Oklahoma School Testing Program

OKLAHOMA STATE DEPARTMENT OF EDUCATION

JANET BARRESI

STATE SUPERINTENDENT OF PUBLIC INSTRUCTION

Oklahoma Core Curriculum Tests

2014–2015 Released Items

End-of-Instruction Biology I

Oklahoma State Department of Education
Oklahoma City, Oklahoma

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Biology I

Directions

Read each question and choose the best answer.

1 **A biology class in Oklahoma is investigating why penicillin (an antibiotic) has become less effective in treating a bacterial infection. They repeat an experiment first conducted in England, in 1940, that proved penicillin was effective. After following the same experimental methods, the class's results show penicillin to be less effective in killing the bacteria.**

What most likely is the reason for the different results between the two experiments?

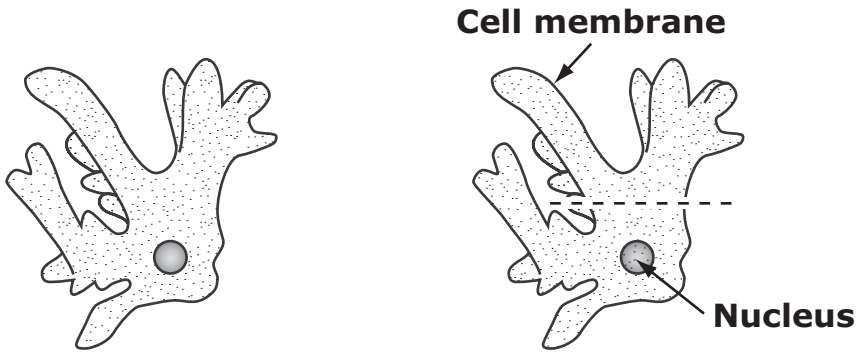
A The two experiments were conducted in different years.

B The two experiments were conducted in different countries.

C All bacteria developed resistance over time in response to the use of penicillin.

D Penicillin-resistant forms of the bacteria have become more common since 1940.

2 **Some students used *Amoebas* to demonstrate that the nucleus is necessary for cell growth and survival. The students cut fifty *Amoebas* into halves as the diagram shows. The students observed the *Amoeba* halves for two days and recorded the results in the data table.**



Whole *Amoeba*

***Amoeba* cut into halves**

Total Number of Halves	Number of Halves Dead After Two Days	Number of Halves Alive and Growing After Two Days
100	58	42

Was the design of the investigation adequate to demonstrate the importance of the nuclei in the *Amoebas*?

F yes because the students started with each amoeba half receiving some of the cell membrane

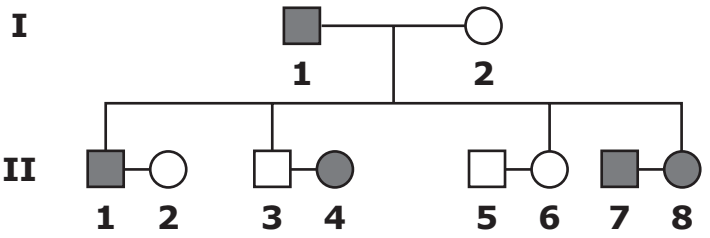
G yes because the students started with fifty *Amoeba* halves with nuclei and fifty halves without nuclei

H no because the students should have recorded the numbers of surviving *Amoeba* halves with and without nuclei

J no because the students should have recorded the size of the cell membrane in each of the *Amoeba* halves after cutting the *Amoebas* into halves

GO ON ▶

3 **The pedigree represents a family with an autosomal dominant disease (D).**



Key	
□ = Unaffected male	■ = Affected male
○ = Unaffected female	● = Affected female

From which pair of parents in generation II could the genotype probability of the offspring be 50% DD and 50% Dd?

A 1, 2

B 3, 4

C 5, 6

D 7, 8

4 **Which information and which tools would be the <u>most</u> appropriate for determining whether the alleles of a mouse affect its running speed?**

F the genotype of the mouse, a wall clock, and a microscope

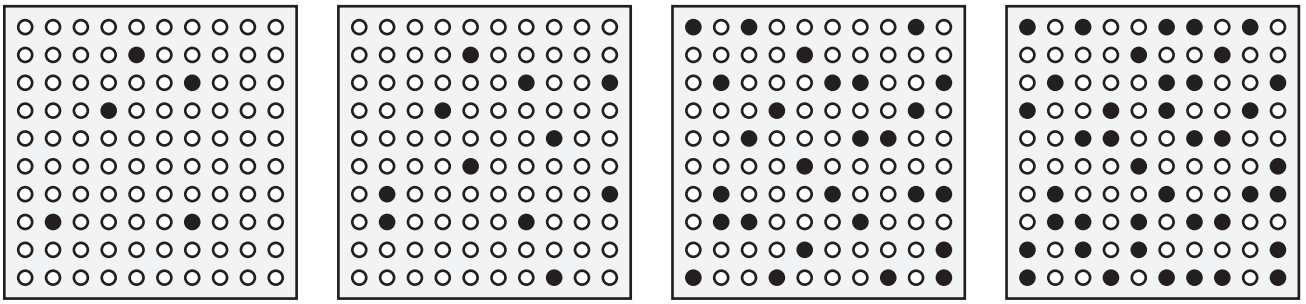
G the phenotype of the mouse, a microscope, and a stopwatch

H the phenotype of the mouse, a metric ruler, and a wall clock

J the genotype of the mouse, a stopwatch, and a metric ruler

5 **A farmer treated his crops with an insecticide that was 95% efficient. The trend graph shows an increase in insecticide resistance because of insecticide overuse in the environment over time.**

Change in Insect Resistance over Time



Insecticide applications over time

Key
● = Resistant
○ = Not resistant

Which statement <u>best</u> explains why insects become insecticide resistant?

