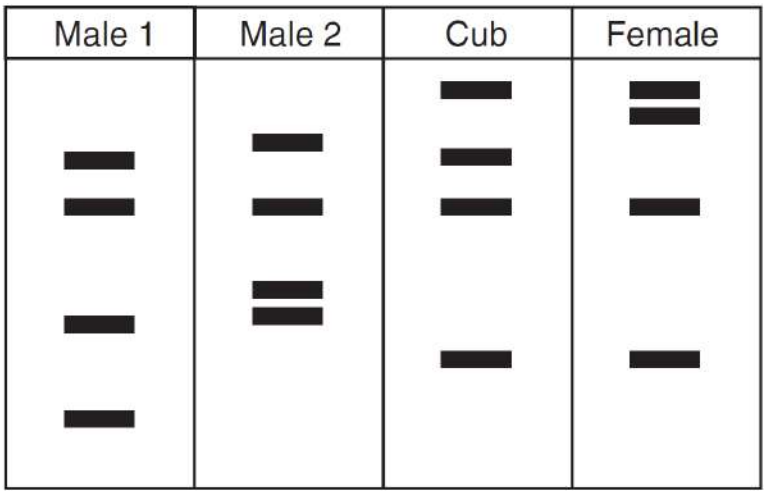
Name:_____ **Date:_____**

Mr. Krebs **State Labs** **Living Environment 8**

1. Base your answer to the following question on the information below and on your knowledge of biology.

Caretakers at a zoo are trying to determine which of two male tigers fathered the newest cub. They obtained DNA from the tiger cub, the mother tiger, and the two male tigers. The DNA was analyzed. The results of the analysis are shown below.



Which male tiger is the father of the newborn cub? Support your answer.

Male tiger: _____

2. Base your answer to the following question on the DNA base sequence below and on your knowledge of biology.

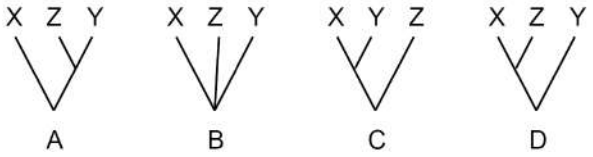
AAC–GCC–GTC–CGC–TAG

If a mutation occurs, leaving 12 bases, what is the maximum number of amino acids that could be coded for by this DNA segment?

_____ **amino acids**

3. During a laboratory activity, students ran in place for three minutes. Students then complained of muscle fatigue in their legs. State *one* biological reason why the students experienced muscle fatigue after exercising.

4. The diagram below represents three branching diagrams that show relationships between three different species, *X*, *Y*, and *Z*.



On the line below, write the letter of the diagram that shows that *X* and *Y* are more closely related to each other than to species *Z*. Explain why that diagram indicates a close relationship.

5. During the process of chromosome replication, a genetic error occurs. As a result, a sequence of events occurs as described below.

Event *A*: a protein with a new sequence of amino acids is produced
Event *B*: a DNA strand with an altered base sequence is formed
Event *C*: a new inheritable trait is expressed in an organism
Event *D*: an mRNA strand with a new sequence of bases is synthesized

The usual order in which these events would occur is

A) *B* — *D* — *A* — *C*
B) *B* — *D* — *C* — *A*
C) *D* — *A* — *B* — *C*
D) *D* — *C* — *B* — *A*

6. The chart below shows the molecular comparison between several species.

Molecular Comparison Chart

Botana curus	DNA	GTG	GAC	TGA	GGA	CTC
	mRNA	CAC	CUG	ACU	CCU	GAG
	Amino acid	His	Leu	Thr	Pro	Glu

Species X	DNA	GTG	GAC	AGA	GGA	CAC
	mRNA	CAC	CUG	UCU	CCU	GUG
	Amino acid	His	Leu	Ser	Pro	Val

Species Y	DNA	GTG	GAC	AGA	GGA	CAC
	mRNA	CAC	CUG	UCU	CCU	GUG
	Amino acid	His	Leu	Ser	Pro	Val

Species Z	DNA	GTA	GAC	TGA	GGA	CTC
	mRNA	CAU	CUG	ACU	CCU	GAG
	Amino acid	His	Leu	Thr	Pro	Glu

Identify which species is likely to be more closely related to *Botana curus*. Support your answer.

