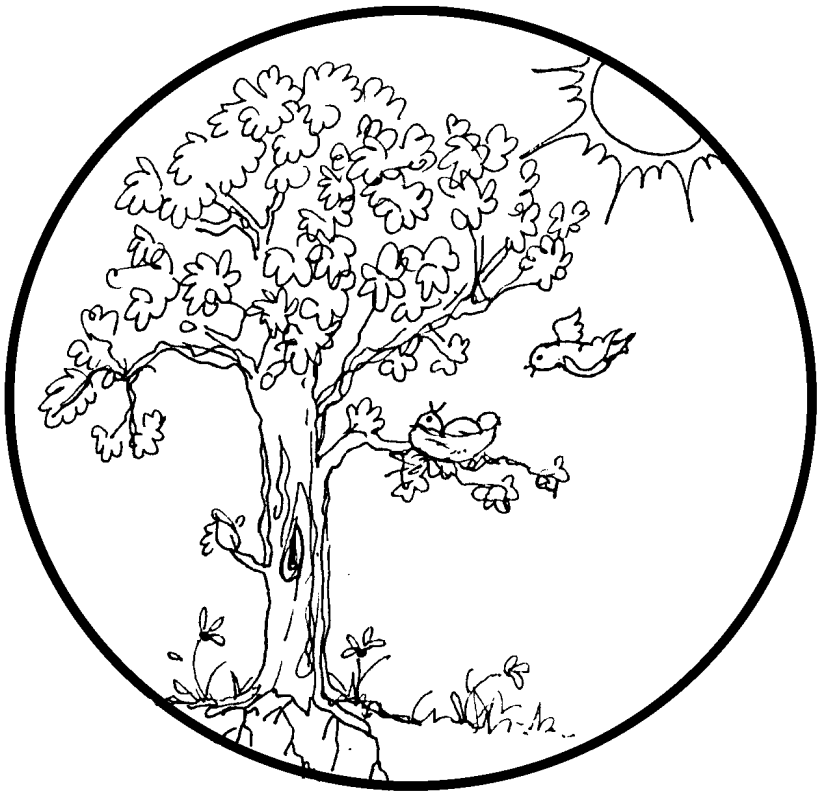
Life Cycle

Diversity in a Balance

SIXTH GRADE

WORKBOOK



student _____

LIFE CYCLE - ORGANISMS (6A)
PRE

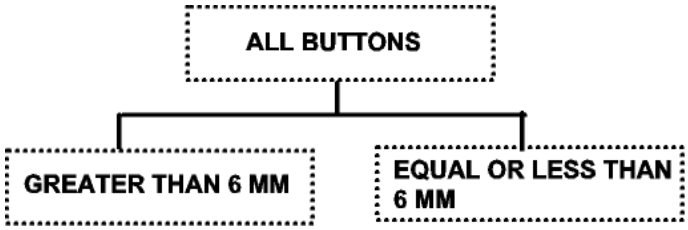
1. You are going to make a "sorting machine" on paper to organize (classify) your buttons. You may have seen a similar "machine" at a bank or a fair which separates coins poured into the top. This machine organizes coins by size.

2. You are going to draw a picture of your machine on the back of this worksheet. It will be a classification tree for buttons.

3. First you must make a list of the key characteristics for the buttons. Size might be one. List some other characteristics, but be specific. For example, buttons that are greater than 6 mm but less than or equal than 6 mm. Make sure you are realistic with your buttons. If you don't have any bottoms that are less than 6 mm, you should not separate them. You need more than just size.

_____
_____

4. Your tree might look like this to start with.



Each time you separate a group of buttons they can be divided into two more groups based on one characteristic (such as "blue and not blue") for the third branch.

5. Continue branching until each button (or group of identical buttons) has its own box.

6. Your instructor will test your machine with one button to see if it can find its home box when dropped in the top of your machine.

CONCLUSIONS: Why is it important to organize information? Does classification help identify an object? How?

_____

LIFE CYCLE - ORGANISMS (6A)

PROBLEM: How can you distinguish different microbes?

PREDICTION:_____
_____

MATERIALS: slides, pond water, microscope, pictures of microbes found in fresh water
PROCEDURE: Look at the slides that your instructor has prepared for you and the mushroom. Draw what you see. After you look at the prepared slides, look at live material with the microscope. Your teacher will give you instructions. Draw what you see on the back of this lab sheet.

BACTERIA	PROTOZOA
PROTOZOA	MUSHROOM

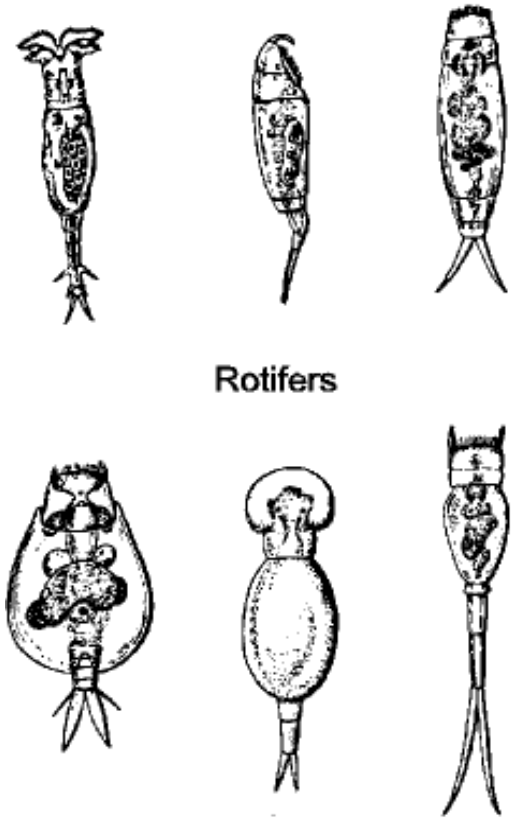
CONCLUSIONS: What differences did you observe among bacteria, protozoa, and fungi?
_____

_____

_____

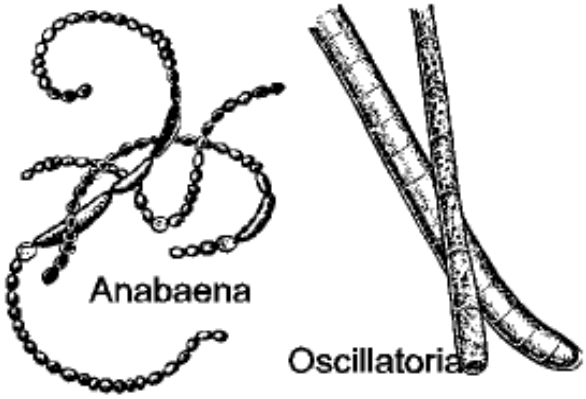
LIFE CYCLE - ORGANISMS (6A)