A The insects become resistant because of better nutrition and crop fertilizers.

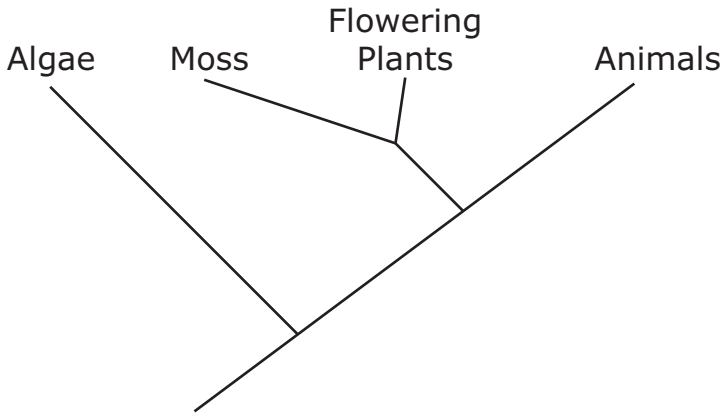
B The insecticide chemicals degrade over time and become ineffective.

C Some resistant insects pass the trait to their nonresistant mates.

D Some resistant insects pass the trait to their offspring.

6 **To determine how organisms are related, some biologists compared the genetic code for the protein cytochrome-C found in different organisms.**

Cladogram



Amino Acid Differences in Cytochrome-C (per 100 residues)

Compared Groups	Number of Differences
Algae vs. Animals	62
Flowering Plants vs. Algae	59
Flowering Plants vs. Animals	52

Based on the cladogram and the data in the table, which is the <u>most</u> accurate prediction about moss?

F Moss will be more closely related to algae than to flowering plants.

G Moss will be more closely related to animals than to flowering plants.

H A comparison of moss and flowering plants will result in less than 52 differences.

J A comparison of moss and flowering plants will result in more than 52 differences.

7 **A student studied the cell cycle of an onion root-tip cell. She discovered that the length of the cell cycle was approximately 24 hours.**

Starting with one cell, how many cells would exist after 96 hours?

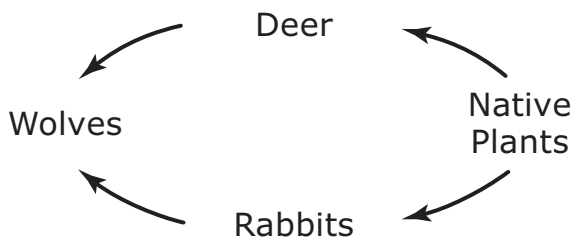
A 4

B 16

C 24

D 31

8 **Biologists are releasing wolves back into the wild in an area where the wolves have not been for many years.**



Which statement <u>best</u> predicts how populations of organisms in the food web will change in the years after the wolves are released?

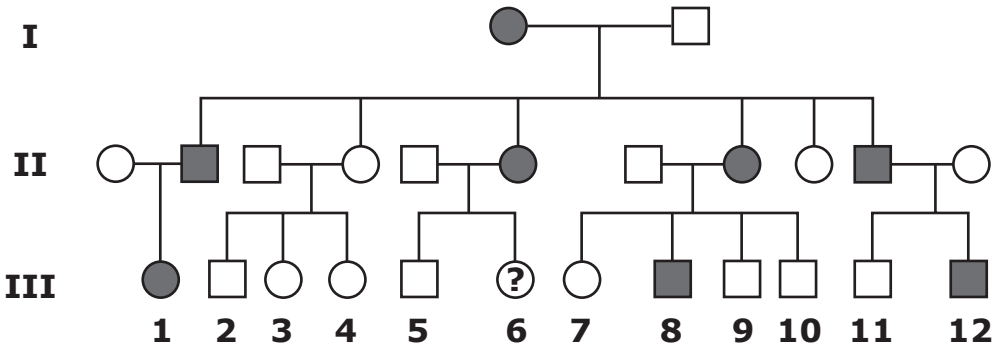
F The deer, rabbits, and native plants will increase.

G The deer, rabbits, and native plants will decrease.

H The deer and rabbits will increase; native plants will decrease.

J The deer and rabbits will decrease; native plants will increase.

9 **A pedigree for an inherited physical trait is shown.**



Key	
□ = Affected male	■ = Unaffected male
○ = Affected female	● = Unaffected female

Based on the pedigree, what is the probability that individual 6 in generation III will display the physical trait?

