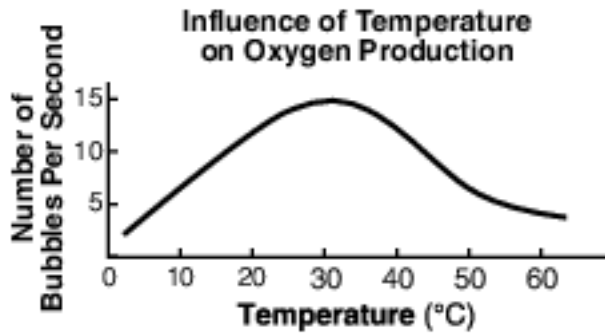


Data Organization Plot And Interpretation

- 1 The graph below shows the results of an action of the enzyme catalase on a piece of meat. Evidence of enzyme activity is indicated by bubbles of oxygen.



Which statement best summarizes the activity of catalase shown in the graph?

- (1) The enzyme works better at 10°C than at 50°C.
- (2) The enzyme works better at 5°C than at 65°C.
- (3) The enzyme works better at 35°C than at either temperature extreme.
- (4) The enzyme works at the same level in all environments.

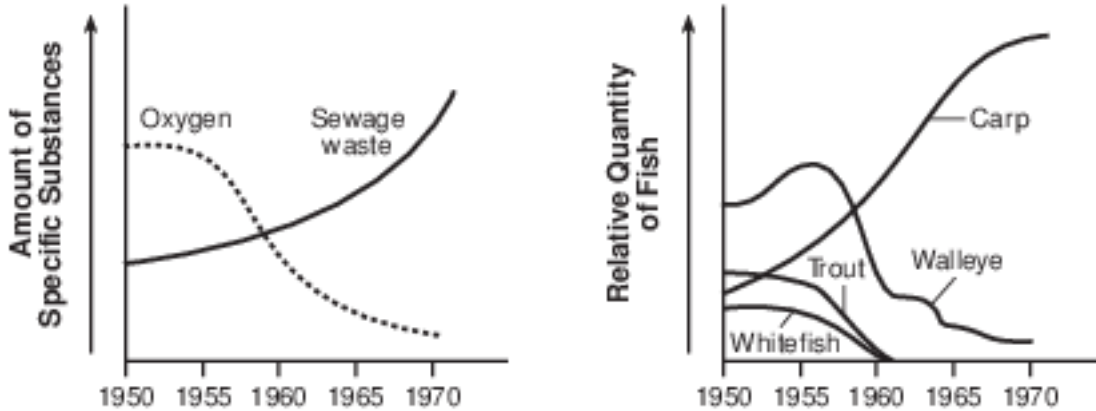
Base your answers to questions 2 on the information below and on your knowledge of biology.

An experiment was carried out to answer the question “Does the pH of water affect the growth of radish plants?” Two groups of ten radish plants were set up. One group was watered with water having a pH of 3.0, and the other group was watered with water having a pH of 7.0. Both groups of plants received the same amount and intensity of light, the same amount of water, and they were grown in the same type of soil. The heights of the radish plants were measured every 2 days for a period of 2 weeks.

- 2 What was the dependent variable in this experiment?
- | | |
|---------------------------|------------------------------|
| (1) heights of the plants | (3) temperature of the water |
| (2) pH of the water | (4) type of soil |

Base your answers to questions 3 on the graphs below and on your knowledge of biology. The graphs show the effect of sewage (human organic waste) flowing into a lake on the level of dissolved oxygen in the water and the size of different fish populations.

Oxygen Content and Fish Population in a Lake

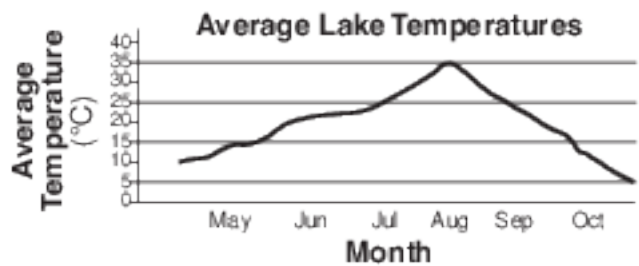
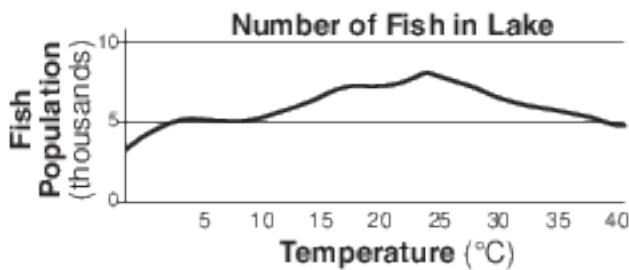


