Fishkill
Task Information

Grade: Biology

Content:

- MST Framework Reference - Standard 4 - The Living Environment
- Regents Biology - Unit VII - Ecology

Format: Paper/Pencil

Purpose: To analyze data related to temperature and dissolved oxygen.

Skills:

Primary: Interpreting data, Predicting, Graphing, Applying math

Secondary: Generalizing, Inferring

Time: 20 minutes

Materials: worksheet, pencil, ruler

Preparation: none

Safety: none

Extensions/Modifications: none

Fishkill

Task: At this station, you will analyze data to determine the effect of thermal pollution on a certain species of fish.

Background

Water temperature is a limiting factor in an aquatic habitat, affecting activities such as respiration and reproduction.

Directions

Examine the data in the table below. It shows the concentration of dissolved oxygen available in water at different temperatures. The oxygen available to fish is in units marked ppm or "parts per million." A higher ppm reading indicates a greater concentration of oxygen.

Water temperature (⁰ Celsius)	Concentration of Dissolved Oxygen (ppm)
30	7.8
20	9.0
10	10.5
0	14.1

1.   Construct a line graph of the data presented above.
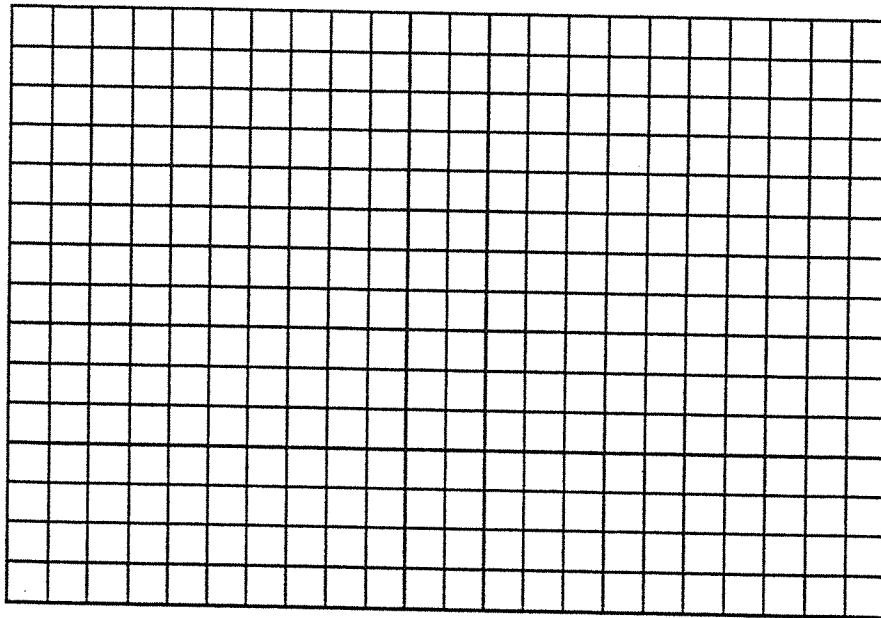
> **Please Continue on the Next Page**

2. A certain species of fish normally live in a pond that never exceeds the temperature of 10°C. This species of fish requires a dissolved oxygen level 9.5 ppm. Industrial development has the potential of increasing the pond's temperature by releasing hot water produced during a necessary process. Answer the questions below based on your knowledge of biology and using your graph.

A. According to your graph, at what temperature would the dissolved oxygen level in the pond drop below the required level?

_____

B. What impact would the change in temperature have on the fish. Explain your reasoning in complete sentences.

_____

_____

_____

_____

3. Using complete sentences, suggest two (2) ways of preventing the thermal pollution and still have the industrial development occur.

_____

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Fishkill - Scoring Rubric
Maximum Score - 16 points

Question 1. - Graph
7 points total

Graph set-up
4 points total
- Allow 1 point for an appropriate title
- Allow 1 point for labeled axis
  - Temperature - horizontal axis
  - Dissolved oxygen - vertical axis
- Allow 1 point for use of appropriate units
- Allow 1 point for providing appropriate scale on both axis

Graph plotting
2 points total
- Allow 2 points if **all** four (4) points a re plotted correctly
- Allow 1 point if three (3) points a plotted correctly
- No credit if fewer than three(3) points are plotted correctly

Graph line
1 point total
- Allow 1 point if the line is drawn correctly

Question 2 - Prediction
5 points total
Part A
- Allow 1 point if the student correctly gives temperature value based on their graph.
- Allow 1 point if the student records units in °Celsius

Part B
- Allow 1 point if the student's statement reflects that the temperature change produces a response due to the unfavorable habitat
- Allow 2 points student uses complete sentences to explain that the temperature change reduces the dissolved oxygen level and produces respiratory stress in the fish population survival.
- Allow 1 point if the student's explanation is correct but not written in complete sentences.
- No credit if the student's explanation is incorrect even if it is in complete sentences.

Question 3 - Prevention methods
4 points total
- Allow 2 points for each acceptable suggestion for prevention of thermal pollution. Suggestions must be written in complete sentences.
- Allow 1 point for each acceptable suggestion, but **not** written in complete sentences.

Sample of acceptable suggestions:
- Hot water could be stored in holding ponds before release.
- Hot water could be used in some part of the factory.
- Cooling towers could be constructed to let heat leave the water before it is released.

Highest possible score - 16 points

Student ID _____   **Scoring Form - Fishkill**

Male / Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. **Graph**

set- up	0	1	2	3	4
plotting data	0	1	2		
line	0	1			

2. **Prediction**

A. Temperature value/ units	0	1	2		
B. Effect	0	1	2	3	

3. **Prevention**

0	1	2	3	4

Total Score _____

Total Possible score -16 points

Student ID _BIO – FK – 1_   **Scoring Form - Fishkill**

Male / Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. **Graph**

   set- up   0   1   2   3   (4)

   plotting data   0   1   (2)

   line   0   (1)

2. **Prediction**

   A.   Temperature value/ units   0   1   (2)

   B.   Effect   0   1   2   (3)

3. **Prevention**   0   1   2   3   (4)

Total Score _16 pts_

Total Possible score -16 points

Student ID _BIO – FK – 2_   **Scoring Form - Fishkill**

Male / Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. **Graph**

   set- up   0   1   (2)   3   4

   plotting data   0   (1)   2

   line   0   (1)

2. **Prediction**

   A.   Temperature value/ units   0   1   (2)

   B.   Effect   0   1   2   (3)

3. **Prevention**   0   1   (2)   3   4

Total Score _11 pts_

Total Possible score -16 points