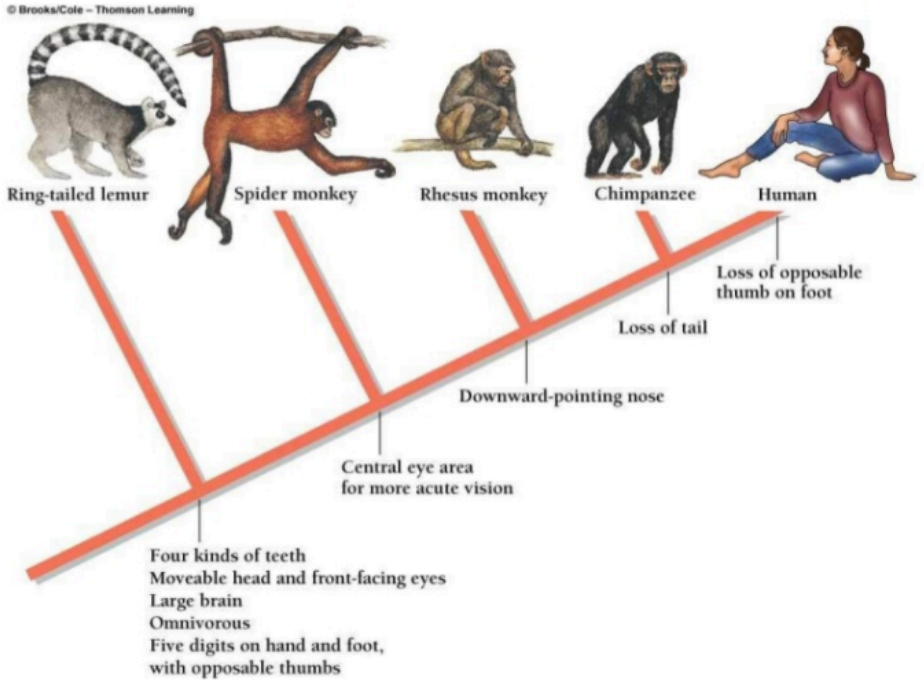
Biology

**Unit 1 and 2: Cumulative Exam** Name: _____

1. Use the primate cladogram below to answer the questions that follow.




**PRE-QUESTIONS:**

a) Which organisms on this cladogram would have a downward-pointing nose?

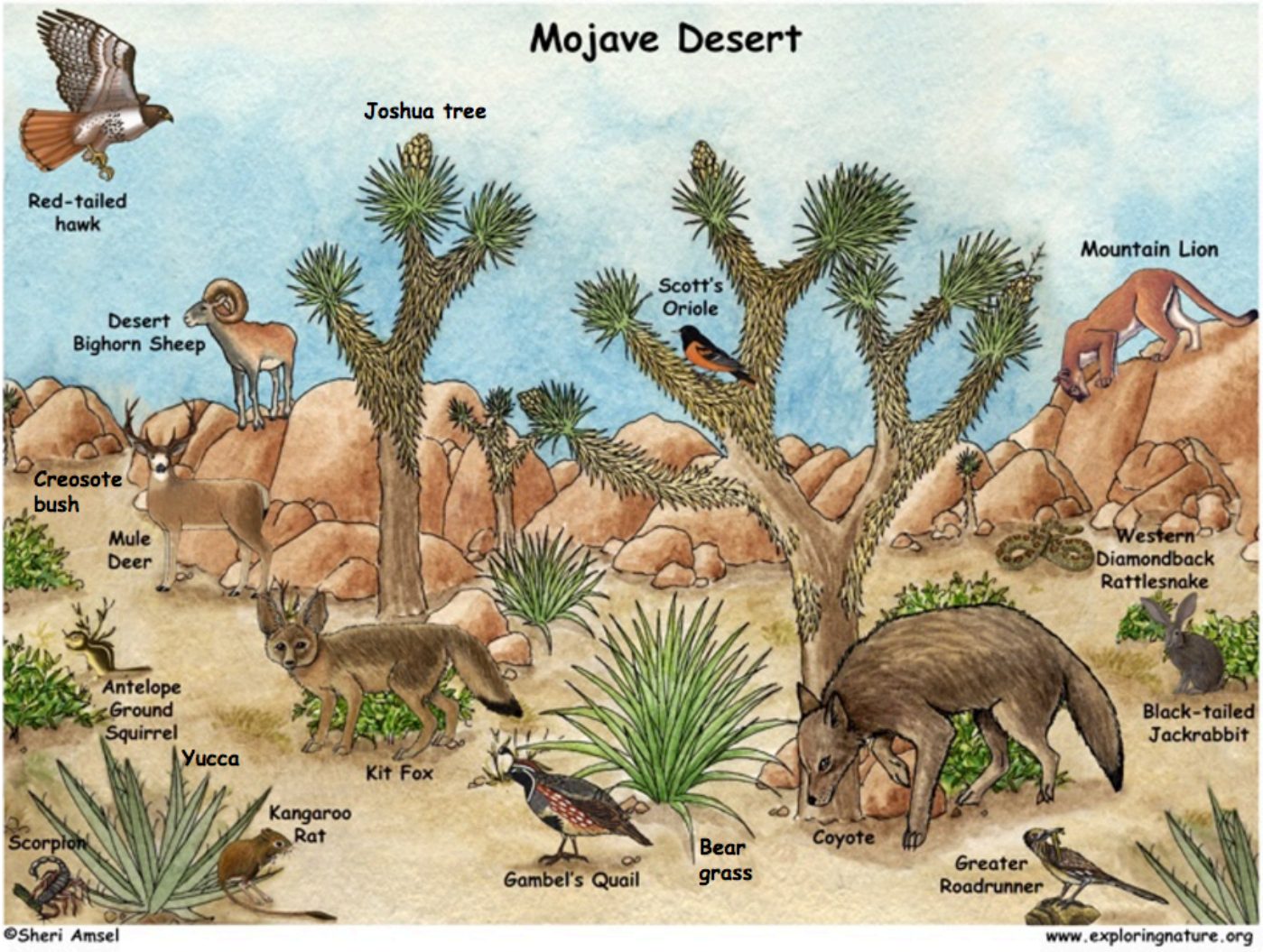
b) Of the ring-tailed lemur, spider monkey, and chimpanzee, which two share a more recent common ancestor?