3 Which inference can be made from the graphs?

- (1) The increase in sewage waste from 1950 to 1970 was due to a decreasing human population.
- (2) The decrease in sewage waste shows that the environmental problems associated with land pollution have been solved.
- (3) Sewage waste is a good source of nutrients for most fish.
- (4) Increases in sewage waste were responsible for decreasing oxygen levels in the lake.

Base your answers to questions 4 on the information and graphs below, and on your knowledge of biology. The diagrams below show the number of fish in a lake and the average water temperature in the lake for the months of May through October.

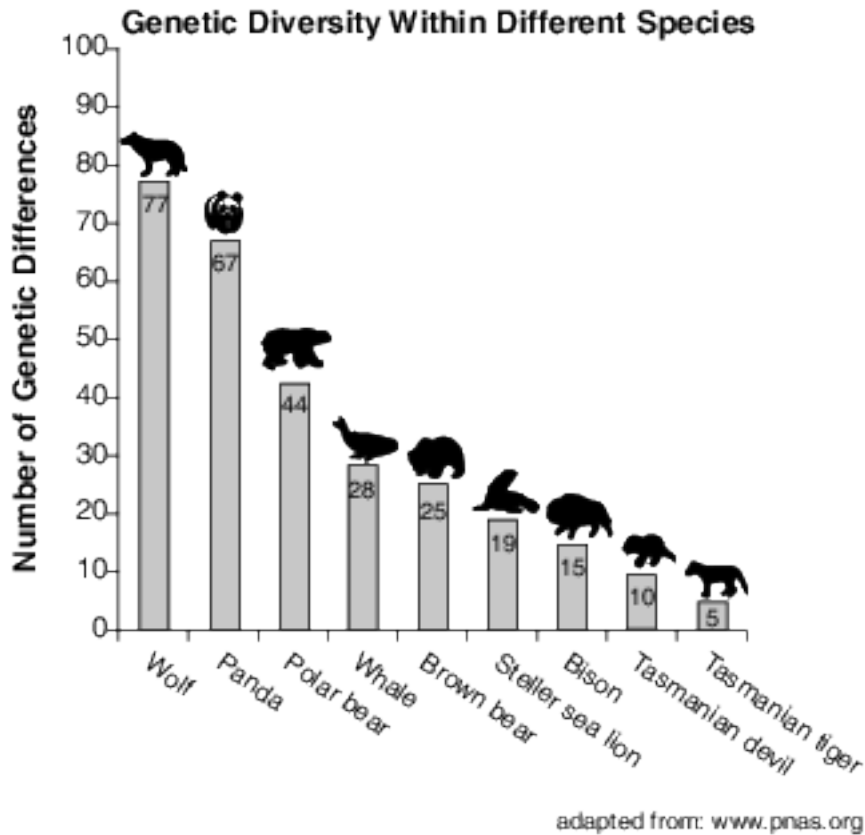
During certain times of the year, bears feed heavily on a population of fish in a lake. At other times of the year, the bear population feeds primarily on fruits, berries, and insects.



4 During which month would the bears in the area have the most fish available?

- (1) May
- (2) July
- (3) August
- (4) October

5 The chart below shows the number of differences in genetic material between individuals within the same species. Scientists can use this information to determine which populations demonstrate the greatest amount of genetic diversity.



According to the chart, which two species would be more likely to survive if their environmental conditions changed?

- (1) Tasmanian tiger and Tasmanian devil
- (2) brown bear and whale
- (3) Tasmanian tiger and wolf
- (4) panda and wolf

Base your answers to questions 6 on the information and data table below and on your knowledge of biology.

Illinois Greater Prairie Chicken on the Rise

As pioneers moved west in the mid-1800s, the greater prairie chicken population in Illinois was estimated to number in the millions. Since then, their population has drastically declined.