ROTIFERS



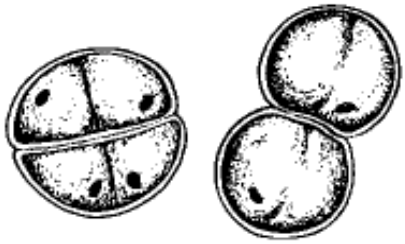
Rotifers

BACTERIA



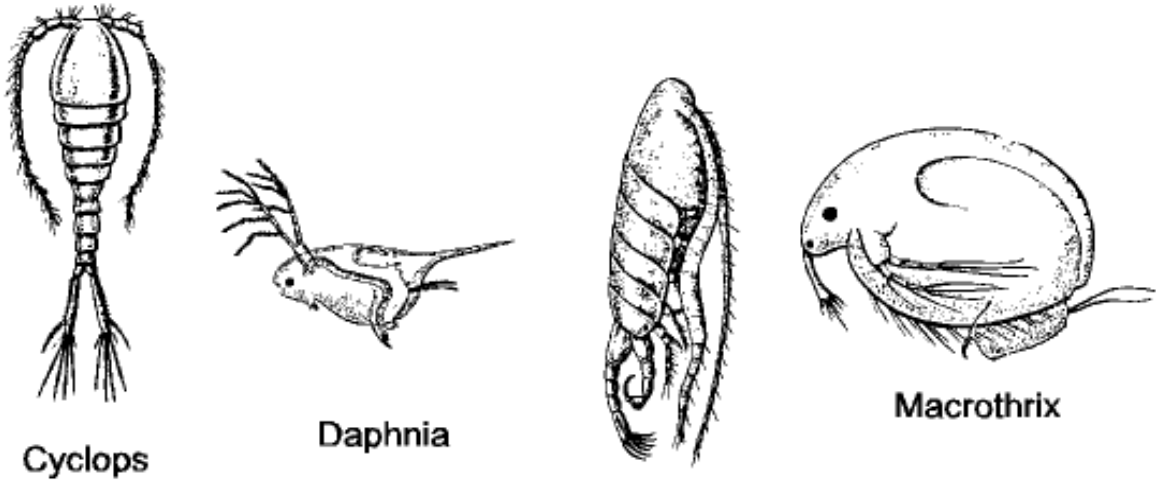
Anabaena

Oscillatoria



Chroococcus

ARTHROPODS



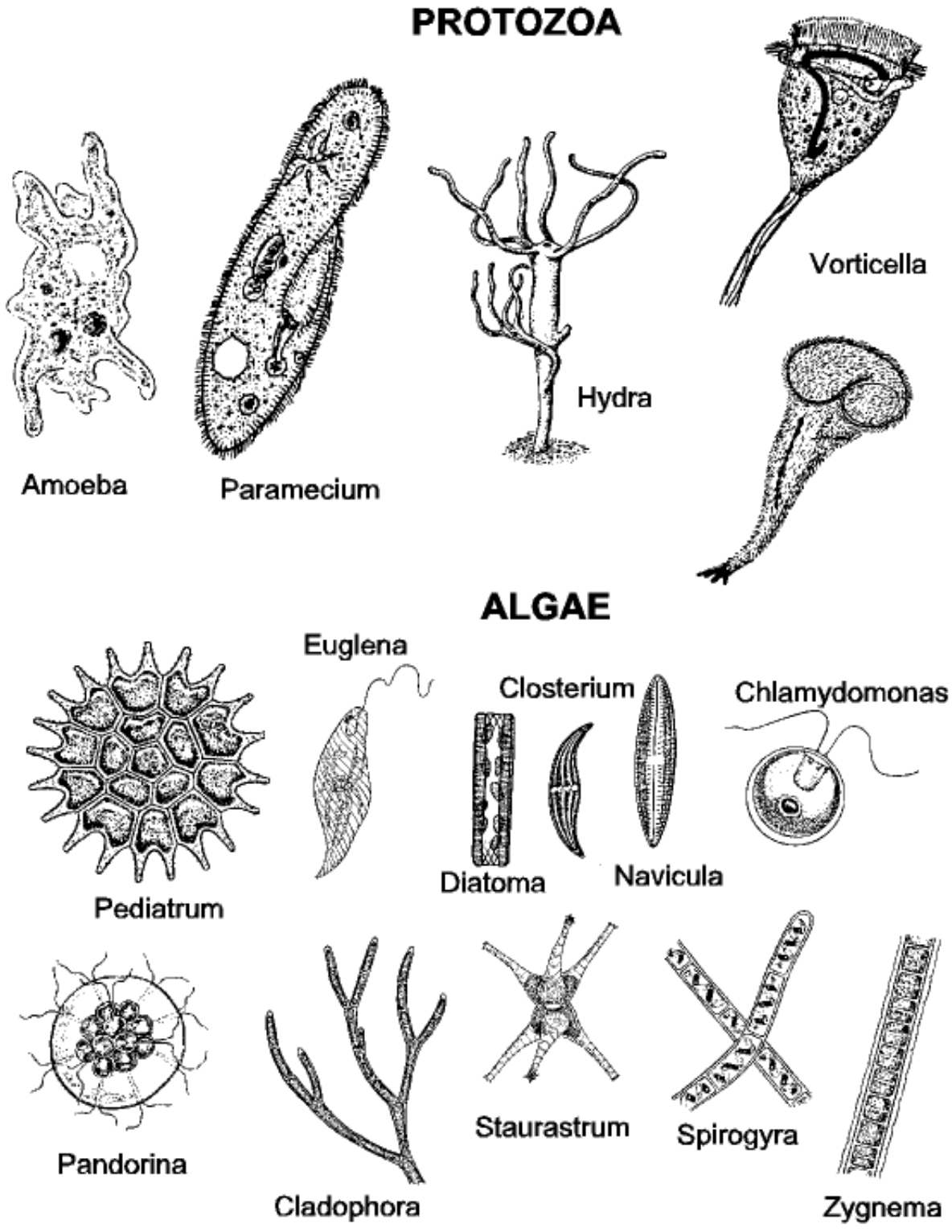
Cyclops

Daphnia

Diatomus

Macrothrix

LIFE CYCLE - ORGANISMS (6A)



LIFE CYCLE - ORGANISMS (6A)

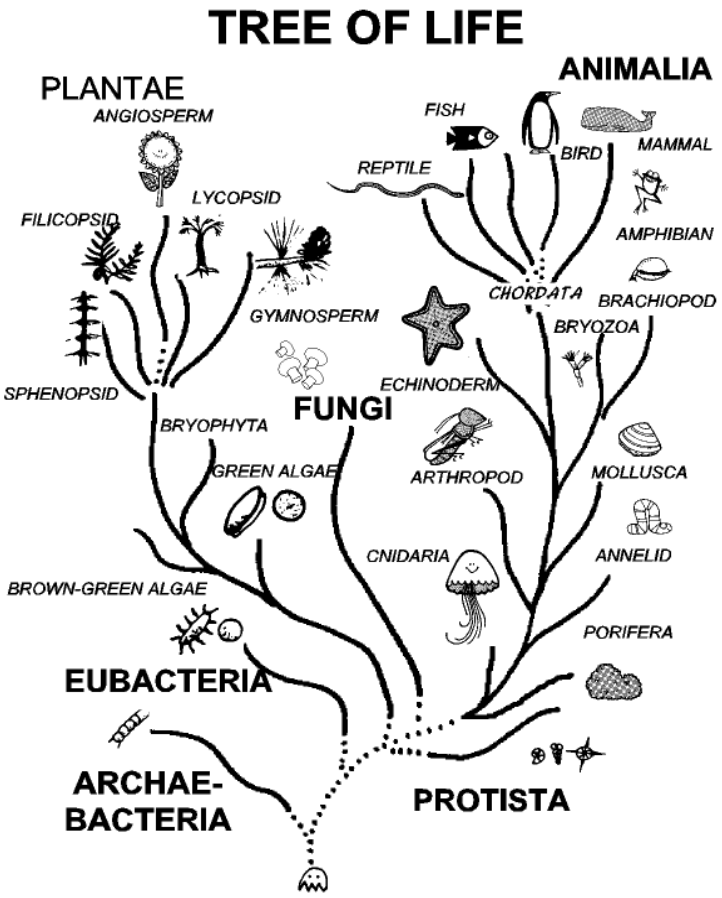
ORGANISM TO STUDY:

_____

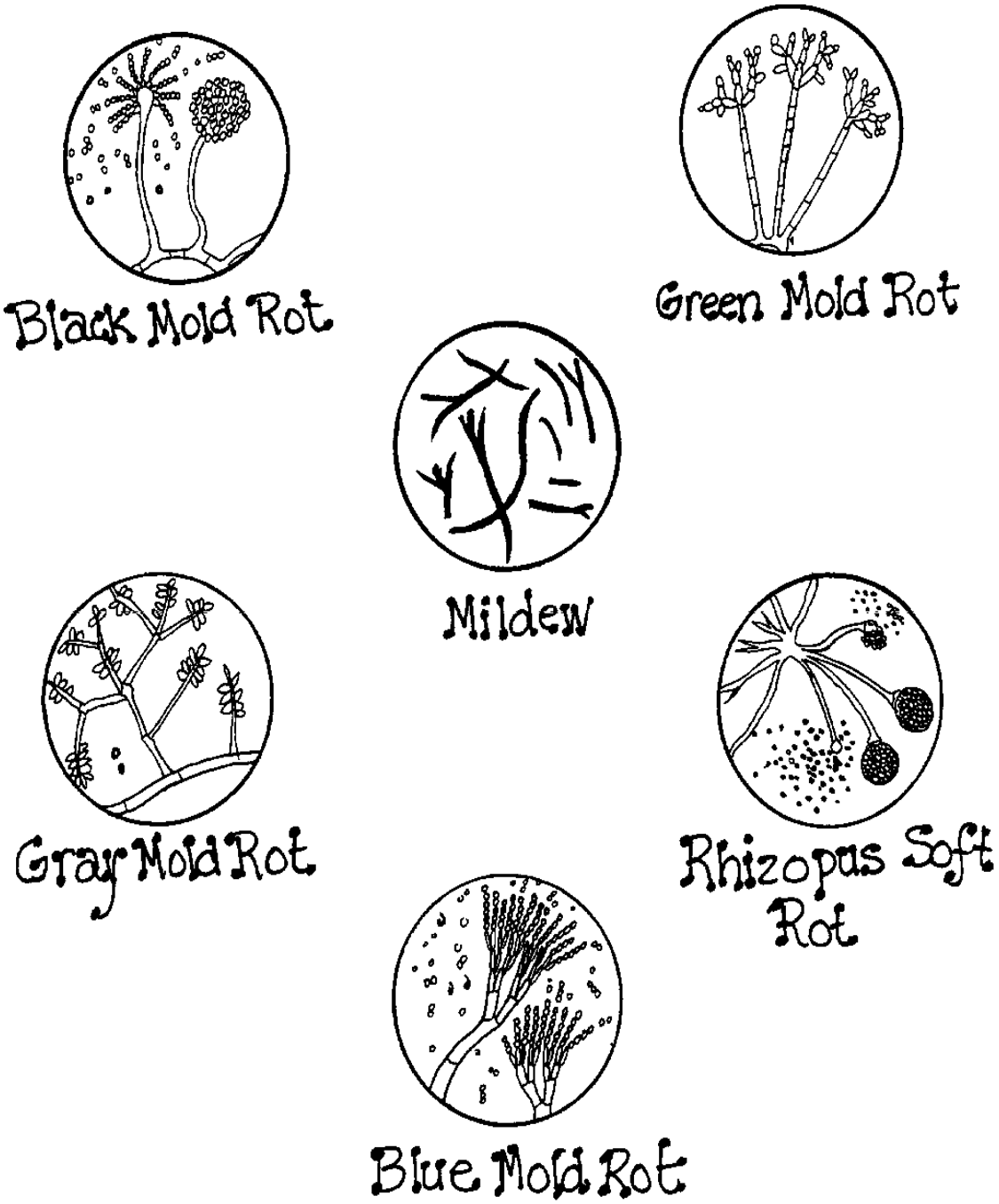
What kingdom does it belong to?

_____

Information:



WHAT KIND OF ROT DO YOU HAVE?



TYPES OF "ROT" THAT YOU MIGHT FIND UNDER THE MICROSCOPE

LIFE CYCLE - ORGANISMS (6B)

PROBLEM: How does food rot?

PREDICTION: _____

PROCEDURE:

MATERIALS: MICROSCOPES, 1 week, 5 day, and 3 day old bread

Look at the different molds. Draw what you see using a microscope.

FRESH	3 DAY
5 DAY	1 WEEK

CONCLUSIONS: What are the differences among the 4 pieces of bread?
Where did the mold come from?

_____

_____

_____

LIFE CYCLE - ORGANISMS (6B)
POST

DEVELOPING A PLOT FOR CHILDREN'S STORY

SUBJECT _____

AUTHOR _____

CHARACTERS

PLOT OF STORY

THE STORY WILL OPEN AS:

THE MAIN CHARACTER WILL ACCOMPLISH WHAT?

WHAT WILL THE ENDING BE LIKE?

LIFE CYCLE - ORGANISMS (6B)
POST

LIFE CYCLE - HUMAN BIOLOGY (6A)
PRE

Draw a line to the correct location on the diagram of the following endocrine system organs.

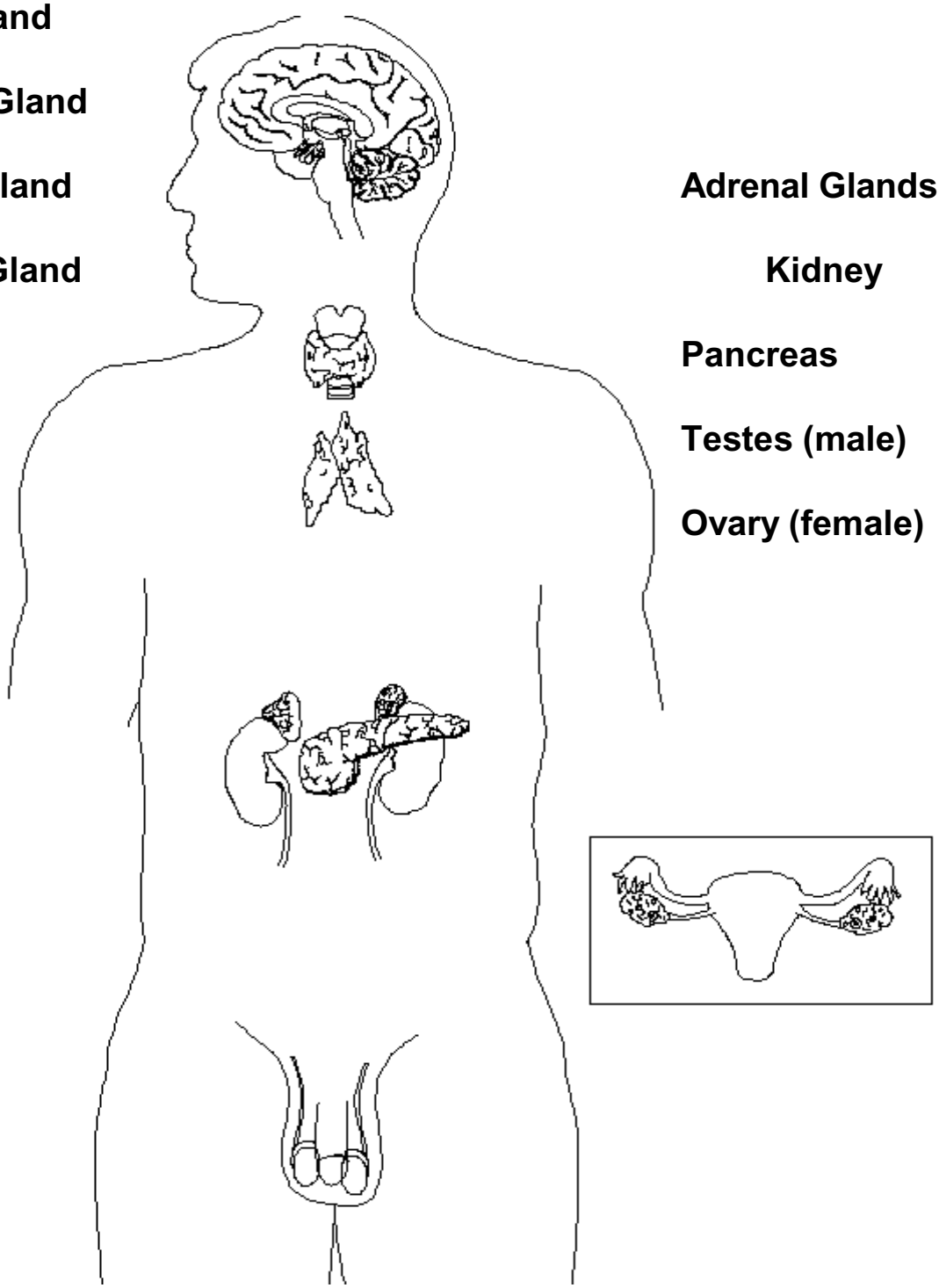
Hypothalamus

Pineal Gland

Pituitary Gland

Thyroid Gland

Thymus Gland



Adrenal Glands

Kidney

Pancreas

Testes (male)

Ovary (female)

LIFE CYCLE - HUMAN BIOLOGY (6A)

PROBLEM: Does a fetus grow at a constant rate?

PREDICTION:_____

MATERIALS: ruler, fetus growth chart, timetable of fetal development, calculator

PROCEDURE: Measure the fetus in the chart as it grows through time. Record the information below and try to find the period during the pregnancy when the growth is at its highest rate. To figure this you must count the weeks between the measured period. This baby will be 20 inches long after its born. The growth rate can be calculated by dividing the growth by the number of weeks.