A 25%

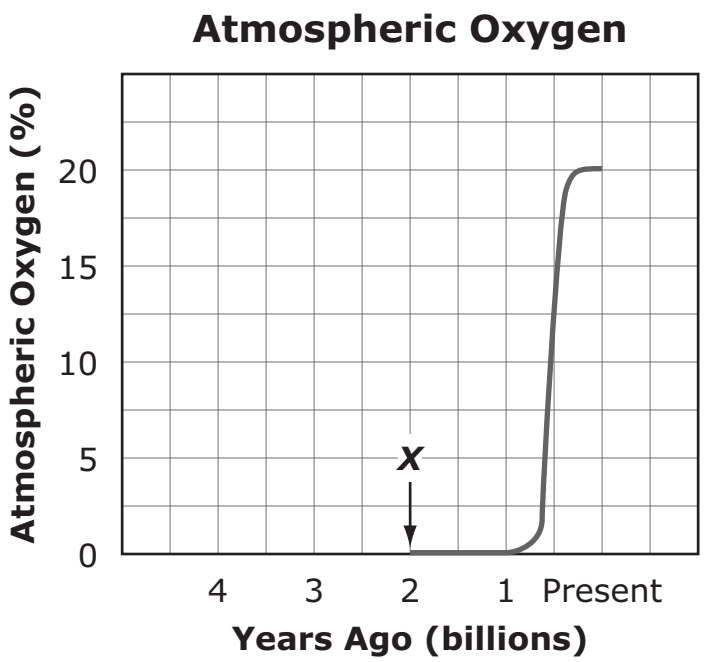
B 50%

C 75%

D 100%

GO ON

10 **The graph shows the changes in oxygen levels in the atmosphere of Earth over time.**



Which important event in the history of Earth occurred just before point *X*?

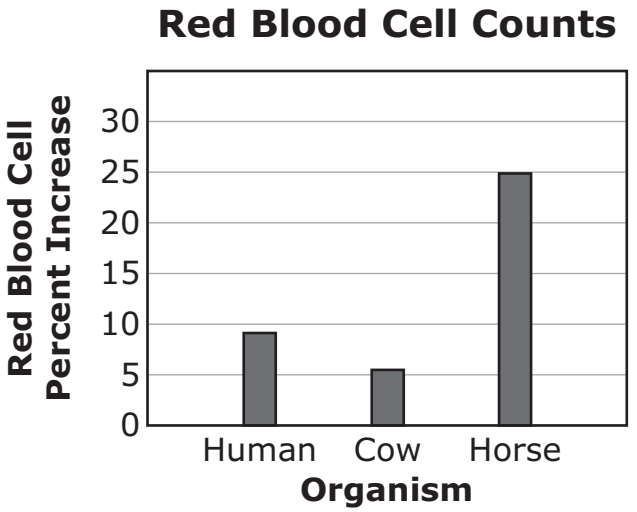
F the development of animals

G the development of respiration

H the development of photosynthesis

J the development of mutlicellular organisms

11 **Scientists studied the effect of increased altitude on the number of red blood cells in three organisms. Red blood cell counts were done in each organism at low altitude. The organisms were moved to a mountaintop and allowed to adjust to their new surroundings. Red blood cell counts were repeated. The graph shows the change in red blood cell counts for the three organisms.**



The chemical process that increases red blood cell counts is the same in each organism because of

A speciation.

B differentiation.

C common ancestry.

D geographic isolation.

12 **An ecologist collected biomass data about an ecosystem. Each organism represented a different trophic level.**

Organism	Biomass (g/m^2)
1	37
2	2
3	11
4	809

Which conclusion about the organisms in this ecosystem is <u>most</u> logical?

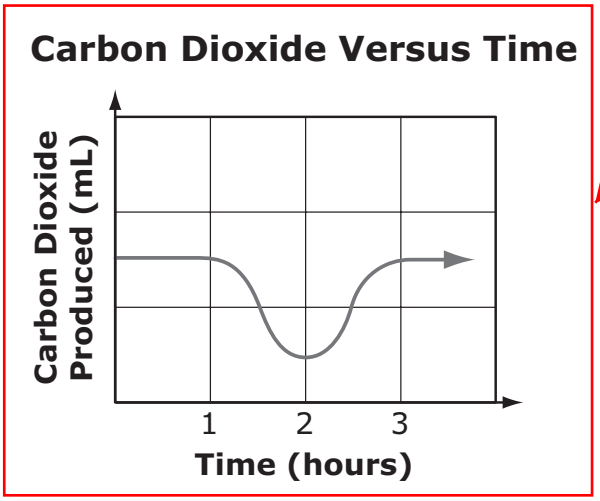
F Organism 1 cycles the least amount of matter into the ecosystem.

G Organism 2 cycles nitrogen from living systems into the environment.

H Organism 3 cycles oxygen from the atmosphere into living systems.

J Organism 4 cycles carbon from the environment into living systems.

13 **A scientist recorded carbon dioxide production from an animal over a three-hour period.**



Vendor: Please display art at 100%. Currently, art is at 92%, which makes the type appears smaller as well.

Which conclusion is correct based on the data?

A Water produced was highest at hour 2 because carbon dioxide production was lowest.

B Oxygen intake was lowest at hour 2 because carbon dioxide production was lowest.

C Water produced was lowest at hour 2 because glucose breakdown was highest.

D Oxygen intake was highest at hour 2 because glucose breakdown was highest.

14 **Over the past 100 years, the acidity of a lake has slowly increased due to industrial pollution. Most of the fish in the lake have died, but scientists have discovered one population of fish adapted to the high acidity level. A group of fishermen have proposed pumping fresh water into the lake to restore the acidity level to normal and re-introducing the species of fish that have died out.**

Which prediction describes what will most likely happen if the lake is restored?

F The re-introduced fish populations will be unable to compete with the population adapted to high acidity.

G The re-introduced fish populations and the population adapted to high acidity will both increase.

H The re-introduced fish populations will increase, and the population adapted to high acidity will be unaffected.

