frequency of behaviours of three kinds of primates: human, ape, and monkey, during a set time interval.

PART A: OBSERVATIONAL PROCEDURE

1. Your teacher will assign you one species of ape and one species of monkey. You can observe people in the zoo for the human primate category. Record the *common name* and *scientific name* of each species on your data sheets.
2. Use a watch to time a fixed observation period for each species; 30 minutes is suggested. Record your observation time on your data sheet for each primate.
3. Using the following key and your handout, describe the behaviours you observe during your observation period on your data sheet:

locomotion (6 modes, see Fig. 1)

- a) arboreal quadrupedalism - tree-dwelling, using hands, feet and tail to maintain balance
- b) vertical clinging and leaping
- c) terrestrial quadrupedalism - monkey
- d) terrestrial quadrupedalism - ape, knucklewalking
- e) brachiation - arm-over-arm swinging motion
- f) bipedalism - upright walking on two legs

foraging - how the animal finds food

facial expressions (6 types, see Fig. 2) **to be used as a guide*

- a) play face - relaxed, open mouth, upper teeth covered
- b) pout - used in begging for food
- c) display face - used in attack; facial hairs erected
- d) full open grin - intense fear or excitement
- e) horizontal pout - shows submission
- f) fear grin - during approach to/from a higher-ranking primate

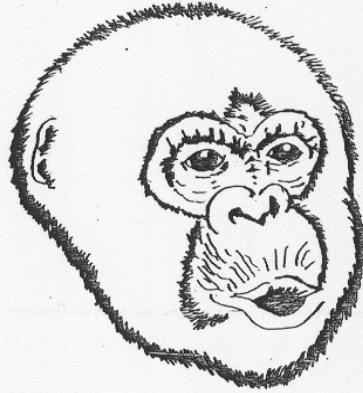
4. Draw labeled diagrams in the space provided(see exemplar, Fig. 3)

