

Creating a Line Graph

- When data is collected during a controlled experiment, it is organized into a data table.
 - Below is raw data obtained from an experiment involving the number of bacteria present at different time periods:
 - 0 min - 30, 10 min - 45, 20 min - 60, 30 min 80, 40 min - 100, 50 min 130, 60 min - 135
 - Organize the data into the table below:

Time (minutes)	Number of bacteria

- Once the data is organized into a data table, it is used to create a line graph to observe trends in the data
- The independent variable **ALWAYS** goes on the x-axis (horizontal axis)
- Which variable in the example above is the independent variable?
- The dependent variable **ALWAYS** goes on the y-axis (vertical axis)
- Identify the dependent variable in the example above:
- An even scale must be created for each axis
- Before filling in the scale for each, determine the lowest and highest points:
 - What is the lowest data point for the x-axis?
 - The highest?

- Create an even scale that includes the lowest and highest points on this axis
- What is the lowest data point for the y-axis?
- The highest?
- Now create an even scale that includes the lowest and highest points on this axis
- Now that the scales are set up for each axis, the data points can be plotted
- Start with the first data point and look for the x-coordinate
- Follow this up until you reach the corresponding y-coordinate and place a small but noticeable dot at that point
- Continue in this fashion for the remaining data points
- Connect the points in order using a straight edge
- Unless directed otherwise, surround each point with a circle
- If a title is not provided, then you must create one that describes the relationship illustrated in the graph
 - The effects of (the independent variable) on (the dependent variable) is an effective format for a title
- Create a line graph using the information from the data table above and the graph paper provided
 - Label the axes
 - Create even scales for each axis
 - Provide a title using the format above
 - Connect each point with a straight edge and surround each point with a circle

Part B-2

Answer all questions in this part. [12]

Directions (44–55): For those questions that are followed by four choices, circle the *number* of the choice that best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question.

Base your answers to questions 44 through 48 on the passage and data table below and on your knowledge of biology.

**For Teacher
Use Only**

The amount of oxygen gas dissolved in water is important to the organisms that live in a river. The amount of dissolved oxygen varies with changes in both physical factors and biological processes. The temperature of the water is one physical factor affecting dissolved oxygen levels as shown in the data table below. The amount of dissolved oxygen is expressed in parts per million (ppm).

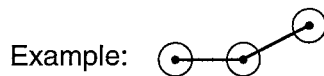
Dissolved Oxygen Levels at Various Temperatures

Water Temperature (°C)	Level of Dissolved Oxygen (ppm)
1	14
10	11
15	10
20	9
25	8
30	7

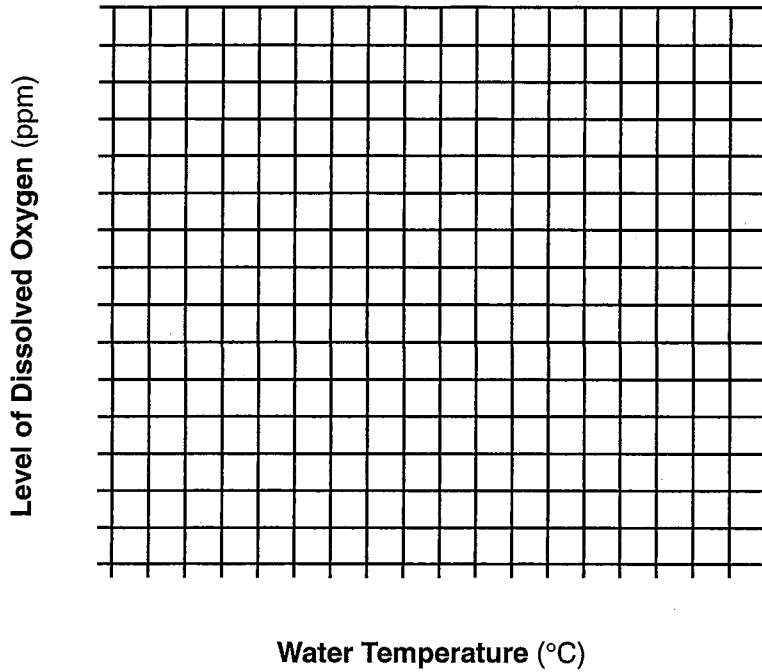
Directions (44–45): Using the information given, construct a line graph on the grid on page 13, following the directions below.