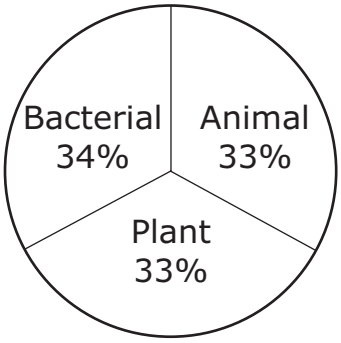
J The re-introduced fish populations will increase, and the population adapted to high acidity will decrease.

15 **A student observed several organisms and their cells. She recorded her observations in the table.**

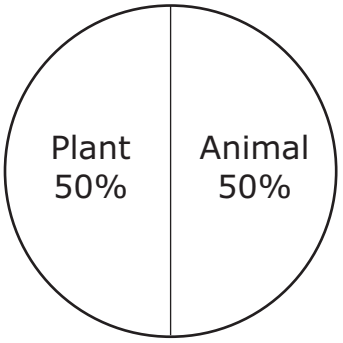
Organism	Single-celled (S) or Multicelled (M)	Cell Wall? (Y/N)	Chloroplasts? (Y/N)
1	M	Y	N
2	M	N	N
3	M	Y	Y
4	M	N	N
5	M	Y	N
6	S	Y	N

Based on the data, which circle graph represents the percentages of cell types the student observed?

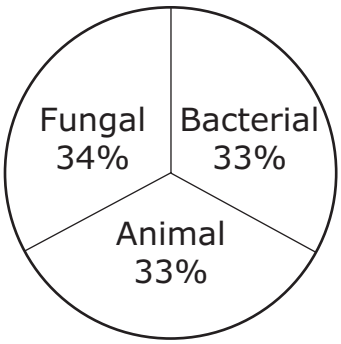
A **Cell Types**



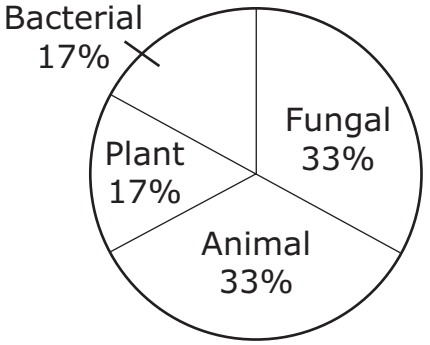
B **Cell Types**



C **Cell Types**



D **Cell Types**



16 **The larvae of four closely related beetle species consume ants of a particular species. Each beetle species has developed a different strategy for acquiring food. The table shows details of these strategies.**

Larvae of Beetle Species	Strategy for Acquiring Food	Response of Ants
Species 1	Live with ants, secrete ant chemicals, and eat ants	None
Species 2	Live in ant nest and eat ants	Do not tolerate beetles
Species 3	Sneak into ant nest, hide in burrow, and eat ant eggs	Do not tolerate beetles
Species 4	Hunt ants outside ant nest	None

Which beetle species has developed an adaptation in which the ants are unaware of the presence of the beetle larvae?

F Species 1

G Species 2

H Species 3

J Species 4

17 **To study population growth, an ecologist placed five mice in a small, isolated habitat and tracked the growth of the population over a ten-year period.**

Mouse Population

Year	Number of Mice
1990	9
1991	56
1992	156
1993	403
1994	1,200
1995	1,188
1996	1,190
1997	1,204
1998	1,210
1999	1,192

Which condition most likely had the greatest influence on the mouse population after 1994?

A No limiting factors were present.

B Carrying capacity had been reached.

C A new predator had entered the area.

D The mice were no longer reproducing.

18 **The table shows an observation about each structure that composes the levels of organization of life.**

Structure	Observation
1	One cell type with many cells that work together to perform a function
2	Many systems that work together to maintain homeostasis
3	One cell
4	Different tissue types that work together to perform a function
5	Several different organs that perform a function

What sequence of numbers is correct for the levels of organization of life from least complex to most complex?

F 3-4-2-1-5

G 2-1-3-5-4

H 2-5-4-1-3

J 3-1-4-5-2

19 **In humans, long eyelashes are dominant to short eyelashes. Two parents are heterozygous for this trait.**

What is the probability that an offspring of these parents will have short eyelashes, and in which unit should the length of the eyelashes be measured?

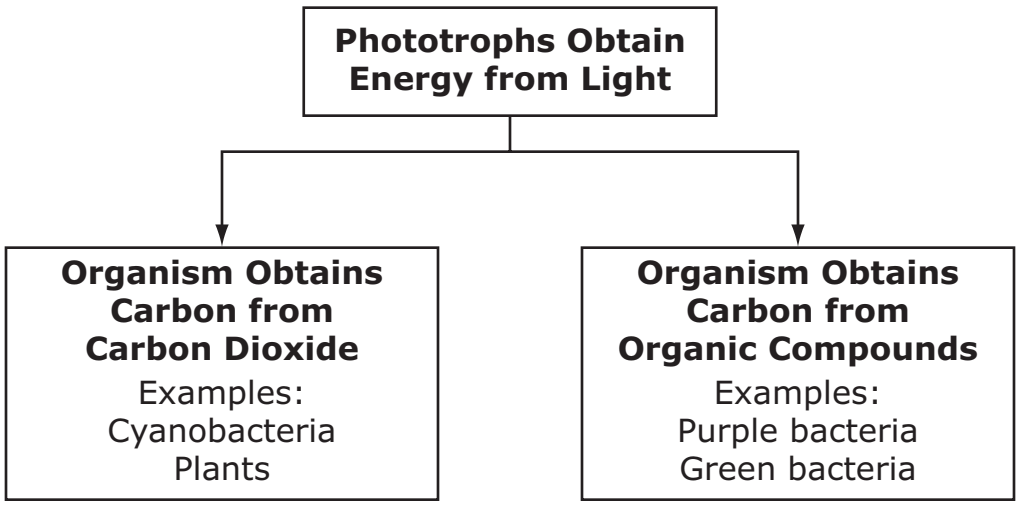
A 25%, grams

B 50%, meters

C 25%, millimeters

D 50%, micrograms

20 **Some scientists examined various organisms that photosynthesize. The scientists divided the organisms according to how they obtained carbon for synthesizing macromolecules. This is the classification scheme.**