Figure 1
Facial Expressions

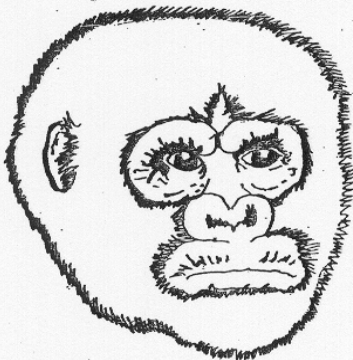
a) Playface



b) Pout



c) Display face



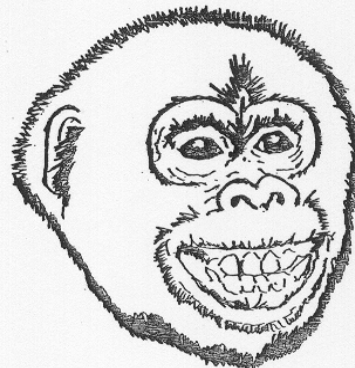
d) Full open grin

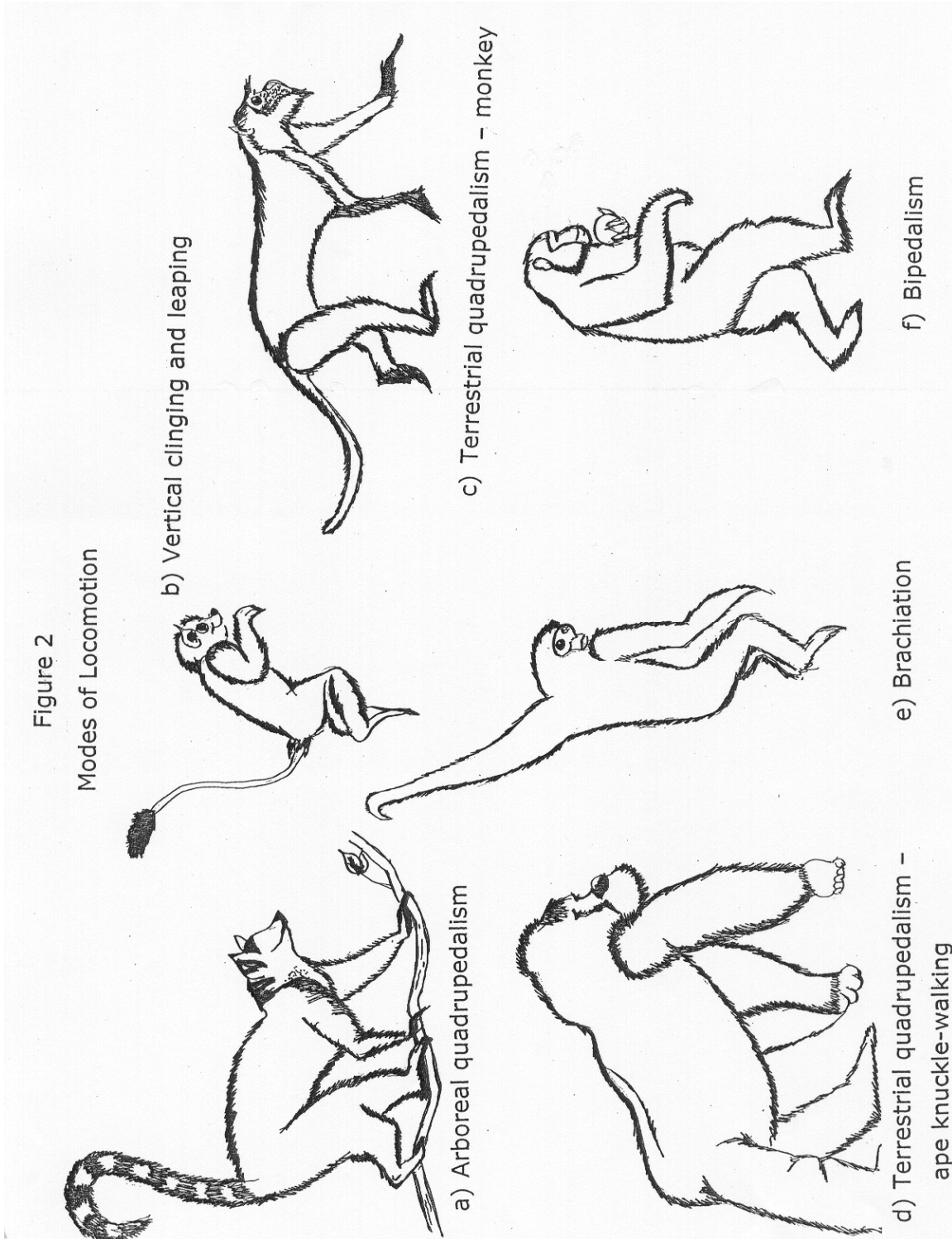


e) Horizontal pout



f) Fear grin





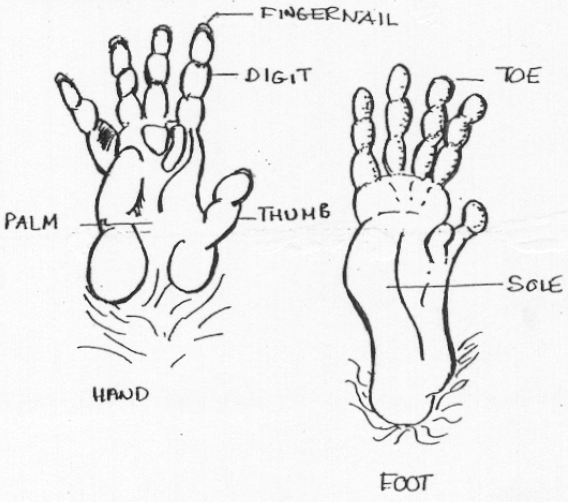
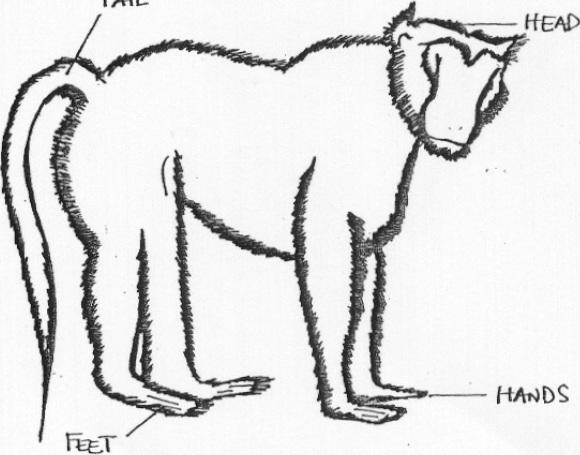
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FIGURE 3
EXEMPLAR

PRIMATE OBSERVATION SHEET

STUDENT NAME:
DATE:

SCIENTIFIC NAME: *Erythrocebus patas* COMMON NAME: Patas Monkey OBSERVATION TIME: 45min

DESCRIBE THE FOLLOWING BEHAVIOURS	DRAW LABELLED DIAGRAMS OF THE FOLLOWING
<p>LOCOMOTION - Movement is quadrupedal using both hands and feet to walk and move extremely fast and appear to be using their fingers for walking instead of hands</p>	<p>HANDS AND FEET</p> 
<p>RESTING - resting on rear end with hind legs tucked between arms and posture slightly hunched</p>	
<p>SLEEPING - sleeping while lying down on side, appears to make a nest for comfort</p>	
<p>FEEDING - eats fruits and pellets while standing on feet</p>	<p>BODY FORM</p> <p>MALE FEMALE</p>  <p>MALE PATAS</p>
<p>FORAGING - looking for leaves and pieces of leftover fruit on the ground</p>	
<p>GROOMING - use of hands to groom self and that of baby, slow and gentle movements</p>	
<p>USE OF HANDS AND FEET - use their hands and feet for locomotion, - hands are primarily used for eating and opening fruits - baby uses feet to jump up and down</p>	