7. An experiment is performed to determine the effect of watching basketball games on pulse rates. Ten students agreed to wear devices that monitor pulse rates while watching a basketball game between competitive opponents. Their pulse rates were measured every minute for five minutes in the first quarter of the game. The data collected indicated that pulse rates did not change significantly during the monitored period. State *one* way that this experiment could be improved to obtain a valid conclusion.

8. Base your answer to the following question on the information below and on your knowledge of biology.

During a lab activity, a 14-year-old student took his resting pulse rate. He counted 20 beats in 20 seconds. He calculated his pulse rate for a minute and compared the result to the data shown in the table below.

Normal Pulse Rate Ranges

Age Group	Resting Heart Rate (beats per minute)
Children (ages 6-15)	70 – 100
Adults (ages 18 and over)	60 – 100

According to the data table, does the student's pulse rate fall within the normal range? Support your answer.

9. Identify *one* waste product that is released during exercise. Explain how this waste product leaves the body.

Waste product:

10. Identify *one* adaptation, other than beak size and shape, a finch species might possess and state how that would aid in its survival.

11. Some roads are salted heavily in winter. Describe *one* way plants growing near these roads could be harmed by the salt.

12. The table below shows the food sources for two different species of Galapagos finches on an island.

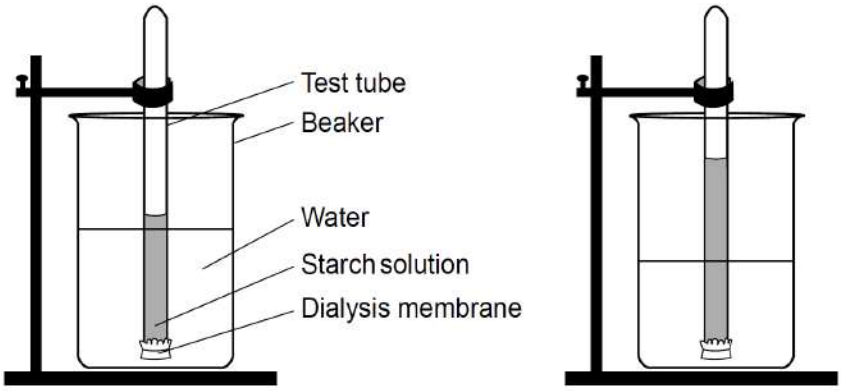
Two Galapagos Finches and Their Sources of Food

Name	Foods
Vegetarian finch *Platyspiza crassirostris* 	Buds, leaves, fruit of trees 
Cactus finch *Geospiza scandens* 	Cactus flowers and nectar 

State *one* reason why these two species probably do *not* live in the same area of this island.

13. Base your answer to the following question on the diagram below and on your knowledge of biology. The diagram represents a laboratory setup.