Plants are distinguished from purple bacteria by

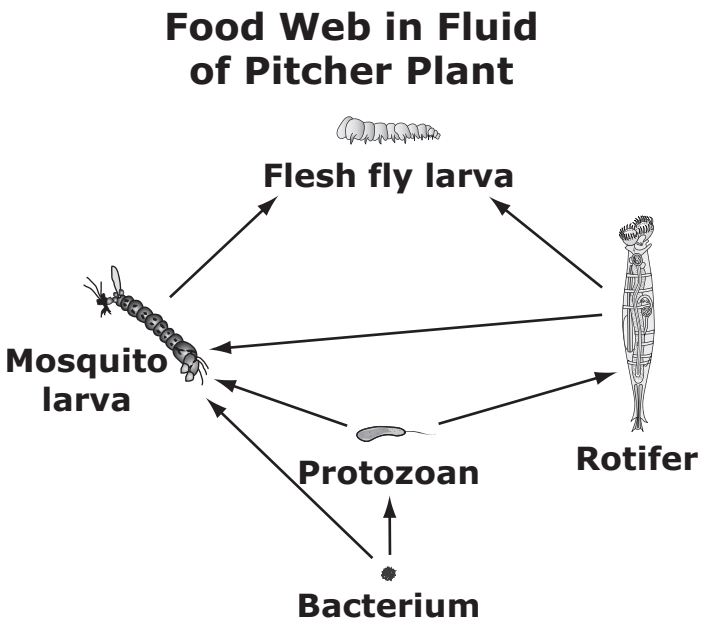
F the color of the chlorophyll.

G the ability to photosynthesize.

H the production of organic compounds.

J the ability to obtain carbon dioxide from the air.

21 **The diagram shows a food web within the fluid inside a carnivorous pitcher plant.**



(not to scale)

An increase in which predator population limits the mosquito larva population?

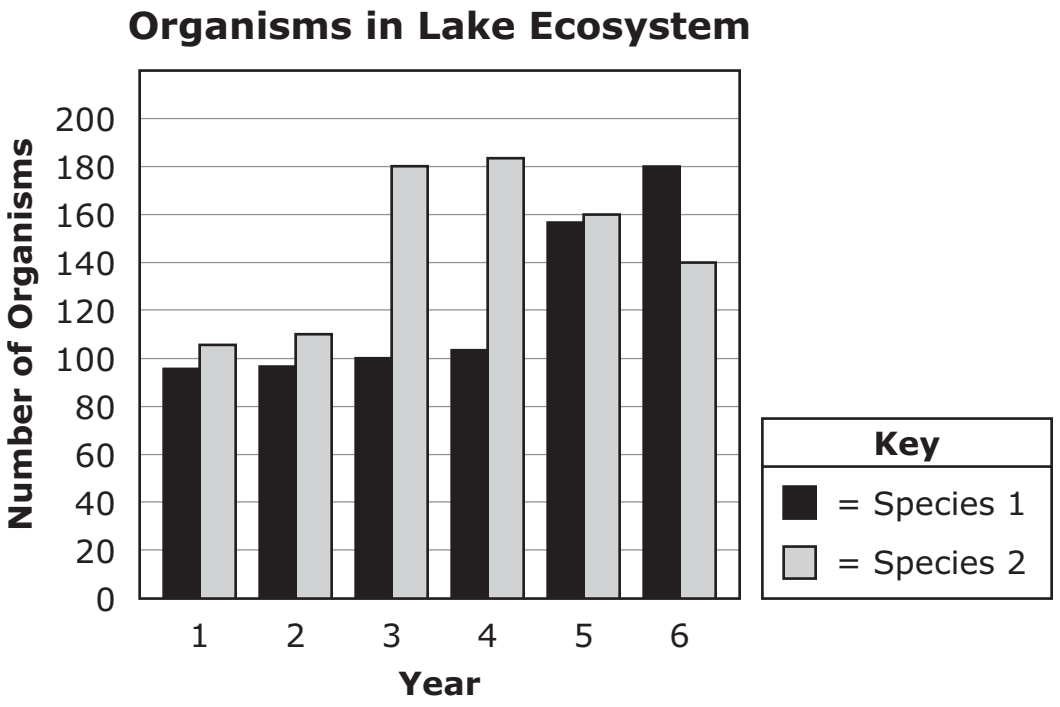
A rotifer

B bacterium

C protozoan

D flesh fly larva

22 **Two species compete for food in a lake. The bar graph shows the numbers of organisms of each species over six years. Flooding rains affected the lake ecosystem in Year 3.**



Which statement explains a probable population change in a future year that has little rainfall?

F Species 1 possesses an adaptation in which the population increases when a significant water increase occurs; therefore, the result of little rain would be a decrease in population.

G Species 2 possesses an adaptation in which the population increases when a significant water increase occurs; therefore, the result of little rain would be a decrease in population.