***The Patas Monkey is not currently housed in the zoo**

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STUDENT NAME:

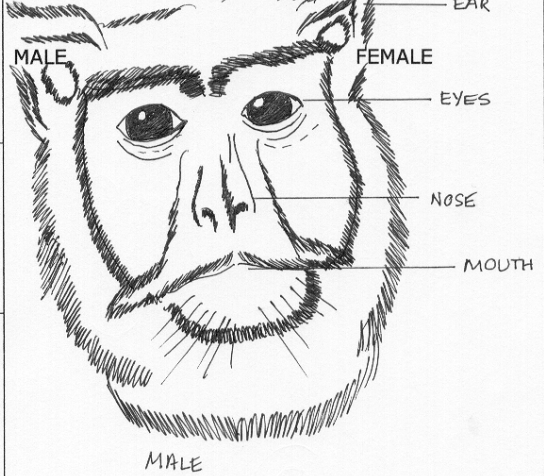
DATE:

PRIMATE OBSERVATION SHEET

VOCALIZATION

-none observed

FACIAL CHARACTERISTICS



FACIAL EXPRESSIONS

- full open grin when mother approached with baby by male in a confrontational manner

INTERACTION WITH OTHERS

- female remains in close contact with baby carrying it around with her, she appears to be intensively possessive of her baby, male tends to remain on his own away from others, watching his surroundings vigilantly

ADDITIONAL DRAWINGS

INCLUDE:

- NESTING SITE
- TOOLS (E.G STICK)
- TYPES OF FOOD
- TOYS



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SCIENTIFIC NAME:

COMMON NAME: HUMAN

OBSERVATION TIME:

ZOO GEOGRAPHIC LOCATION:

DESCRIBE THE FOLLOWING BEHAVIOURS	DRAW LABELLED DIAGRAMS OF THE FOLLOWING
LOCOMOTION	HANDS AND FEET
RESTING	
SLEEPING	
FEEDING	BODY FORM MALE FEMALE
FORAGING	
GROOMING	



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USE OF HANDS AND FEET	FACIAL CHARACTERISTICS	
VOCALIZATION		MALE FEMALE
FACIAL EXPRESSIONS		
INTERACTION WITH OTHERS		

ADDITIONAL DRAWINGS

INCLUDE:

- NESTING SITE
- TOOLS (E.G STICK)
- TYPES OF FOOD
- TOYS



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SCIENTIFIC NAME: _____ COMMON NAME: APE SPECIES _____
OBSERVATION TIME: _____
ZOO GEOGRAPHIC LOCATION: _____

DESCRIBE THE FOLLOWING BEHAVIOURS	DRAW LABELLED DIAGRAMS OF THE FOLLOWING
LOCOMOTION	HANDS AND FEET
RESTING	
SLEEPING	
FEEDING	BODY FORM MALE FEMALE
FORAGING	
GROOMING	

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USE OF HANDS AND FEET	
VOCALIZATION	FACIAL CHARACTERISTICS MALE FEMALE
FACIAL EXPRESSIONS	
INTERACTION WITH OTHERS	

ADDITIONAL DRAWINGS

INCLUDE:

- NESTING SITE
- TOOLS (E.G STICK)
- TYPES OF FOOD
- TOYS



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SCIENTIFIC NAME:

COMMON NAME: MONKEY SPECIES _____

OBSERVATION TIME:

ZOO GEOGRAPHIC REGION:

DESCRIBE THE FOLLOWING BEHAVIOURS	DRAW LABELLED DIAGRAMS OF THE FOLLOWING
<p>LOCOMOTION</p>	<p>HANDS AND FEET</p>
<p>RESTING</p>	
<p>SLEEPING</p>	
<p>FEEDING</p>	<p>BODY FORM</p> <p>MALE FEMALE</p>
<p>FORAGING</p>	
<p>GROOMING</p>	

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PART B: PRIMATE SKULL COMPARISON (see Fig. 4 and Table 1)