	# Weeks	Size cm	Growth cm	Growth Rate	% Growth
5th week					
8th week					
12th week					
18th week					
22nd week					
26th week					
30th week					
34th week					
36th week					

Why is the baby turning around in the womb? _____
_____

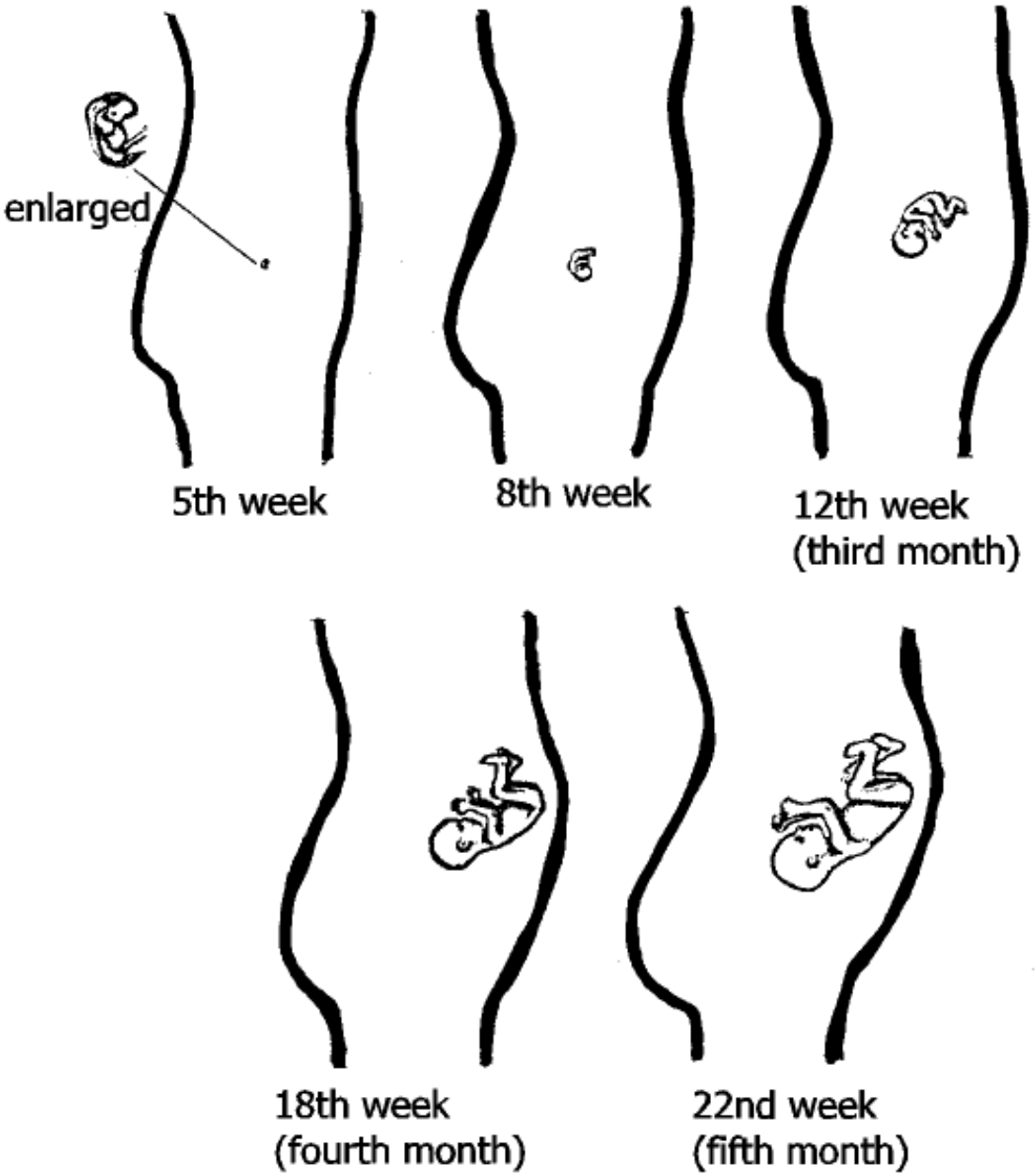
Look at the "Timetable of Fetal Development."

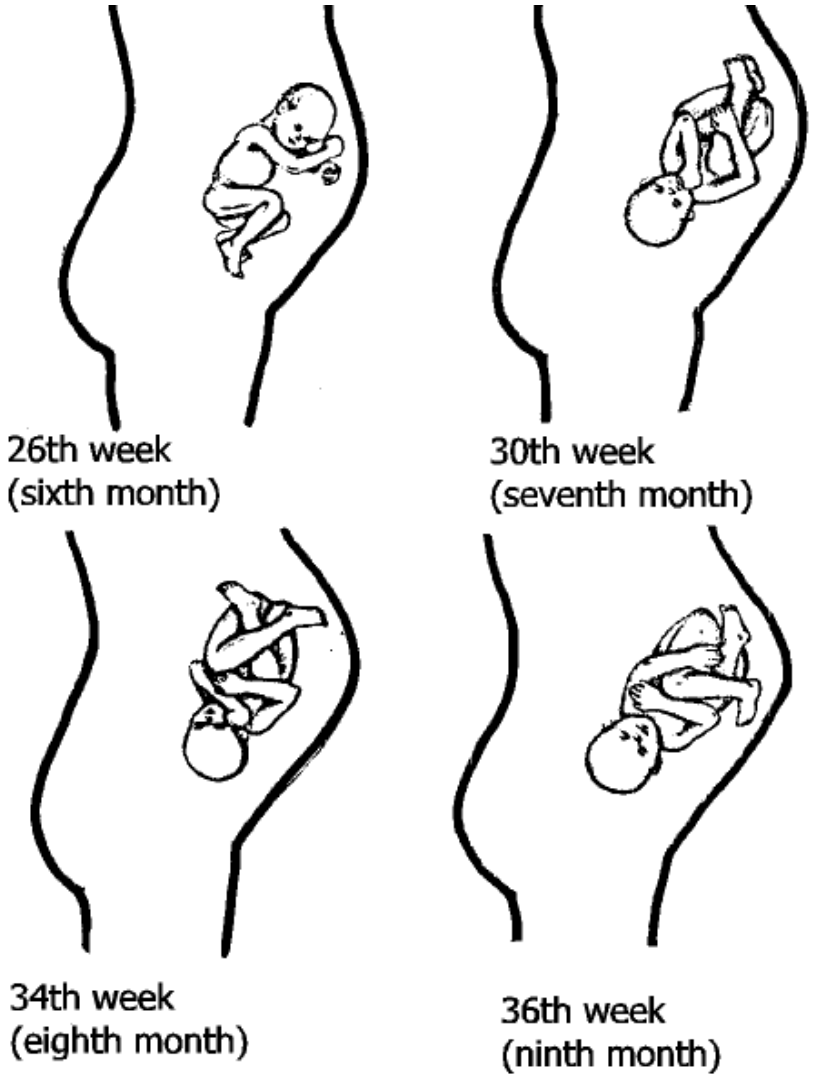
1. When do the gallbladder and liver form? _____
2. Primitive blood vessels form when? _____
3. Eyes open _____ Eye lens form _____
4. Fetus has downy hair over its body _____
5. When does a baby become plump? _____

CONCLUSIONS: When does the greatest growth rate occur?

_____

_____


enlarged
5th week
8th week
12th week
(third month)
18th week
(fourth month)
22nd week
(fifth month)



redrawn from The Human Body by R.and B. Bruun

GROWTH OF A FETUS

5-9 days - Remains free in uterine cavity.

10-11 days - Attaches to and begins to become imbedded in the prepared lining of the uterus. The different tissue layers are developing.

14 days - Irregular, blob-like oval body with a longitudinal depression from which cells are pushed into an enlarging body.

18-21 days - Thickening of the neural plate, which is the first sign of the central nervous system. The primitive heart is a simple tube. There are primitive lung buds. Two faint depressions are the sites of eyes. The embryo begins to curve head-to-tail to fit its environment.