44 Mark an appropriate scale on each labeled axis. [1]

45 Plot the data for dissolved oxygen on the grid. Surround each point with a small circle and connect the points. [1]



Dissolved Oxygen Levels at Various Temperatures



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46 If the trend continues as shown in the data, what would the dissolved oxygen level most likely be if the temperature of the water was 35°C? [1]

_____ ppm

46

47 State the relationship between the level of dissolved oxygen and water temperature. [1]

47

48 Identify *one* physical or biological process taking place within the river, other than temperature change, that would affect the level of dissolved oxygen and state whether this process would increase or decrease the level of dissolved oxygen. [1]

48

Base your answers to questions 46 through 49 on the information and data table below and on your knowledge of biology.

**For Teacher
Use Only**

A number of bean seeds planted at the same time produced plants that were later divided into two groups, *A* and *B*. Each plant in group *A* was treated with the same concentration of gibberellic acid (a plant hormone). The plants in group *B* were not treated with gibberellic acid. All other growth conditions were kept constant. The height of each plant was measured on 5 consecutive days, and the average height of each group was recorded in the data table below.

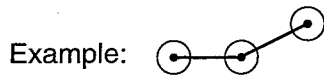
Data Table

	Average Plant Height (cm)				
	Day 1	Day 2	Day 3	Day 4	Day 5
Group A	5	7	10	13	15
Group B	5	6	6.5	7	7.5

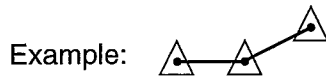
Directions (46–48): Using the information in the data table, construct a line graph on the grid on the next page, following the directions below.

46 Mark an appropriate scale on the axis labeled “Average Plant Height (cm).” [1]

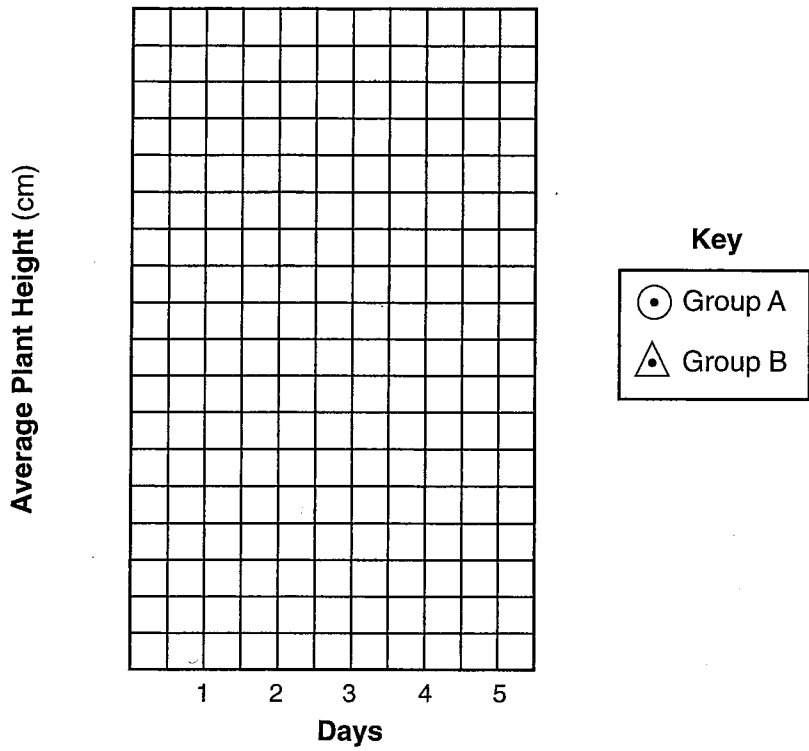
47 Plot the data for the average height of the plants in group *A*. Surround each point with a small circle and connect the points. [1]



48 Plot the data for the average height of the plants in group *B*. Surround each point with a small triangle and connect the points. [1]



Plant Height



**For Teacher
Use Only**

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49 State a valid conclusion that can be drawn concerning the effect of gibberellic acid on bean plant growth. [1]

49

Base your answers to questions 47 through 51 on the information and data table below and on your knowledge of biology.