In groups of 3 or 4,

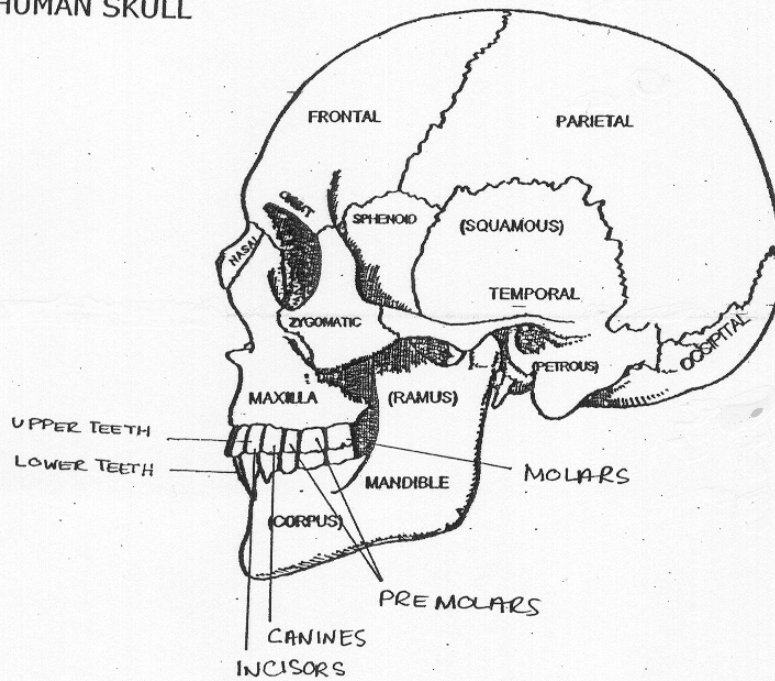
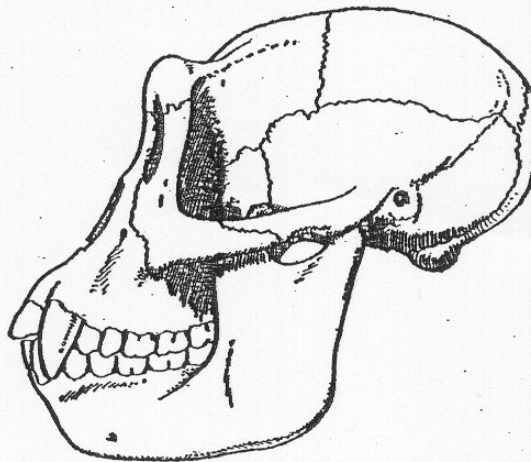
1. Use the human skull pictured on Fig. 4 and label the parts of the provide ape and monkey skulls figures
2. In Table 1, compare and contrast the following regions between the three primate skulls:

*consider location, shape and dimensions

mandible
maxilla
upper teeth
bottom teeth
orbits
nasal
parietal
frontal

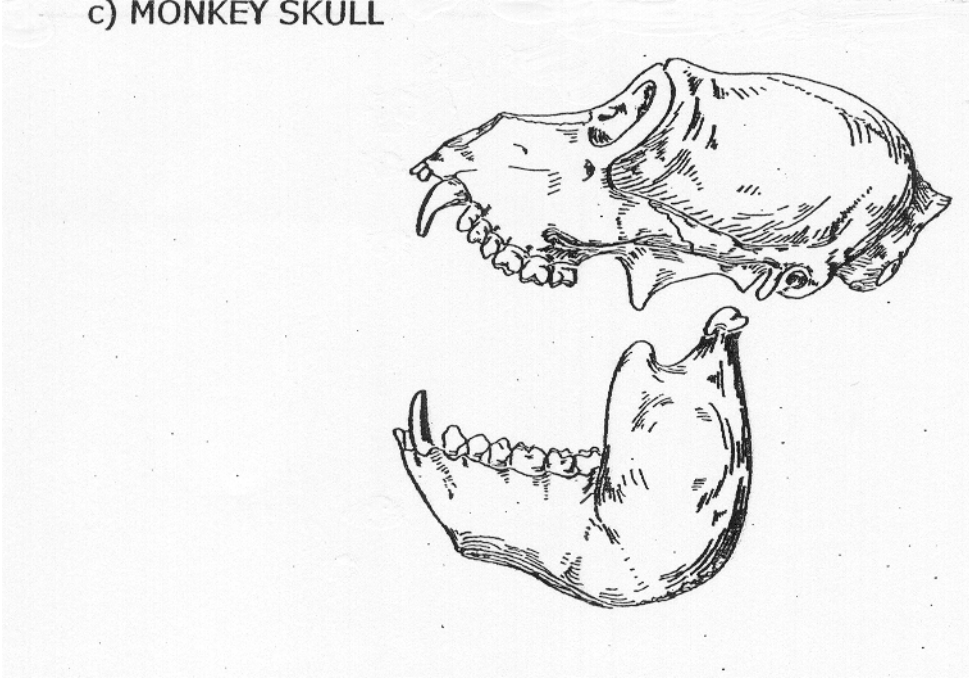
Encourage students to look at three dimensional scans of primate skulls at the Smithsonian National Museum of Natural History website:

<http://humanorigins.si.edu/evidence/3d-collection/primate>

Anthropology Activity, Grade 11**FIGURE 4****a) HUMAN SKULL****b) APE SKULL**

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c) MONKEY SKULL



http://humanorigins.si.edu/evidence/3d-collection/primate?field_primate_spec_common_name_tid=12625

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Table 1. Primate Skull Comparison

Skull Part	Human	Ape	Monkey
Mandible			
Maxilla			
Upper teeth			
Lower teeth			
Orbits			
Nasal			
Parietal			
Frontal			

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Table 1. Primate Skull Comparison SUGGESTED ANSWER KEY