4th week - Beginning of gallbladder and liver tubules. Parts of brain begin differentiation. Local dilations indicates beginning of stomach. Heart tube becomes slightly bend. Nose parts suggested. Tiny liver and belly stalk. Primitive head parts, mount, brain, eyes, ears, are forming. Opening from mouth to gut breaks through; a little later, the anus. Primitive thyroid cells. Windpipe and larynx beginning. The heart is under the chin. First heartbeat occurs. Blood corpuscles form, circulation begins.

5th week - Nasal pit, buds that will be arms and legs, cells that will develop into pancreas gland, tiny thickening that will be tongue appear. The gut elongates. Primitive blood vessels function. Beginnings of eye lens, cranial nerves, retinal layer.

6th week - Arm and leg buds lengthen, faint grooves suggest toes and fingers. Brain recognizable. Lung buds bifurcate. Primitive kidney established. Eyes far to either side of head. Epithelium and primitive ear parts begin to form. Nasal pits recognizable as nostrils. Stomach suggests adult form. Salivary glands identifiable. Skeleton system begins.

7th week - Distinct beginnings of fingers, toes, eyelids, delicate fibrils that will be muscles, autonomic nervous system. Nasal opening break through, optic nerve fibers extend, gallbladder elongates.

8th week - Centers of bone growth established. Thumb and big toe begin to diverge. Local buds destined to be teeth. Rapid growth of nose and upper jaw. Ears are very low on head. Recognizable human form.

3rd month - Eyelids meet and fuse, eyes remain closed until seventh month. Bony parts of skull develop from base of skull upward. Inner ear structure almost complete. Hair follicles appear. External genitals evidenced by swellings; sex not obvious.

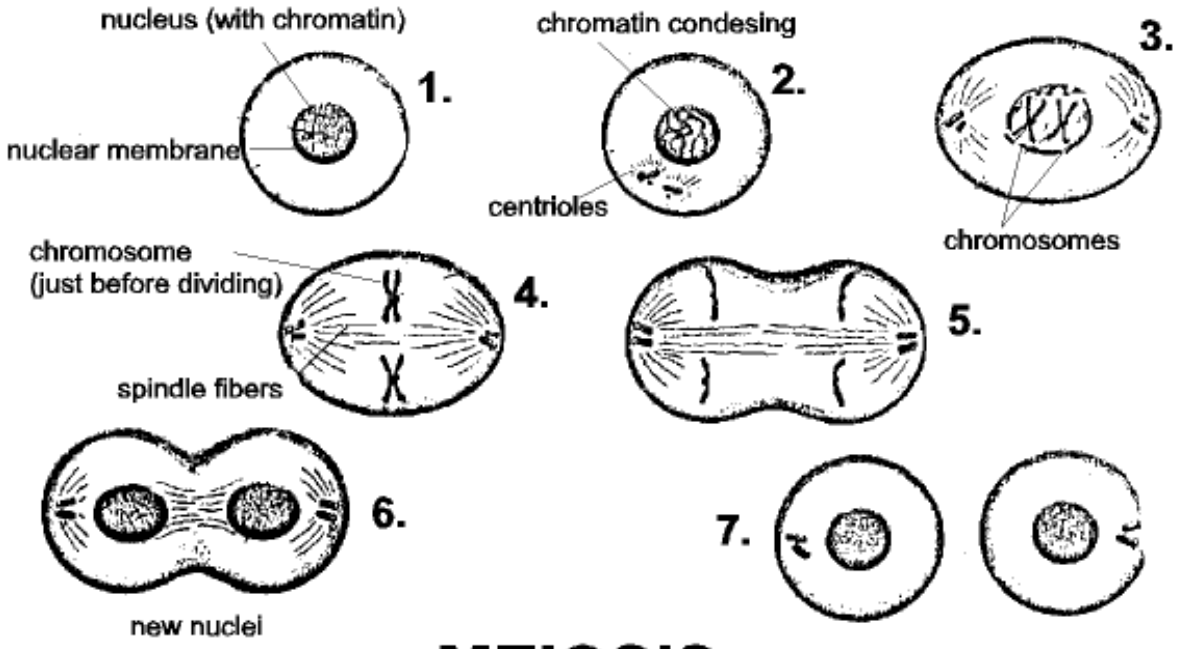
4th month - Brain a recognizable miniature of adult brain; large bulge of forebrain distinguishable from cerebellum and brain stem. Sweat glands appear. Outer skin thickens into distinctive layer.

5th month - Structures of testes and windpipe are well established. Branching structures will become kidney tubules.

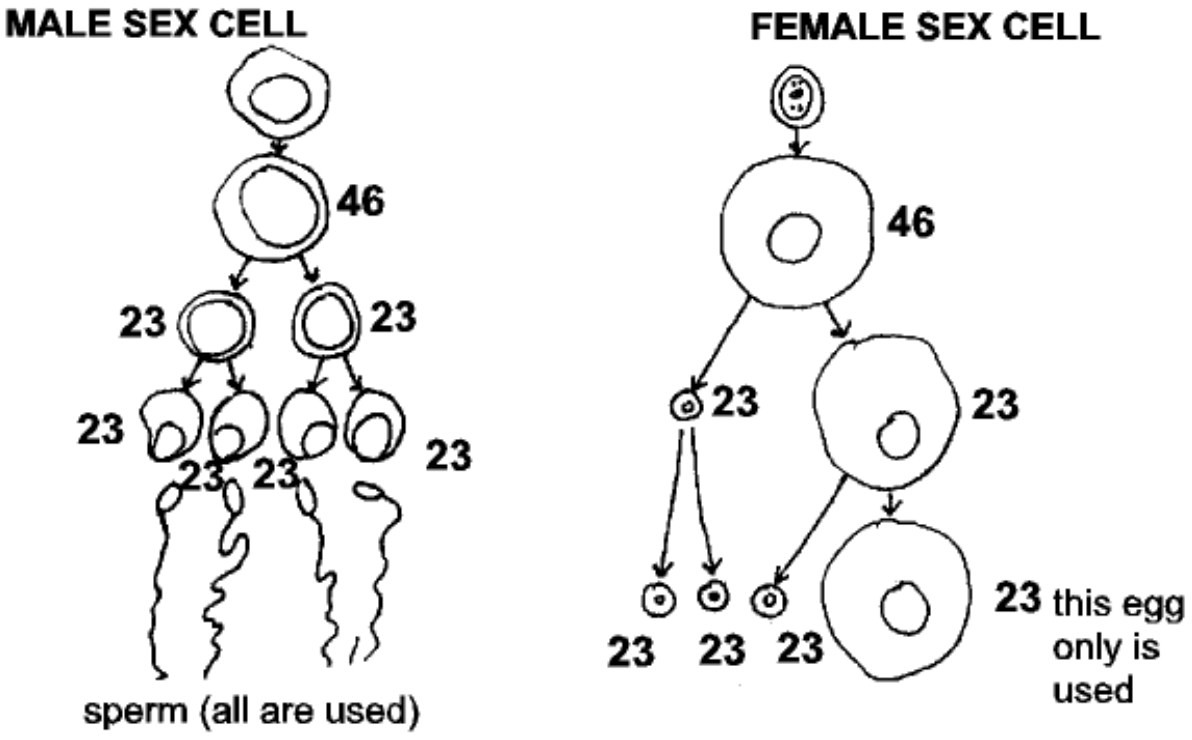
6th month - Eyebrows, eyelashes are visible. Fetus is coated with downy hair. Skin ridges form on palms and soles, the lifelong basis of fingerprints and sole prints. The bronchial tree branches out actively, continues to do so after birth.

7th month - Eyelids unfuse, Testes begin to descent. Fat begins to be deposited under translucent skin layers and fetus becomes plumper.

MITOSIS



MEIOSIS



WHAT CAUSES DISEASES?

Certain bacteria, viruses, and protozoa are responsible for many diseases that affect humans. Below is a brief description of one disease-causing agent from each of the three groups and the name of a disease each agent causes. Using the characteristics given, draw the disease-causing agent in the space provided.

BACTERIA (STREPTOCOCCUS) CAUSES STREP THROAT small spherical bodies, lined-upside-by-side, forming "s"-shaped chains	
VIRUS (RHINOVIRUS) CAUSES COMMON COLD spherical bodies with smaller, randomly arranged spherical bodies within them	
PROTOZOA (ENTAMOEBA) CAUSES DYSENTERY shapeless blobs with cell walls that keep them held together	

LIFE CYCLE - HUMAN BIOLOGY (6B)

PROBLEM: What is the difference between a bacterium and a virus?