H Species 1 will become a predator of Species 2.

J Species 2 will become a predator of Species 1.

23 **A scientist compared the chromosome numbers during mitosis and meiosis for several plants. The scientist determined the diploid and haploid chromosome numbers and recorded the information in the table.**

Plant	Diploid Chromosome Number	Haploid Chromosome Number
Alfalfa	16	8
Apple	34	17
Corn	20	10
Potato	48	24
Rice	24	12
Soybean	40	20

Which hypothesis do the data in the table support?

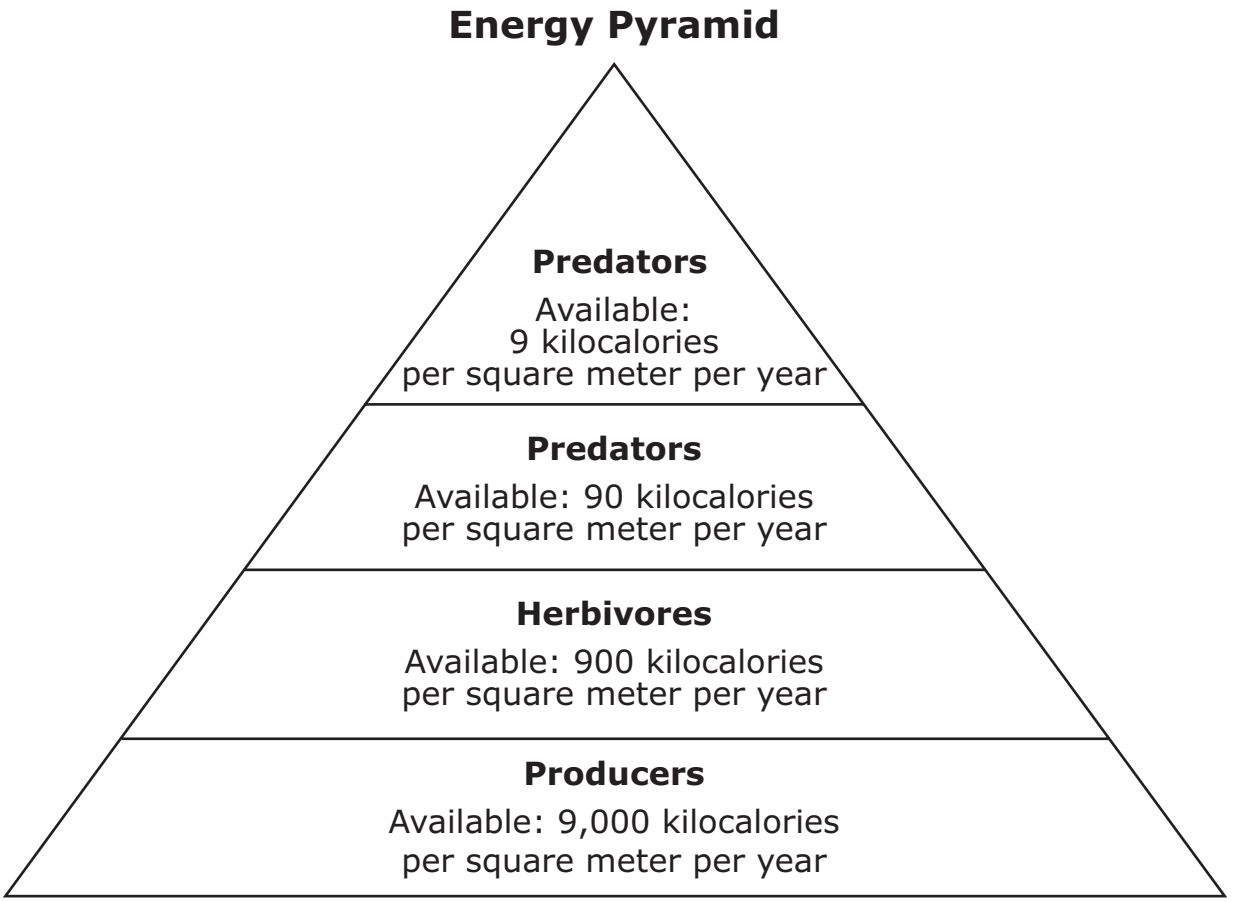
A If a root cell contains 17 chromosomes, then the species of plant being observed is apple.

B If a leaf cell contains 24 chromosomes, then the species of plant being observed is potato.

C If a sperm cell contains 20 chromosomes, then the species of plant being observed is corn.

D If a xylem cell contains 40 chromosomes, then the species of plant being observed is soybean.

24 **The diagram shows the relative amounts of energy stored at each level of an ecosystem.**



What percentage of the energy created by producers is used by third-level consumers?

F 0.1%

G 9.0%

H 10.0%

J 90.0%

25 **The table shows a small part of the sequence of amino acids within the cytochrome c protein in four animals.**

Position of the Amino Acids in Cytochrome c

Position of the Amino Acid	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
Horse	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Whale	A	B	C	D	E	Y	G	H	Z	J	K	L	M	N	O
Turtle	A	B	C	D	E	V	G	H	Z	J	K	U	M	N	O
Rabbit	A	B	C	D	E	Y	G	H	Z	J	K	L	M	N	O

How many amino acid positions differ between the turtle and the horse, and what does this most likely mean?