Skull Part	Human	Ape	Monkey
Mandible	smaller, more compact than ape and monkey	wider and more rounded than human	more rounded than human, but similar in shape to ape
Maxilla	located underneath the orbits	wider than human located underneath the orbits	located more beside the orbits
Upper teeth	smaller teeth than ape	overall, larger teeth than human canines are larger, sharper and more pronounced than human	overall, similar size as human canines are sharper than humans, and similar to ape
Lower teeth	slightly smaller than ape	slightly larger than human, but similar size as monkey	similar size to ape
Orbits	located on either side of nasal bone similar shape as ape and monkey	located on top of nasal bone similar shape as monkey and human	located beside nasal bone and more recessed into skull similar shape as ape and human
Nasal	located higher from the maxilla than ape positioned in between the orbits	located lower from the maxilla than human positioned underneath the orbits	located lower from the maxilla than human and ape positioned underneath and beside the orbits
Parietal	larger than ape and monkey	smaller than human, but larger than monkey	smaller than both human and ape
Frontal	larger than ape and monkey	smaller than human	smaller than human and ape

*some students may choose ape or monkey to be the standard

ASSESSMENT TOOL: ZOO ACTIVITY

Rating Scale (Option A)

Presentation

- writing is neat and legible 0 1
- proper spelling and grammar 0 1 2

Content

Part A:

- behaviour categories are complete 0 1
- drawings are complete and labeled properly 0 1 2 3 4
- observations are effectively described using appropriate language 0 1 2 3 4 5

Part B:

- primate skulls are correctly labeled 0 1 2 3 4
- comparisons are complete and accurate 0 1 2 3 4

Participation

- attendance for entire zoo field trip 0 1 2
- participation in all activities 0 1 2

Total: /25

Rubric (Option B)

DESCRIPTION	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
PRESENTATION	-writing is illegible -over 5 spelling errors	-writing is difficult to read -3-5 spelling errors	-writing is legible and neat -1-2 spelling errors	-writing is very legible and very neat -no spelling errors
CONTENT	- less than half of the behaviour categories are complete - less than half of the drawings are complete and labeled -poor observations and comparisons, rarely using appropriate language	half of the behaviour categories are complete -half of the drawings are complete and labeled -fair observations and comparisons, using appropriate language some of the time	-more than half of the behaviour categories are complete -more than half of the drawings are complete and labeled -good observations and comparisons, using appropriate language most of the time	-all behavior categories are complete -drawings are complete and properly labeled -observations and comparisons are excellently described, using appropriate language
PARTICIPATION	-absent for more than two parts of the zoo field trip - poor participation in activities	-absent for two parts of the zoo field trip - fair participation in activities	- absent for one part of the field trip -good participation in activities	-attended all parts of field trip -excellent participation in activities

POST-ZOO ACTIVITY

TIME

OBJECTIVE

To compare and contrast the behaviour and morphology of humans, apes and monkeys in order to address the question: are humans unique primates?

EXPECTATIONS

By the end of these activities, students will

- compare and contrast primate skulls
- compare and contrast primate hand and feet use
- analyze observations from the zoo to compare and contrast primate morphology and behaviour
- communicate these analyses (written report, presentation, magazine article etc.)

MATERIALS

- primate skeleton handout (Fig. 5)
- primate hand and feet use handout (Fig. 6)
- student question sheet
- chart paper
- markers

ACTIVITY

Part A:

In groups of 3,

1a) Primate Skeleton Comparison

students examine human, ape, and monkey skeleton drawings (Fig.5) and answer the questions on the student question sheet.

1b) Hand and Feet Use Comparison

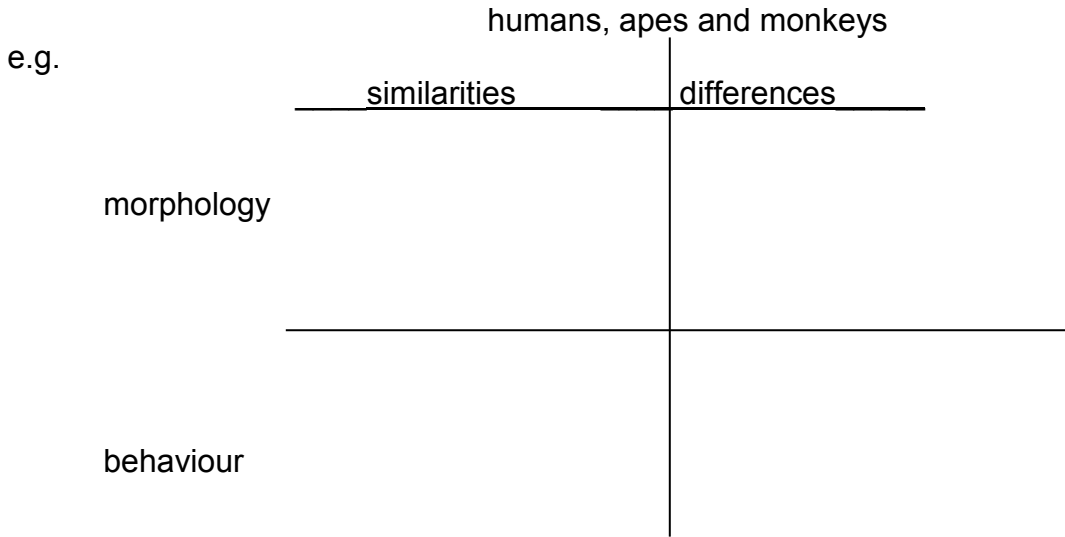
students examine ape and monkey hand and feet use drawings (Fig. 6) and fill in the chart on the student question sheet.