PREDICTION: _____

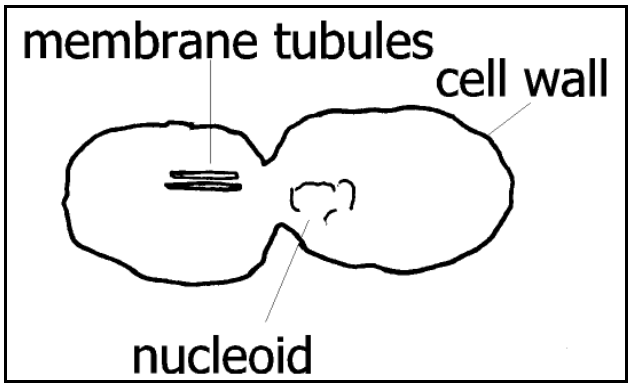
MATERIALS: bacteria and virus sheet, glue, construction paper

PROCEDURE:

1. Go over the characteristics of a bacteria and virus using the diagrams below.
2. Cut the bacteria and virus sheet and group them into bacteria and viruses.
3. Glue the pieces on 2 separate sheets of construction paper and label bacteria and viruses.

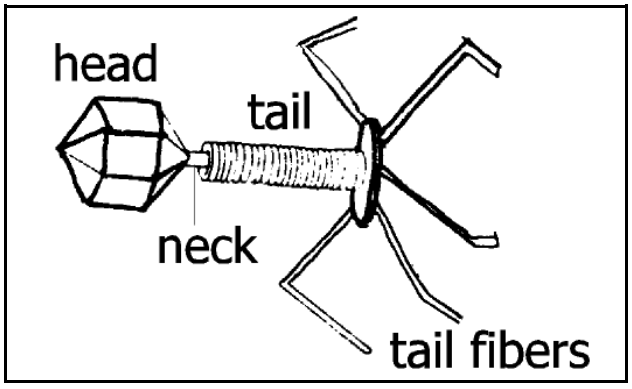
BACTERIA

1. 3 basic shapes: bacillus, coccus, and spirillum
2. have a tough outer covering called the non-cellulosic cell wall



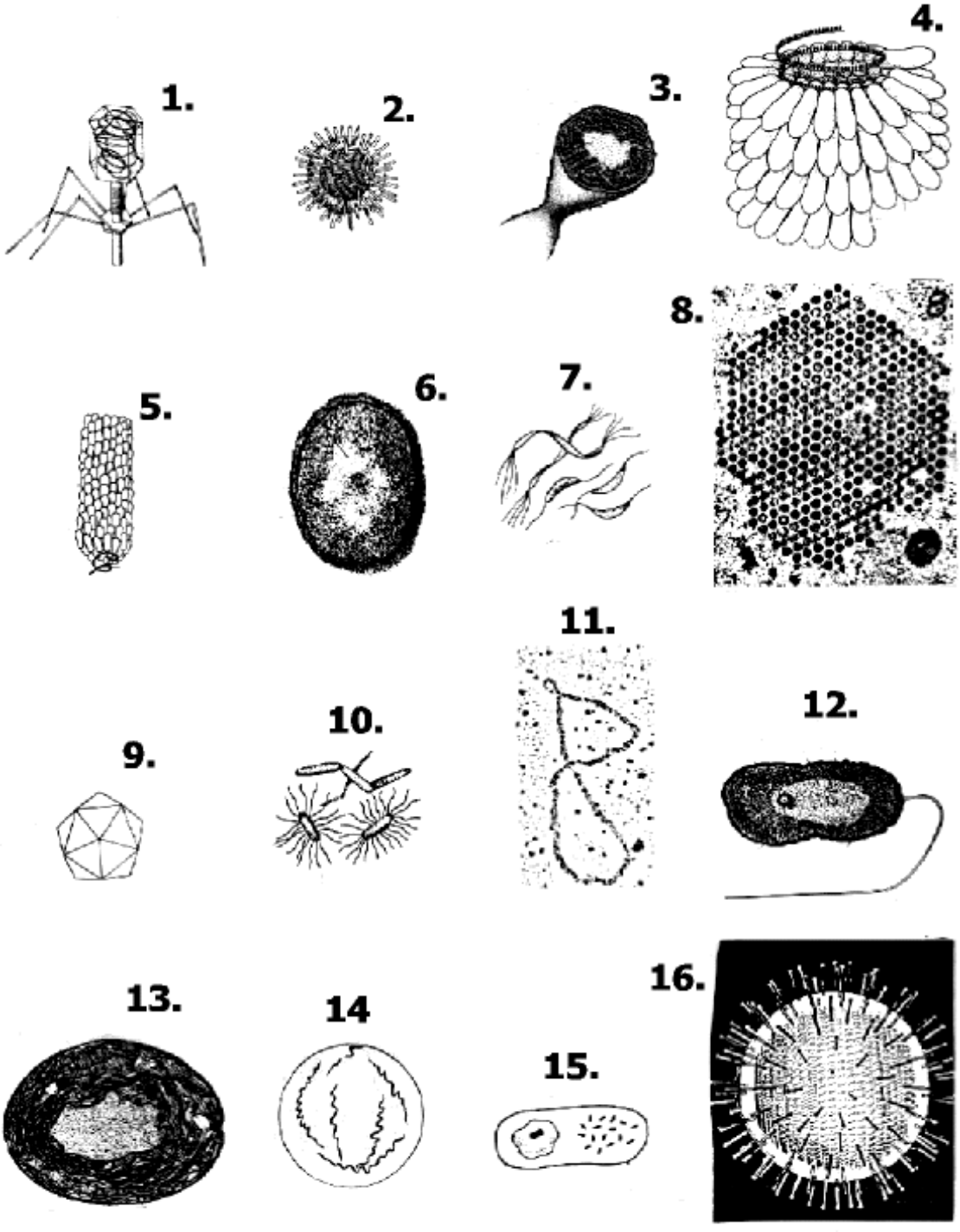
VIRUS

1. non living, needs a host to reproduce
2. composed of nucleic acid enclosed in a coat of protein



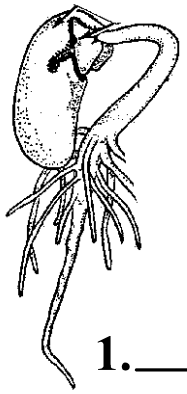
CONCLUSION: How can you tell the difference between a bacterium and a virus?

_____


1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.

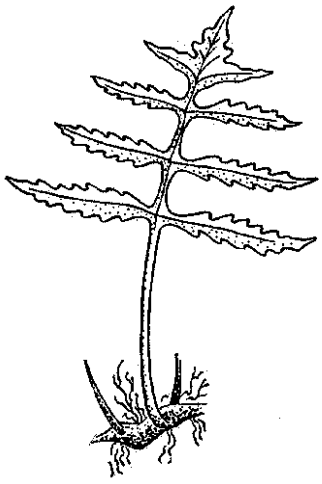
LIFE CYCLE - PLANTS (6A)
PRE

LABEL THE THALLOPHYTES, BRYOPHYTES, AND TRACHEOPHYTES

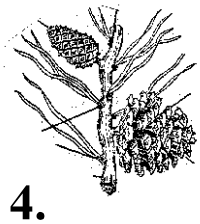


1. _____

2. _____

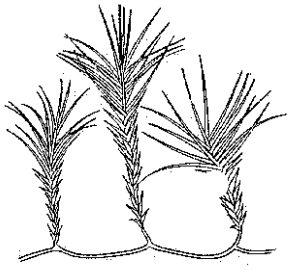


3. _____

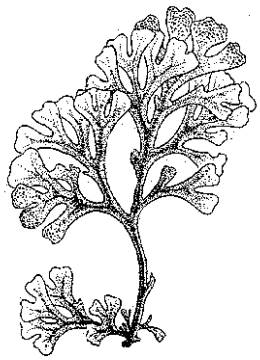


4. _____

6. _____

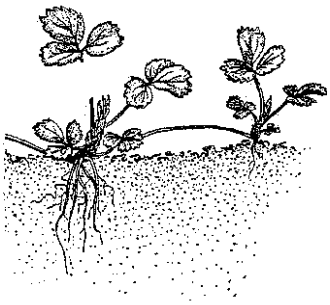


7. _____



8. _____

5. _____



9. _____

10. _____

LIFE CYCLE - PLANTS (6A)

PROBLEM: Do all plants "bend" toward light?