Evidence of the rapidly declining population was obtained from studying the number of eggs that hatched over several years. In Jasper County, Illinois, the number of prairie chickens fell from 2,000 to less than 50 in under 35 years. Researchers compared the DNA from feather samples from the living Illinois chickens to the DNA from feather samples dating from the year 1930 found in a museum. It was found that the living Illinois chicken population had a very low level of genetic diversity.

In 1992, researchers attempted to increase genetic variation by transporting more than 500 healthy prairie chickens into Illinois from the states of Minnesota, Kansas, and Nebraska. The data table below shows the changes in the percent of eggs that hatched from samples taken in different years. Researchers documented that this increase in the percent of eggs that hatched was not influenced by environmental events.

Prairie Chicken Egg Hatching

Years	Percent of Eggs Hatched
1970–1974	89
1975–1979	88
1980–1984	83
1985–1989	78
1990	38
1993–1996	94

Adapted from: <http://www.sciencedaily.com/releases/1998/11/981130045644.htm>

Directions: Using the information given, construct a bar graph on the grid following the directions below.

6 Label the y-axis on the line provided. [1]

Base your answers to questions 7 on the information and data table below and on your knowledge of biology.

Moose-killing Winter Ticks

Moose habitat is determined by temperature. Moose prefer areas where the average summer temperature is around 15°C and does not exceed 27°C for too long. The reason for this temperature dependency: Moose cannot sweat.

Besides the cooling effect of water, which moose are almost always near, aquatic environments provide them with a good supply of food, and in the past, have protected them against biting insects. However, the North American moose population is facing a new threat: a parasite called the winter tick. These ticks lodge themselves in the animal’s fur and hold on through the winter, sucking the animal’s blood. Many infected moose end up dying of exhaustion and weakness as a result of the large number of ticks feeding on them.

Ticks are most active during dry days in the fall. Adult ticks that drop off moose in the spring and land on snow cover have a poorer survival rate. Climate change can be predicted to improve conditions for winter ticks due to longer and warmer falls, and earlier snowmelt in the spring.

Surveys of the moose population in northeastern Minnesota have recorded the change shown below in the moose population between 2005 and 2013.

**Estimated Moose Population
In Northeastern Minnesota**

Survey Year	Estimated Moose Population
2005	8160
2006	8840
2007	6860
2008	7890
2009	7840
2010	5700
2011	4900
2012	4230
2013	2760

Directions: Using the information in the data table, construct a line graph on the grid below, following the directions below.

- 7 Mark an appropriate scale, without any breaks in the data, on the axis labeled “Estimated Moose Population.” [1]

Base your answers to questions 8 on the information below and on your knowledge of biology.

Five groups of corn seeds, each containing 275 seeds, were soaked for 1 hour in different concentrations of gibberellic acid, a plant growth hormone. After 1 hour, the seeds were rinsed in tap water and drained of all excess water. The seeds were then placed on paper towels and kept moist for 7 days. After 7 days, the growing stems were cut and weighed to determine the increase in growth. Then, the percent increase in growth compared to the growth of a group of untreated seeds was calculated. The results were recorded and are shown in the data table below.

Growth Rate in Corn Plants Treated with Gibberellic Acid

Concentration of Gibberellic Acid in Parts per Million (ppm)	Increase in Growth * (%)
225	15
300	30
400	23
500	15
600	6

* percent increase in growth compared to the growth of untreated seeds

Source: Adapted from www.super-grow.biz/GibberellicAcid.jsp

Directions: Using the information given in the data table, construct a line graph on the grid, following the directions below.

8 Mark an appropriate scale, without any breaks, on each labeled axis on the grid on the next page. [1]

Base your answers to questions 9 on the information and data table below and on your knowledge of biology.

White Nose Syndrome Found in Bats

White nose syndrome (WNS) is a disease found in bats. The disease, first detected in bats during the winter of 2006, is characterized by the appearance of a white fungus on the nose, skin, and wings of some bats, which live in and around caves and mines. It affects the cycle of hibernation and is responsible for the deaths of large numbers of bats of certain species. In some areas, 80-90% of bats have died. Not all bats in an area are affected, and certain bats that are susceptible in one area are not affected in other areas.