Anthropology Activity, Grade 11

Part B:

Primate Morphology and Behaviour Comparison

Working in groups of 3 and using notes from the pre-zoo, zoo, and Part A post-zoo activities, students make a T chart (on chart paper) of the similarities and differences between humans, and apes and monkeys.



Part C: Culminating Task

Students respond to the following question: **Are humans unique primates?** Students will support their point of view using observations, analyses, and hypotheses from zoo investigations of primate morphology and behaviour. Responses can take on one of the following formats:

1. Formal research report
2. Zoo Diaries script
3. Magazine, newspaper article
4. Comic strip
5. Collage
6. Journal, A Day in the Life a Zookeeper or Primate

***NB** it is important for students to understand these comparisons are being made between humans and zoo primates. Some observed behaviours may be unique to zoo primates and not observed in the wild.

PRIMATE SKELETON COMPARISON

Examine the human, ape, and monkey skeleton drawings on Fig. 5 and answer the following questions.

1. Postulate why apes do not usually walk upright.
2. Postulate one possible use for a monkey's tail.
3. When apes do walk upright, why do they tend to waddle?
4. Why do you think apes and monkeys have smaller skulls than humans?



Anthropology Activity, Grade 11

5. Why will a monkey never be able to walk upright?

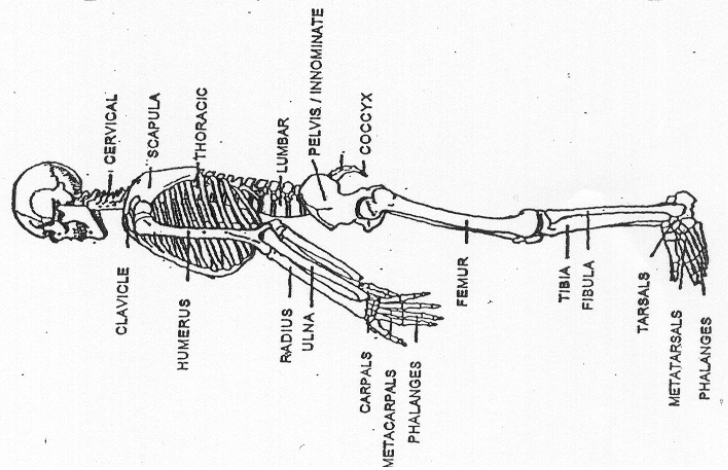
6. What are some anatomical problems associated with bipedalism?

7. Why do you think an ape's forearms are longer than its legs compared to that of a human?

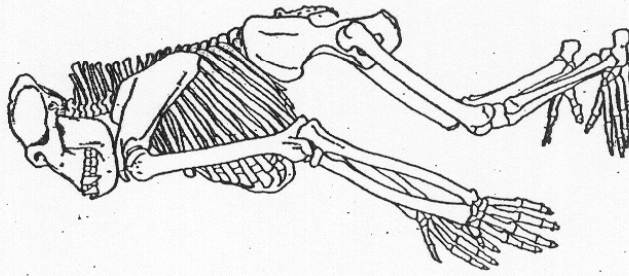
8. Discuss any additional similarities and/or differences between human, ape, and monkey skeletons.

Anthropology Activity, Grade 11

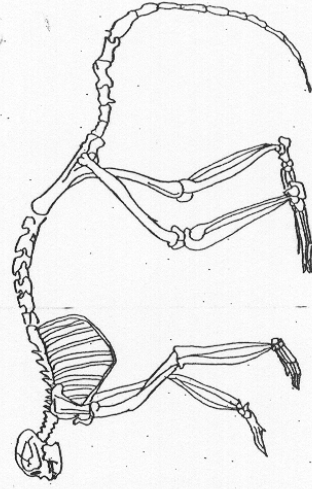
FIGURE 5



A) HUMAN



B) APE



C) MONKEY

SUGGESTED ANSWER KEY**PRIMATE SKELETON COMPARISON**

Examine the human, ape, and monkey skeleton drawings on Fig. 5 and answer the following questions.