c) Describe how the loss of a tail would serve as an adaptation.

**TASK:**
Construct an explanation that describes how some primates evolved to not have a tail through the process of natural selection. Make sure that your explanation gives details about the different steps/requirements for natural selection.

| Integrative Thinking | Beginning | Emerging | Proficient | Advanced |
|---|---|---|---|---|
| **HS.05.12** Construct or revise an explanation based on valid and reliable evidence obtained from a variety of sources. | I can identify relevant information, data, and/or evidence. | I can draft an explanation and offer some support using relevant information, data, and/or evidence. | I can construct and/or revise an explanation based on valid and reliable evidence obtained from a variety of sources. | I can justify or expand my explanation through connections to other topics or ideas. |
| **Specific requirements for this task** | I can identify benefits of adaptations. | The explanation describes why a certain adaptation makes an organism more likely to survive in its environment. | The explanation addresses the requirements/steps necessary for natural selection to occur, in the context of the species chosen. | The explanation provides sophisticated connections or extensions to other course topics that are explained in detail. |

2. Use the Mojave Desert diagram below to answer the questions that follow.




**PRE-QUESTIONS:**

a) What are the producers in this ecosystem?

b) What are the consumers in this ecosystem? What different levels of consumers exist?

c) Where does all of the energy in this ecosystem originally come from?

**TASK #1:**
Construct a model that shows the flow of energy through the Mojave Desert ecosystem represented in the diagram above. Include arrows to show the direction of energy flow, and include at least four levels.

| Communication | Beginning | Emerging | Proficient | Advanced |
|---|---|---|---|---|
| **HS.01.07** Develop and use models to communicate ideas, relationships, or solutions to problems. | I can identify types or parts of models appropriate to the ideas, relationships or solutions to problems. | I can use an existing model to represent or explain ideas, relationships, or solutions to problems. | I can develop and use my model to communicate my ideas, the relationships between ideas, or solutions to problems. | I can apply the model to a similar situation and compare similarities and differences. |
| **Specific requirements for this task** | The model represents some of the organisms in the ecosystem. | The model accurately represents some aspects of energy flow in the ecosystem. | The model accurately shows the flow of energy through 4 levels of the Mojave Desert ecosystem. | The model incorporates other important aspects of the ecosystem, that aren't shown in the image. |

**TASK #2:**

Choose one species from your model in Task #1. For this species, identify one biotic factor and one abiotic factor that affects its population. Explain these effects, using the following terms in your response: **carrying capacity**, **limiting factor**, **biotic**, **abiotic**.

| Communication | Beginning | Emerging | Proficient | Advanced |
|---|---|---|---|---|
| **HS.01.03** Use academic and domain-specific words and phrases. | I am beginning to understand how and when to use academic and domain-specific words and phrases. | I attempt to use new words when prompted, but I sometimes use academic and domain-specific words inaccurately. | I can use new vocabulary including domain-specific words and phrases with accuracy. | I can incorporate new words and phrases while adopting an academic tone for writing and/or speaking. |
| **Specific requirements for this task** | The vocabulary terms are not used or are all use inaccurately. | The vocabulary terms are sometimes integrated into the response accurately. | The identified vocabulary terms are accurately integrated into the response. | Additional relevant vocabulary terms from other course topics are also integrated into the response. |