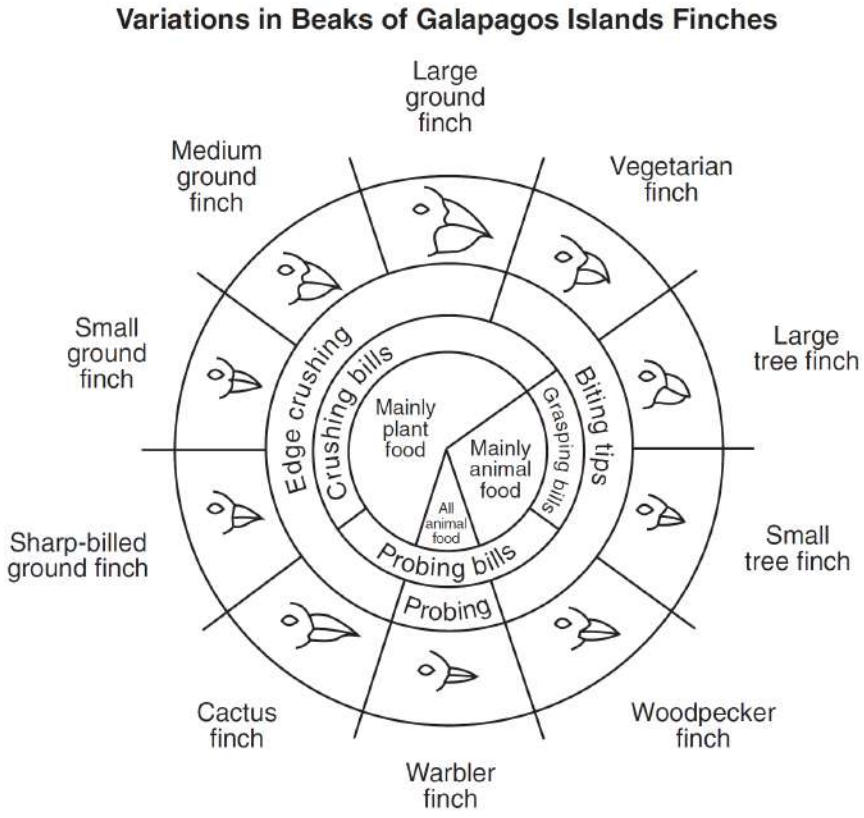
A starch solution in a test tube was separated from the water in a beaker by a dialysis membrane. One hour later, it was observed that the liquid had risen in the test tube.



Initial set-up One hour later

If a starch indicator solution was initially added to the water in the beaker, describe *one* observation that would be made after one hour.

14. Base your answer to the following question on the diagram below and on your knowledge of biology.



from: *Galapagos: A Natural History Guide*

State *two* reasons why the large ground finch and sharp-billed ground finch could live on the same island but not compete for food, even though they both eat mainly plant food.

15. *A* and *B* below represent two different slide preparations of elodea leaves. Elodea is a plant found in streams and ponds in New York State.
The water used on slide *A* contained 1% salt and 99% water.
The salt solution used on slide *B* contained 6% salt and 94% water.
Elodea cells normally contain 1% salt.

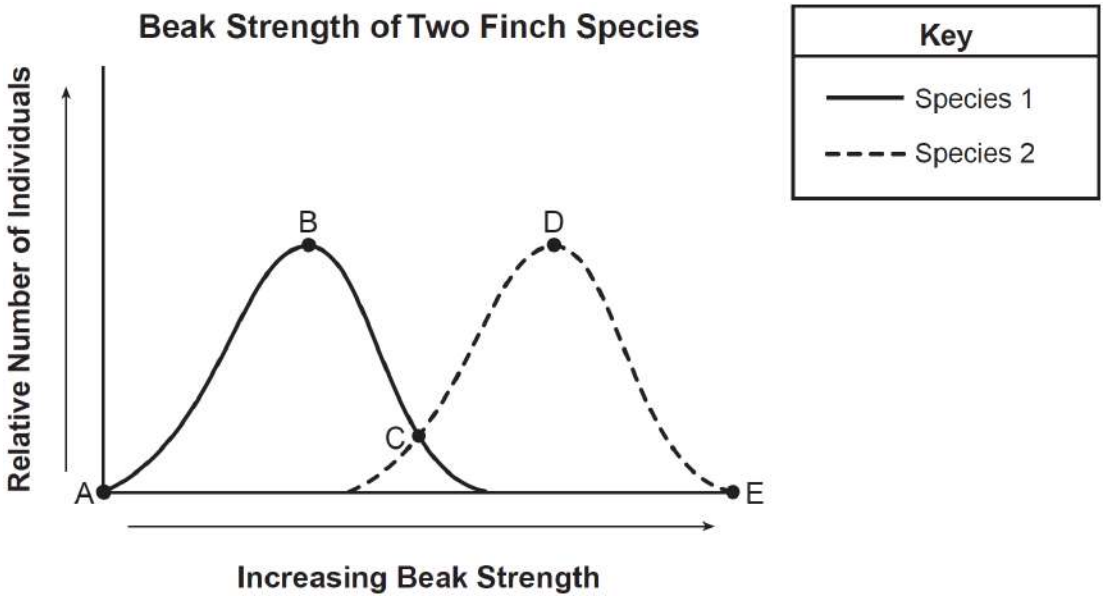
Elodea leaf mounted in 1% salt solution Elodea leaf mounted in 6% salt solution