1. Postulate why apes do not usually walk upright. In what situation(s) do you think an ape would walk upright?
 - apes have a higher centre of gravity (than humans) such that most of their mass is located in the upper body and arms
 - in order to balance, an ape's arms fall forward, which generally necessitates terrestrial quadrupedalism
 - chimpanzees and gorillas "knuckle-walk" and orangutans "fist-walk"
 - apes walk upright when their hands are full, when they are carrying food or other materials and/or during an intimidation display

2. Postulate one possible use for a monkey's tail.
 - balancing while climbing and leaping
 - hanging on branches
 - warmth

3. When apes do walk upright, why do you think they tend to waddle?
 - articulation of an ape's pelvis and femur is at a 90° angle with the spine such that when an ape walks upright, its legs are slightly bent
 - this allows the waddling

4. Why do you think apes and monkeys have smaller skulls than humans?
 - apes and monkeys have smaller skulls and consequently smaller brains

5. Why will a monkey never be able to walk upright?
 - a monkey's centre of gravity is in the middle of its body, in between its front and back legs, which is why it can walk on all four limbs
 - a monkey cannot walk upright (or using two limbs) because the monkey's mass would no longer be evenly distributed, creating an unbalanced situation whereby the monkey would fall over

Anthropology Activity, Grade 11

6. Suggest some anatomical problems associated with bipedalism?
- walking upright places a lot of pressure on feet, knees, and back which support the weight of the whole body
 - continued pressure at the joints causes lubricants, the part of the skeleton that helps joints move smoothly, grows thin and bones grind against each other
 - a slipped disk can pinch a nerve
7. Why do you think apes have arms that are much longer than their legs compared to humans?
- apes are quadrupedal and need long arms for knuckle-walking or fist-walking
 - humans are bipedal and do not need long arms to walk upright
 - the long reach provided by long arms is also a great asset in moving through the trees
8. Discuss any additional similarities and/or differences between human, ape, and monkey skeletons.

Answers will vary

- relative size: monkeys are smaller than apes and humans
- rib cage: gorilla rib cage is much larger than human or monkey
- pelvis: gorilla pelvis is much larger than human, but sits at an angle like the monkey
- scapula: gorilla scapula is much larger than human and monkey
- crest on skull: gorilla crest is very large (this crest is an attachment for very large chewing muscles)

Anthropology Activity, Grade 11

HAND AND FEET USE COMPARISON

Analyze each of the diagrams on Fig. 6. What do the diagrams suggest about the hand and foot use of each primate? What do they reveal about each primate's way of life?

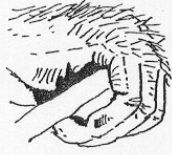
To answer these questions, fill in the following chart:

	Primate	Description of diagram	Use
HAND	a) Spider monkey		
	b) Gibbon		
	c) Gorilla		
	d) Macaque		
FOOT	e) Tamarin		
	f) Siamang		
	g) Orangutan		
	h) Baboon		

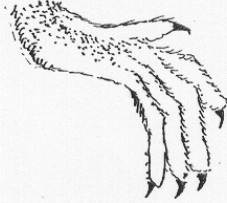
*you may also consider information and observations collected at the zoo

Anthropology Activity, Grade 11

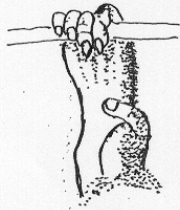
Figure 6



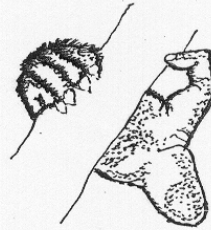
a) Spider monkey hand



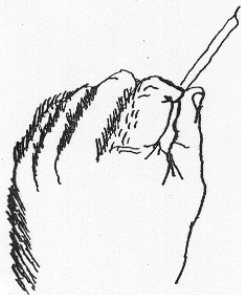
e) Tamarin foot



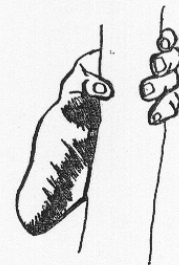
b) Gibbon hand



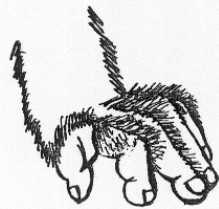
f) Siamang foot



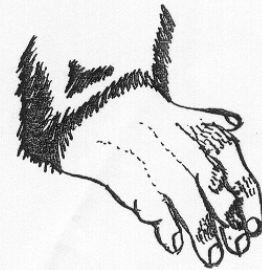
c) Gorilla hand



g) Orang-utan foot



d) Macaque hand



h) Baboon foot

Anthropology Activity, Grade 11

SUGGESTED ANSWER KEY: Answers will vary
HAND AND FEET USE COMPARISON

Analyze each of the diagrams on Fig. 6. What do the diagrams suggest about the hand and foot use of each primate? What do they reveal about each primate's way of life?