PREDICTION: _____

MATERIALS: rooted plants, seedling, soil, milk container

PROCEDURE: **Exercise 1**. Duplicate Darwin's and Boysen-Jensen's experiment as described by your teacher. Describe what you did and record what happens on each day that you observed the plant with and without a cap, and with no top.

_____
_____
_____

	DAY____	DAY____	DAY____	DAY____
NO CAP				
CAP				
NO TOP				

Exercise 2. Plant rootings as described by your teacher. Make sure that you water the plants and that they are all in the sample place. Describe how they bend for one week.

DAY OF OBSERVATION							
TYPE OF PLANT	1	2	3	4	5	6	7

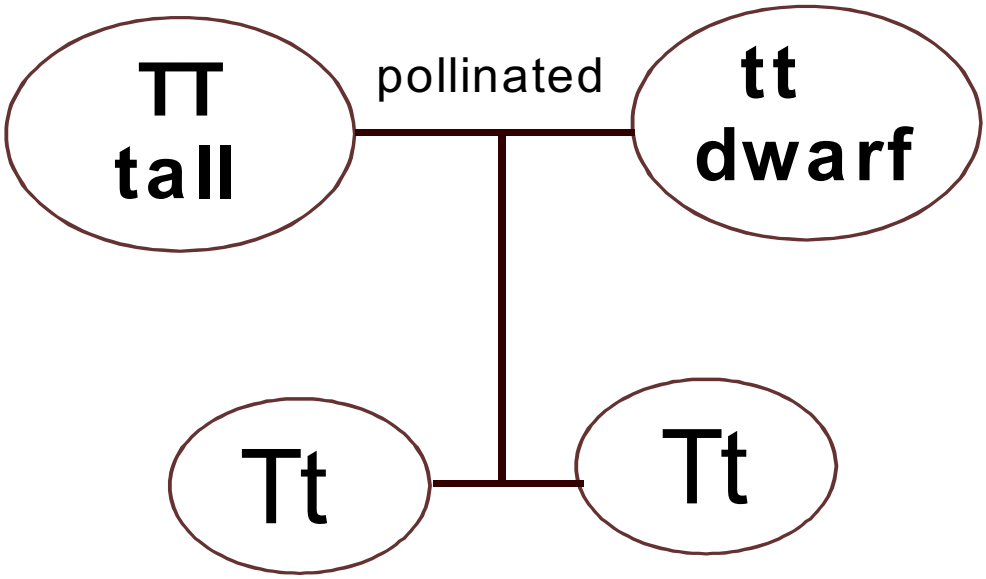
CONCLUSIONS: Is there a difference amongst the plants?

_____

_____

_____

MENDEL'S GARDEN PEAS



	T	t
T	TT	Tt
t	tT	tt

TT = tall dominant
Tt = tall dwarf recessive
tT = tall dwarf recessive
tt = dwarf

LIFE CYCLE - PLANTS (6B)

PROBLEM: How can you predict the phenotype of a hybrid with 2 traits?

PREDICTION:_____

MATERIALS: circle "gametes"

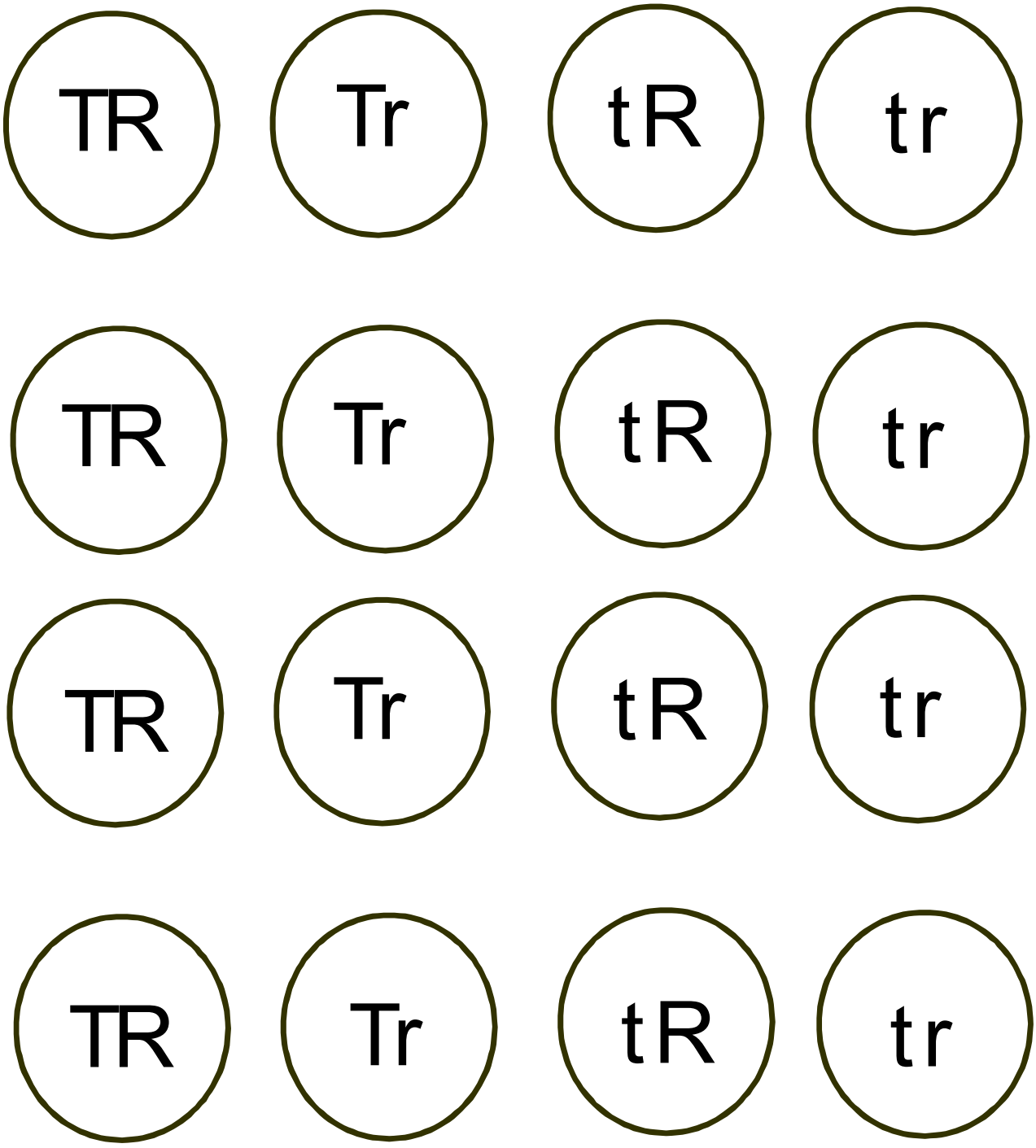
PROCEDURE: 2 hybrid plants can each produce 4 possible genotypes. By using a grid like below determine the genotypes and phenotypes.

	TR	Tr	tR	tr
TR				
Tr				
tR				
tr				

number	GENOTYPE	number	PHENOTYPE
_____ _____ _____ _____	TTRR TtRR TTRr TtRr	_____	tall, red
_____ _____	TTrr Ttrr	_____	tall, white
_____ _____	ttRR ttRr	_____	dwarf, red
_____	ttrr	_____	dwarf, white

CONCLUSIONS: Summarize the graph above.

_____


TR
Tr
tR
tr
TR
Tr
tR
tr
TR
Tr
tR
tr
TR
Tr
tR
tr

LIFE CYCLE - NATURAL ENVIRONMENT (6A)
PRE

MINERAL	COMPOSITION
CALCITE	$CaCO_3$
BARITE	$BaSO_4$
COPPER	Cu
FLUORITE	CaF_2
GALENA	PbS
QUARTZ	SiO_2
SERPENTINE	$Mg_6(Si_4O_{10})(OH)_8$
FELDSPAR	$CaK(AlSi_3O_8)$
CINNABAR	HgS

1. Which elements are in soil that has the following minerals in the parent rock: serpentine, copper, and calcite.

_____
_____

2. Which elements are in soil that has the following minerals in the parent rock: quartz, galena, fluorite, and feldspar.