3. The data table below shows the sequence of amino acids that make up the protein *cytochrome-c* in various organisms. Amino acids (such as *gln* or *pro*) are coded for by the organism's DNA.

| Animal | Amino Acid Sequences in Cytochrome-c | | | | | | | | | | | | | | | | | | | | | # differences |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | |
| **Horse** | gln | pro | phe | thr | thr | ala | lys | asn | lys | thr | lys | glu | glu | thr | leu | met | glu | lys | ala | thr | asn | glu | |
| **Chicken** | gln | glu | phe | ser | thr | asp | lys | asn | lys | thr | gly | glu | asp | thr | leu | met | glu | lys | ala | thr | ser | lys | |
| **Frog** | gln | ala | phe | ser | thr | asp | lys | asn | lys | thr | gly | glu | asp | thr | leu | met | glu | ser | ala | cys | ser | lys | |
| **Human** | gln | pro | tyr | ser | thr | ala | lys | asn | lys | ile | gly | glu | asp | thr | leu | met | glu | lys | ala | thr | asn | glu | |
| **Shark** | gln | gln | phe | ser | thr | asp | lys | ser | lys | thr | gln | gln | glu | thr | leu | arg | ile | lys | thr | ala | ala | ser | |
| **Monkey** | gln | pro | tyr | ser | thr | ala | lys | asn | lys | thr | gly | glu | asp | thr | leu | met | glu | lys | ala | thr | asn | glu | |
| **Rabbit** | gln | val | phe | ser | thr | asp | lys | asn | lys | thr | gly | glu | asp | thr | leu | met | glu | lys | ala | thr | asn | glu | |

**PRE-QUESTIONS:**

a) For each non-human animal, take a highlighter and mark any amino acids that are different than the human sequence. When you finish, record how many differences you found in the column on the right.

b) Based on amino acid similarities, make a claim about whether humans shares a more recent common ancestor with rabbits or sharks.

**Claim**: Humans share a more recent common ancestor with _____ than _____.

**TASK:**
Using the data from the table above, write a paragraph supporting your claim with evidence and reasoning.

| Integrative Thinking | Beginning | Emerging | Proficient | Advanced |
|---|---|---|---|---|
| **HS.05.01**<br>Use evidence and reasoning to justify claims. | I need support in choosing relevant information to support my claim.<br><br>I need support in using reasoning to connect my evidence to my claim. | I can include relevant information from a text, graph, or other source in my finished product.<br><br>I can discuss the evidence I gathered using reasoning to show how the evidence connects to my claim. | I can analyze and integrate relevant evidence from my sources in my finished product.<br><br>I can discuss the evidence I gathered using reasoning to show how the evidence supports my claim. | I can analyze the evidence I gathered using reasoning, sophisticated connections or applications of concepts, and/or multiple perspectives to support my claim. |
| **Specific requirements for this task** | The response lacks relevant evidence. | The response identifies evidence from data, but lacks reasoning to support the claim. | Evidence from the table provided is discussed, and reasoning is given for why it supports the claim. | The response discusses additional pieces of evidence that could be used to further support the claim. |

4. Starting in 2020 food waste will be banned from disposal in landfills. One solution to this new law is to start backyard composting. This compost can be an excellent source of nutrients for gardens.


**PRE-QUESTIONS:**

a) What nutrients would be returned to the soil from composting?

b) What role does composting play in the nitrogen cycle?

c) What benefit do gardens get by adding compost?

**TASK:**

You are interested in determining whether or not using compost in your garden actually has an effect on the growth of the plants. Plan an investigation that will provide numerical data to answer the question: **Does compost affect plant growth in a garden?** To explain how you will conduct your investigation write a **Background** paragraph (like you would for a lab report) with the following:

- hypothesis with reasoning referencing matter cycles
- description of how you will conduct your experiment
- identification of the independent variable, dependent variable, and at least two constants

| Inquiry | Beginning | Emerging | Proficient | Advanced |
|---|---|---|---|---|
| **HS.04.03** Plan an appropriate investigation that allows for specific data to use as evidence. | I can plan an investigation that produces data. | I can plan an investigation that produces fair and accurate data. | I can plan an investigation to produce precise qualitative and quantitative data. | I can evaluate and/or revise an investigation based on limitations to the precision of data and an assessment of experimental errors. |
| **Specific requirements for this task** | My paragraph explains some aspects of the experiment that will be conducted. | My paragraph explains how the experiment will be conducted, and includes some evidence that the data collected will be valid. | My paragraph clearly explains how the experiment will be conducted, my hypothesis and accurate reasoning referencing matter cycles, and identifies the independent and dependent variables and constants. | My paragraph reflects on possible limitations of the data that will be collected. |