To answer these questions, fill in the following chart:

	Primate	Description of diagram	Use
HAND	a) Spider monkey	-long fingers -much reduced thumb	-can curl fingers around branches -ideal for swinging
	b) Gibbon	-short opposable thumb located far from slender fingers	-can curl fingers around branches -ideal for brachiation
	c) Gorilla	-thick, shorter fingers, more stubby and strong -thumb opposable to other fingers	-can grip objects/tools with precision -support weight when knucklewalking
	d) Macaque	-short fingers -short opposable thumb	-can use hands for walking with palm flat on the ground
FOOT	e) Tamarin	-long foot -claw-like nails on digits	-can use claws to grasp onto branches for anchoring -ideal for branch-running
	f) Siamang	-broad foot -long grasping big toe	-can use feet, especially big toe, to grasp around branches for climbing
	g) Orangutan	-broad foot -long grasping big toe	-can use feet, especially big toe, to grasp around branches for climbing
	h) Baboon	-long, slender digits -nails	-ideal for ground-living

*You may also consider information and observations collected at the zoo

Resources

Books

1. Falk, Dean. Primate Diversity. New York: W.W. Norton and Company, 2000.

This is an excellent book written by Dean Falk, a professor of anthropology at the University of Albany. This book discusses the basics of primate evolution and the method and theory for studying living primates. Then it goes into detailed sections for the primary categories of primates discussing their evolutionary history, behavior and lifestyle. Recommended teacher resource and supplementary student reading.

2. Macdonald, D. ed. All the World's Animals: Primates. New York: Torstar Books, 1984.

This book is an excellent introduction to primatology. It discusses, in general common features and main differences in biology, ecology, and behaviour of primates and their evolution. Following, individual families and species are discussed in great detail. Beautiful illustrations accompany this rich text. Recommended teacher resource.

3. Paterson, J.D. Primate Behavior: An Exercise Workbook. Waveland Press Inc. 1992.

This workbook helps students develop the skills and techniques of observation involved in the discipline of primatology. There are numerous exercises and activities are included with guided student worksheet templates. Suggested enrichment exercises for students.

4. Zoo and Biology Conservation Series: Great Apes and Humans: The Ethics of Coexistence. Smithsonian Institution Press. Washington, 2001.

This book raises ethical questions on the treatments of great apes and their close relations to humans.

Articles

5. Marks, J. "98% Alike? (What Our Similarity to Apes Tells Us About Our Understanding of Genetics)" The Chronicle of Higher Education (2000): B7.

This article discusses the genetic and physical comparison between primates by challenging the reader to question his frame of reference. Suggested teacher resource.

Anthropology Activity, Grade 11

6. van Schaik et al. "Oragutan Cultures and the Evolution of Material Culture." Science 299 (2003):102-105

This article chronicles research on the evolution of orangutan culture an international team performed from six different sites in the wild. It raises the questions: what is culture? Is culture unique to humans? How are cultural behaviors invented and transmitted? From this study, specific cultural behaviours of orangutans have been observed to differ between geographical regions; these include tree tool use, nest building, kiss squeaking and nest shelter seeking behaviour. Advanced reading for high school students.

7. Walton, M. "Study reveals complex orangutan culture." 2 Jan. 2003
CNN (Online: www.cnn.com/2003/TECH/science/01/02/coolsc.orangutans, 7 May 2003)

This CNN article reports the orangutan culture research as published in Science in less technical language. Appropriate reading level for high school students.

8. Yoon, C.K. "Another cultured ape, this time with red hair." The Toronto Star 3 Jan. 2003: A1, A18.

This Toronto Star article reports the orangutan culture research as published in Science in less technical language. Appropriate reading for high school students.

Web Sites

9. <http://www.becominghuman.org/> Becoming Human - The Institute of Human Origins affiliated with the Arizona State University

This website shows an online documentary on human origins as well as offers teaching and learning ideas for primate evolution with links to activities and lesson plans. Recommended for teachers and students.

10. <http://www.eskeletons.org/>

This website offers an interactive activity on comparing primate skeletons. Suggested activities for students.

11. <http://www.indiana.edu/~ensiweb/> ENSI/SENSI: Evolution and the Nature of Science Institutes

This website offers many lessons on primate evolution that include morphological, molecular and phylogenetic analyses. Excellent site for teachers. Recommended teacher resource.

12. <http://netvet.wustl.edu/primates.htm>

Anthropology Activity, Grade 11

This website is an extensive listing of primate-related sites that includes links to Primatological Societies, specialty pages for particular species, primate centers and other facilities that house primates, primate-related publications, and more. Suggested for students and teachers for additional reading.

13. http://www.woodrow.org/teachers/bi/1995/simulation_molecular.html

High school biology activity on *Molecular Biology and Primate Phylogenetics*. Suggested for enrichment activities.

14. <http://www.primate.wisc.edu/pin/factsheets/index.html>,
sponsored by Primate Info Net Wisconsin Primate Research Center,
National Primate Research Centers Program, University of Wisconsin-
Madison

Includes primate fact sheets detailing morphology, behaviour, ecology and geo-distribution. Recommended additional readings for teachers and students.