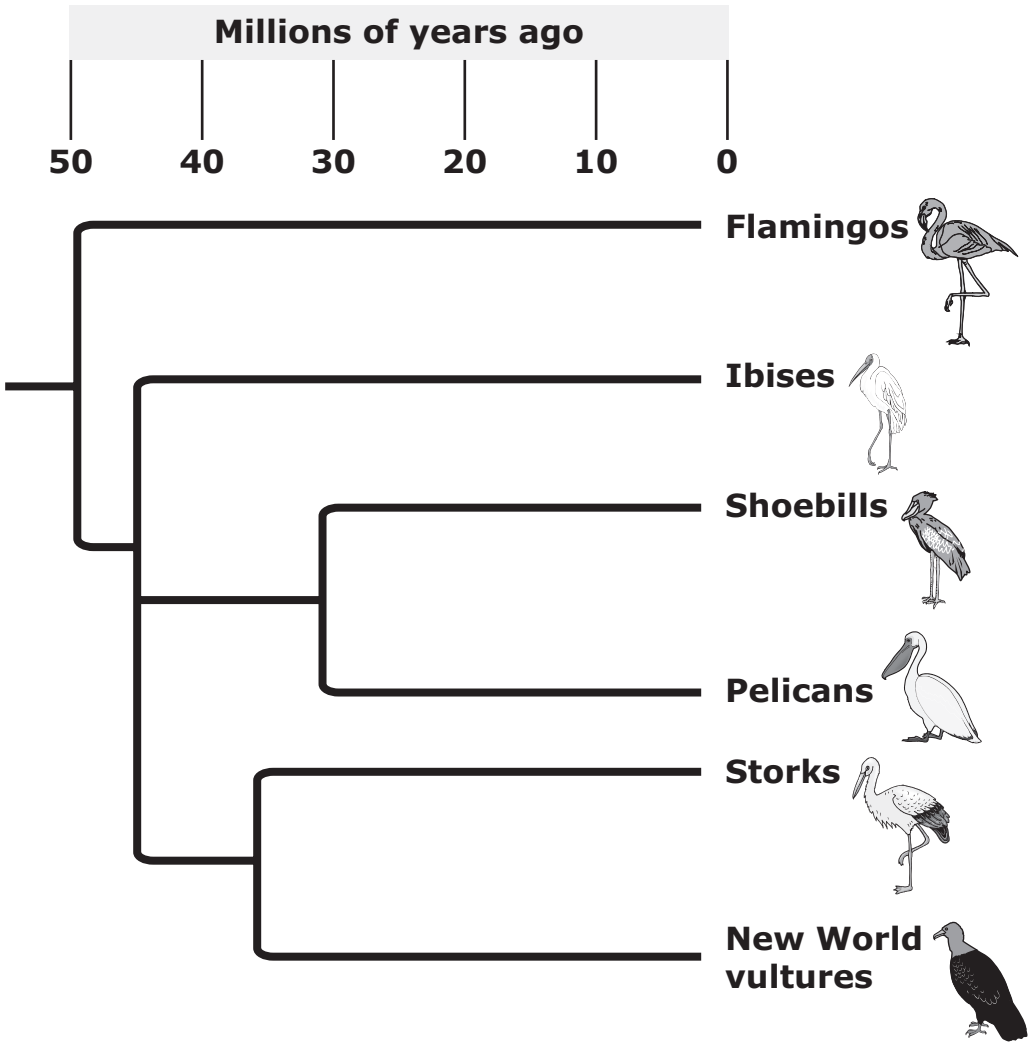
A The amino acid position differs by one, and the protein is exactly the same in the two organisms.

B The amino acid positions differ by three, and the proteins are entirely different in the two organisms.

C The amino acid position differs by one, and horses and turtles are completely unrelated.

D The amino acid positions differ by three, and horses and turtles share a common ancestor.

26 **The cladogram compares the DNA sequences of six birds.**



Which bird's DNA sequence differs from the other birds by the <u>greatest</u> amount?