Biologists investigated the effect of the presence of aluminum ions on root tips of a variety of wheat. They removed 2-mm sections of the tips of roots. Half of the root tips were placed in a nutrient solution with aluminum ions, while the other half were placed in an identical nutrient solution without aluminum ions. The length of the root tips, in millimeters, was measured every hour for seven hours. The results are shown in the data table below.

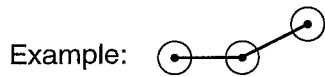
Data Table

Time (hr)	Length of Root Tips in Solution With Aluminum Ions (mm)	Length of Root Tips in Solution Without Aluminum Ions (mm)
0	2.0	2.0
1	2.1	2.2
2	2.2	2.4
3	2.4	2.8
4	2.6	2.9
5	2.7	3.2
6	2.8	3.7
7	2.8	3.9

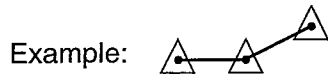
Directions (47–49): Using the information in the data table, construct a line graph on the grid *on the next page*, following the directions below.

47 Mark an appropriate scale on each labeled axis. [1]

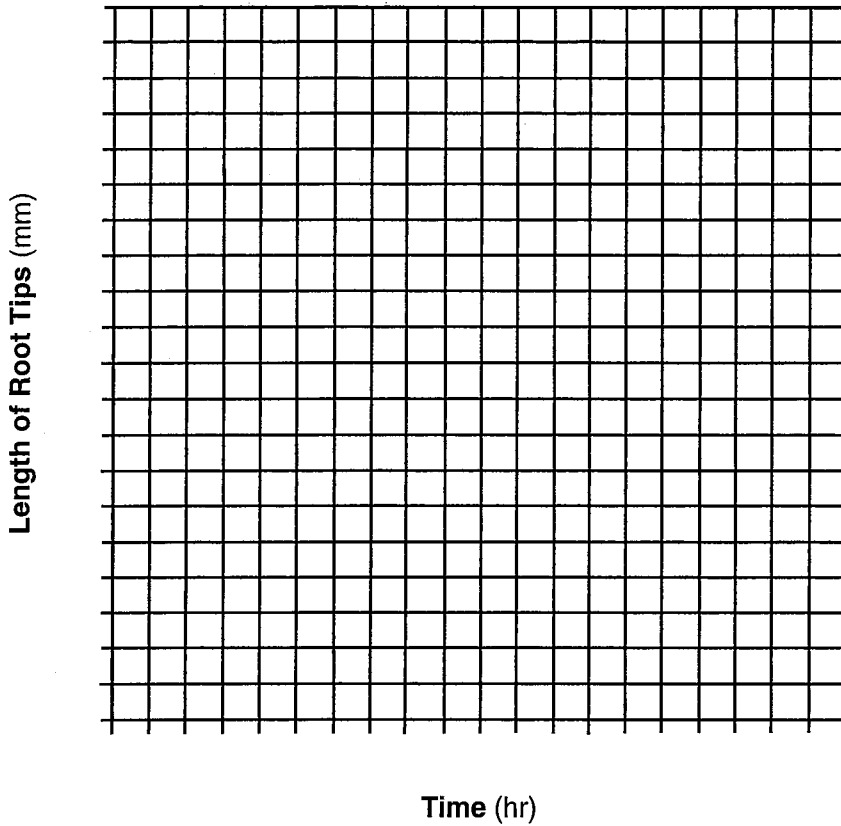
48 Plot the data for root tips in the solution with aluminum ions on the grid. Surround each point with a small circle and connect the points. [1]



49 Plot the data for root tips in the solution without aluminum ions on the grid. Surround each point with a small triangle and connect the points. [1]



Growth of Wheat Root Tips



● = Root tips in solution with aluminum ions
 ▲ = Root tips in solution without aluminum ions

For Teacher Use Only

47

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49

50 The aluminum ions most likely affected

- (1) photosynthetic rate
- (2) the union of gametes
- (3) mitotic cell division
- (4) starch absorption from the soil

50

51 Describe the effect of aluminum ions on the growth of the root tips of wheat. [1]

51