_____
_____

3. Which elements are in soil that has the following minerals in the parent rock: barite, quartz, calcite, and cinnabar.

_____
_____

4. Which of the soils may be dangerous for humans and why?

_____
_____

LIFE CYCLE - NATURAL ENVIRONMENT (6A)

PROBLEM: Can pH be used to detect differences in soil?

PREDICTION: _____

MATERIALS: 3 soil samples, pH indicator paper, magnet, beaker

PROCEDURE:
1. Describe each of the samples that you have. Use a magnifying glass and magnet to see if you can find any differences.
2. Put about 2 ml of the soil in 2.5 ml of water and mix thoroughly.
3. Use the pH indicator paper to determine the pH of the soil by putting the paper into the mixture and comparing it with the colors in the kit.

	DESCRIPTION OF SOIL
SERPENTINITE SOIL pH _____	
GRANITIC SOIL pH _____	
SCHOOL SOIL pH _____	

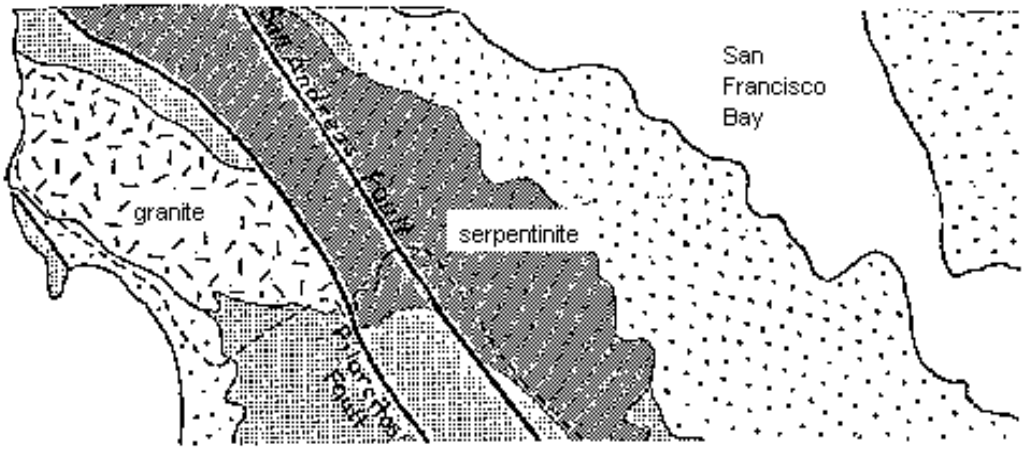
CONCLUSIONS: How are the soils different?

_____

_____

LIFE CYCLE - NATURAL ENVIRONMENT (6A)
POST

SAN ANDREAS FAULT, NEAR HALF MOON BAY, CALIFORNIA



1. Color the areas that are primarily made of serpentinite. Color them blue.

2. Color the areas that are primarily granitic and sedimentary. Color them red.

3. Serpentinite is made of which minerals?
_____

4. Granite is made of which minerals?
_____

5. List the elements that are available in serpentinite soil.
_____

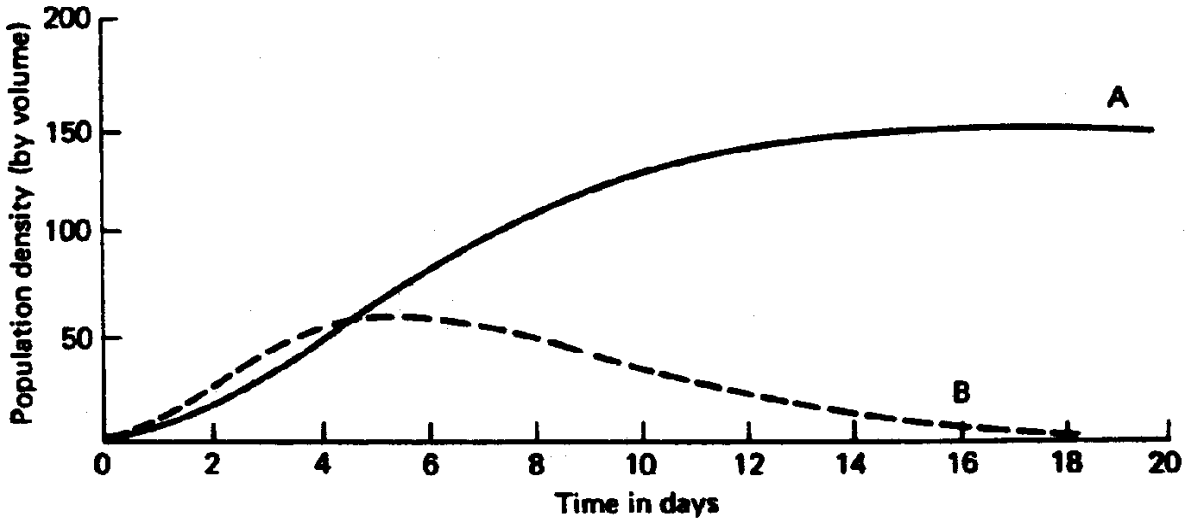
6. List the elements that are available in granitic soil.
_____

7. Which elements are only in granitic soil?
_____

8. Do you think there are enough differences in the soil to cause such a difference on the surface vegetation? Explain.
_____

LIFE CYCLE - NATURAL ENVIRONMENT (6B)
PRE

RULE OF GAUSE COMPETITION



Looking at the graph, answer the following questions.

1. What is the horizontal (x)axis? _____

2. What is the vertical (y) axis? _____

3. What are the increments on the x axis? _____

4. What are the increments on the y axis? _____

5. Describe what happens to species A over time? Describe in detail.
_____
_____
_____

6. Describe what happens to species B over time? Describe in detail.
_____
_____
_____

7. Can you explain what is going on and what will happen to both species?
_____
_____

LIFE CYCLE - NATURAL ENVIRONMENT (6B)

PROBLEM: What influences the type of vegetation in an area?

PREDICTION:_____

MATERIALS: Life Cycle- Natural Environment (6B), Microscope

PROCEDURE:
How many different types of vegetation do you see evidence for in the granitic material? Name them and list the evidence.

_____
_____
_____
_____

How many different types of vegetation do you see evidence for in the serpentinite soil. Name them and list the evidence.

_____
_____
_____

Look at your samples of granite and serpentinite, describe what each looks like by using color, texture, mineral content, or any other descriptive terms in the space provided. Draw what you see.

GRANITE	SERPENTINITE

Draw a picture of the ecosystems that you think each of the soils can support on the back of the sheet. Be specific, especially with the type of animals that you would see.

CONCLUSION: What are some possible reasons for a species to be different in a given area?

_____
_____

LIFE CYCLE - NATURAL ENVIRONMENT (6B) POST

Determine if the following examples are evolution, extinction, adaptation, natural selection, or religion.

1. A scientist grew plants under the same conditions in a greenhouse. He then transplanted the plants to different locations in an east-west transect of California. He then observed the variation of his population of plants and was able to determine how the plants varied in different locations. The scientist used two species of plants, *Achillea lanulosa* and *Achilles borealis.*

_____

2. If water is added continually to desert land, the vegetation will change in into vegetation typical of a river valley.

_____

3. During the Industrial Revolution in England, dark moths began to increase in number in the urbanized area, while in non-polluted areas the white moth count was higher. The color keeps moths hidden on the bark of trees. In the urbanized areas the trees became dark because of the pollution.

_____

4. The dodo bird formerly lived in Mauritius but has been gone since 1681.

_____

5. The Christian Bible said that the Earth was created in 7 days.

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6. Scientists can trace a radiolarian species (one celled protozoa that makes a skeleton of glass) that changed its shape over the last 10 million years.

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7. The great auk was the first species on the coast of North America that man eliminated. This flightless bird was readily accessible to sailors and fishermen who took its eggs for food and slaughtered it for meat, feathers, oil, and cod fish bait. The last two specimens were killed June 8, 1884.

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8. Buddhism is an Asian religion based on the teachings of Buddha.

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