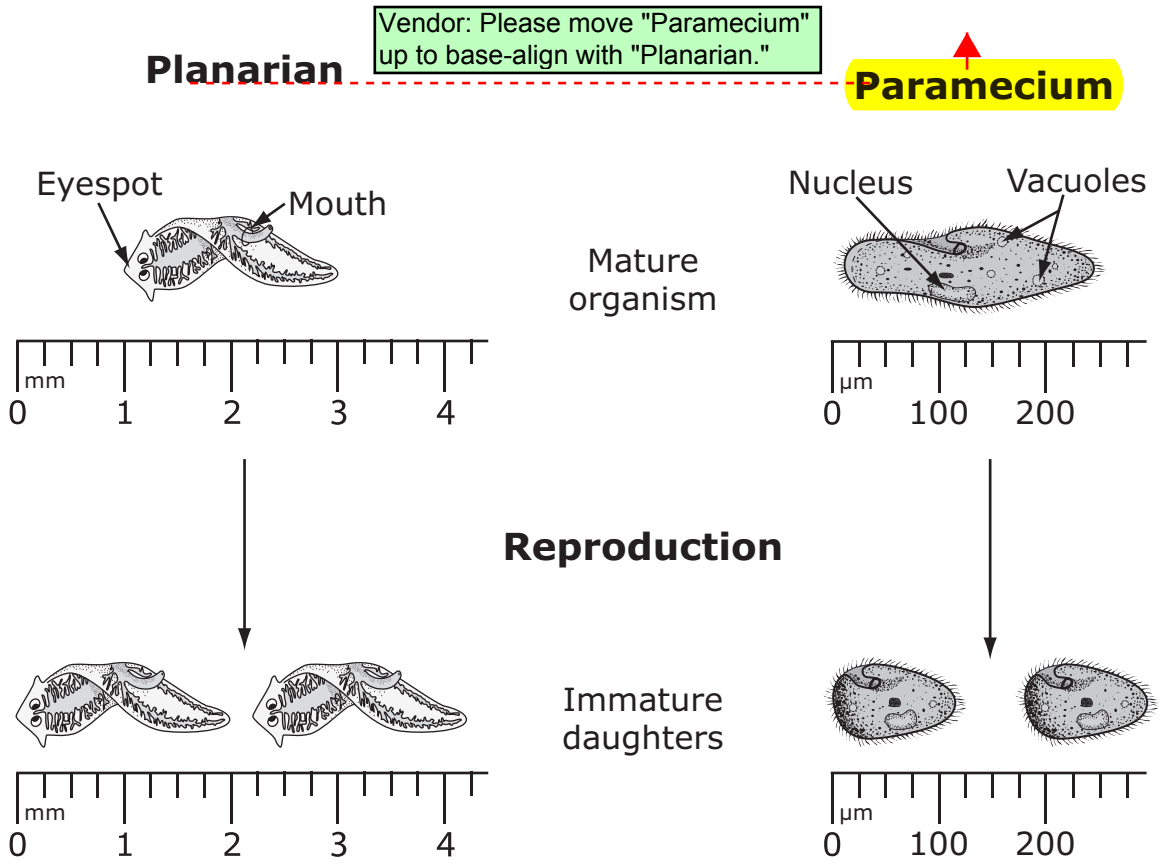
F a flamingo

G an ibis

H a shoebill

J a New World vulture

27 **The diagram shows two microscopic organisms undergoing reproduction.**



Which statement regarding the reproduction of the multicellular organism is true?

A The paramecium produces immature daughters that are the same size as their parent.

B The paramecium produces immature daughter cells that are smaller than their parent.

C The planarian produces immature daughters that are the same size as their parent.

D The planarian produces immature daughter cells that are smaller than their parent.

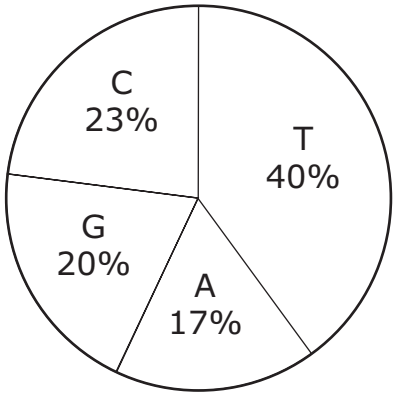
28 **The table shows the base composition of a sequence of DNA.**

DNA Strand Composition

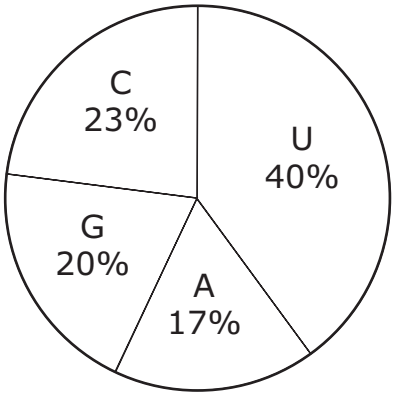
Base	Number of Bases in the Template Strand	% Total in DNA Strand
Adenine	64	40
Thymine	28	17
Cystosine	31	20
Guanine	37	23
Total	**160**	**100**

Which of the circle graphs correctly depicts the composition of an mRNA sequence for which the DNA sequence in the table is the template?

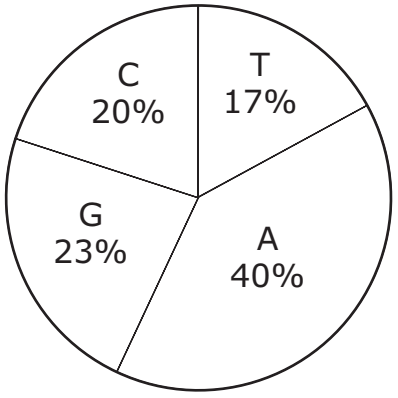
F **mRNA Base Composition**



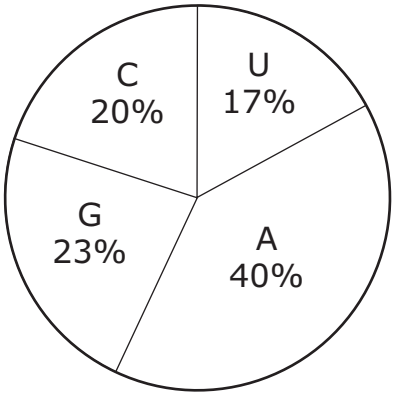
G **mRNA Base Composition**



H **mRNA Base Composition**



J **mRNA Base Composition**



GO ON

29 **A student examining bats and butterflies notices that their wings have the same function. Based on this evidence, he hypothesizes that bats and butterflies share a common ancestry.**

Is his hypothesis correct?

A Yes. Analogous structures are evidence of common ancestry.

B Yes. Homologous structures are evidence of common ancestry.

C No. Analogous structures are not evidence of common ancestry.

D No. Homologous structures are not evidence of common ancestry.

30 **A woman carries only one allele for a recessive sex-linked genetic disease. A man does not have the recessive allele for that genetic disease.**

Which of these is true of their children?

F All of their sons will have the disease.

G All of their children will have the disease.

H None of their children will have the disease.

J None of their daughters will have the disease.

STOP

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