The roles of temperature and humidity in the environment of the bats are two of the many factors being investigated to help control the disease. Over the past few years, the Conserve Wildlife Foundation of New Jersey conducted summer bat counts of two bat species at 22 different sites, totaled the number, and reported the results. The approximate numbers of bats counted (to the nearest hundred) are listed in the table below.

Summer Bat Count (Total Number of Bats)

Year	Big Brown Bats (<i>Eptesicus fuscus</i>)	Little Brown Bats (<i>Myotis lucifugus</i>)
2009	900	6100
2010	1000	1700
2011	1000	500
2012	1000	400
2013	1300	300

Directions: Using the information in the data table, construct a line graph on the grid on the next page, following the directions below.

- 9 Mark an appropriate scale, without any breaks in the data, on the axis labeled “Number of Bats.” [1]

Base your answers to questions 10 on the information and data table below and on your knowledge of biology.

Peregrine falcons are an endangered species in New York State. This crow-sized predator feeds primarily on birds. Starting in the 1940s, exposure to the pesticide DDT in their prey caused declines in the peregrine falcon population. These pesticides caused eggshell thinning, which drastically lowered breeding success. By the early 1960s, peregrine falcons no longer nested in New York State. After the United States banned DDT in 1972, efforts were made to reintroduce peregrine falcons into the Northeast. Since the 1980s, the peregrine falcons are once again breeding in many areas of New York State.



Source: <http://www.dailymail.co.uk/news/article-1018309/Peregrine-falcons-return-breed-time-200-years.html>

The table below shows the number of peregrine falcon offspring produced in New York State over a 20-year period.

Number of Peregrine Falcon Offspring Produced in New York State From 1992 to 2012

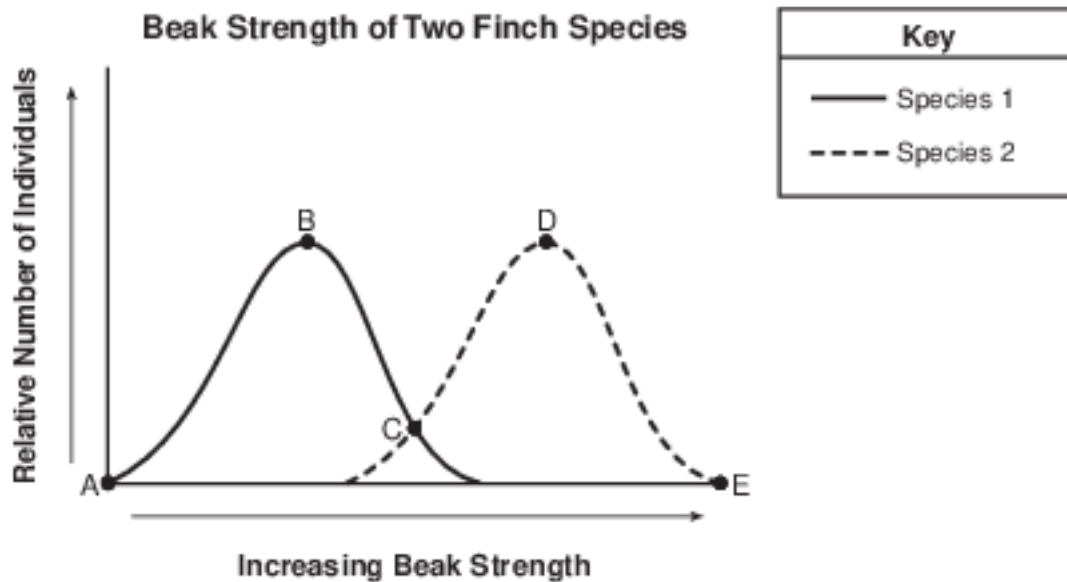
Year	Number of Offspring Produced
1992	30
1996	48
2000	75
2004	79
2008	129
2012	148

Directions: Using the information in the data table, construct a line graph on the grid provided, following the directions below.

10 Mark an appropriate scale, without any breaks in the data, on each labeled axis. [1]

Base your answers to questions 11 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.



11 Select the point on the graph where beak strength of the two bird species is equal. Support your answer. [1]

Point: _____

Base your answers to questions 12 on the information and data table below and on your knowledge of biology.