Five minutes after the slides were prepared, a student using a compound light microscope to observe the cells in leaves *A* and *B* would most likely see that

A) water had moved out of the cells of the leaf on slide *A*
B) salt had moved into the cells of the leaf on slide *A*
C) water had moved out of the cells of the leaf on slide *B*
D) salt had moved out of the cells of the leaf on slide *B*

Base your answers to questions **16** through **18** on the information and diagram below and on your knowledge of biology.

Two species of finches found on a particular Galapagos island eat the seeds of a certain variety of plant. The relative strength of their beaks is shown in the graph below.



16. If the environment on the island changed and the seeds of more of the plants became harder to crack open, describe what the graph might look like after many years have passed.

17. Select the point on the graph where beak strength of the two bird species is equal. Support your answer.

18. One of the finch species has a slightly smaller, weaker beak. Is this species 1 or species 2? Support your answer with information from the graph.

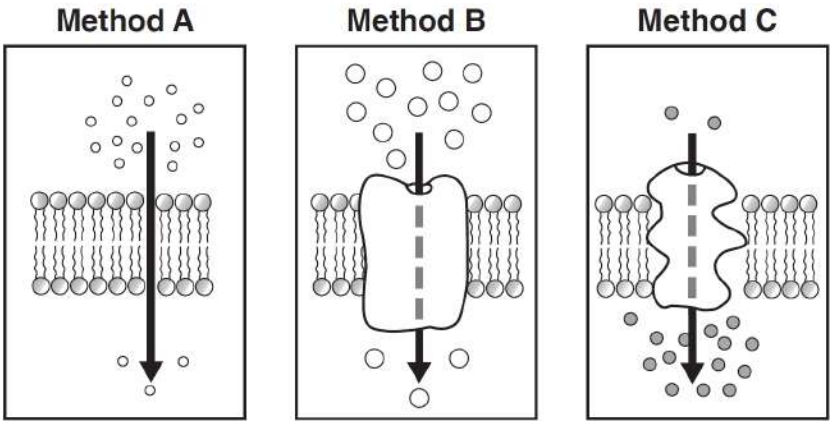
19. Base your answer on the information below and on your knowledge of biology.

A student added glucose indicator to a beaker of an unknown liquid. Starch indicator was added to a different beaker containing an equal amount of the same unknown liquid. The color of the indicator solutions before they were added to the beakers and the color of the contents of the beakers after adding the indicator solutions are recorded in the chart below.

Beaker	Solution	Color of Indicator Solution Before Adding to Beaker	Color of Contents of Beaker After Adding Indicator Solution
1	unknown liquid + glucose indicator	blue	blue (after heating)
2	unknown liquid + starch indicator	amber	blue-black

State *one* conclusion the student would make about the unknown liquid based on the results. Support your answer with information from the data table.

20. Base your answer to the following question on the diagram below and on your knowledge of biology. The diagram represents three sections of a cell membrane showing three different methods involved in the transport of various molecules across the membrane.



Using information from the diagram, state *one* reason why the movement of molecules in method *C* represents active transport.