Diabetes is a disease characterized by consistently high blood glucose levels (at or above 126 mg/100 mL) as a result of hormone deficiency. For a study of diabetes, blood glucose levels from individual A and individual B were recorded each hour over a 5-hour period following a meal. The results are shown in the data table below.

Blood Glucose Levels
(mg/100 mL)

Hours	Individual A	Individual B
0	135	90
1	175	122
2	200	110
3	185	87
4	165	85
5	150	90

Directions: Using the information in the data table, construct a line graph on the grid on the next page, following the directions below.

12 Mark an appropriate scale, without any breaks, on each labeled axis. [1]

Base your answers to questions 13 on the information below and on your knowledge of biology.

In order to determine the effect of a certain antibiotic on a species of microorganism, an investigation was carried out. A sample of a specific species of microorganism was added to 100 mL of a liquid culture medium. One mL of a solution of the antibiotic was then added to that culture medium. Each day at 10 a.m., 1 mL of the experimental culture medium was removed and the number of microorganisms in the 1-mL sample was determined. The 1 mL of experimental culture medium was replaced by 1 mL of new sterile culture medium to maintain a constant volume. The results are shown in the table below.

Changes in Microorganism Population Size

Day	0	1	2	3	4	5	6	7
Number of Microorganisms in Sample	1000	500	100	50	40	200	500	1000

Directions: Using the information in the data table, construct a line graph on the grid, following the directions below.

13 Mark an appropriate scale, without any breaks, on each labeled axis. [1]

Base your answers to questions 14 on the data table below, which shows the estimated population of wolves in Minnesota from 1995 through 2002.

Minnesota Wolf Population

Year	Estimated Population
1995	2000
1996	2200
1997	2300
1998	2450
1999	2500
2000	2600
2001	2600
2002	2600

Directions: Using the information in the data table, construct a line graph on the grid, following the directions below.

14 Label the y-axis on the line provided. [1]

Base your answers to questions 15 on the information and data table below and on your knowledge of biology.

Onondaga Lake is a small lake located near Syracuse, New York. Industrialized municipal wastes have been polluting the lake for decades. Eating fish from the lake has been banned due to mercury concentrations in the fish. The data table below indicates the mercury concentrations in smallmouth bass taken from Onondaga Lake. Smallmouth bass eat smaller fish, which feed on aquatic plants.

At each feeding level in the food chain, more mercury accumulates. The older and larger the fish, the greater the concentration of mercury.

**Mercury in Onondaga Lake
Smallmouth Bass**

Year	Mercury Concentration (ppm – wet weight)
2000	1.5
2001	2.0
2002	1.75
2003	1.0
2004	2.5
2005	2.25

Directions: Using the information in the data table, construct a line graph on the grid below, following the directions below.

15 Mark an appropriate scale, without any breaks in the data, on each labeled axis. [1]

Answer Keys

- 1 3
- 2 1
- 3 4
- 4 2
- 5 4
- 6 Allow 1 credit for correctly labeling the y-axis “Percent of Eggs Hatched.”
- Note: Do not allow credit if percent or % is not included in the label.
- 7 Allow 1 credit for completing an appropriate scale, without any breaks in the data, on the axis
- labeled “Estimated Moose Population.”
- 8 Allow 1 credit for marking an appropriate scale, without any breaks in the data range, on each
- labeled axis.
- 9 Allow 1 credit for marking an appropriate scale, without any breaks in the data, on the axis labeled
- “Number of Bats.”
 - Note: Do not allow credit if the grid is extended to accommodate the scale.
- 10 Allow 1 credit for marking an appropriate scale on the grid provided, without any breaks in the
- data, on each labeled axis.
 - Note: Do not allow credit if the grid is altered to accommodate the scale.
- 11 Allow 1 credit for C and supporting the answer. Acceptable responses include, but are not limited to:
- — At point C, the beak strength has the same value for both species.
 - — because that is where the lines intersect
- 12 Allow 1 credit for marking an appropriate scale, without any breaks, on each labeled axis.
- 13 Allow 1 credit for marking an appropriate scale, without any breaks, on each labeled axis.
- 14 Allow 1 credit for correctly labeling the y-axis.
- 15 Allow 1 credit for marking an appropriate scale, without any breaks in the data, on each labeled axis.