Name _____   Class _____   Date _____

Lead Poisoning and Mental Ability

People are usually exposed to lead in old buildings that were painted with lead paint. The lead can enter your body as dust when you breathe and can permanently damage the brain and nervous system. Lead poisoning can cause aggressive behavior, hyperactivity, headaches, and hearing loss. At high levels, it can cause seizures, coma, and even death. The Centers for Disease Control and Prevention (CDC) state that a lead level of only 10 micrograms per deciliter in the blood can be harmful. (A microgram is one-millionth of a gram, and a deciliter is one-tenth of a liter.) In this lab, you will explore the effect of lead poisoning on the mental ability of children. The children all grew up near a lead smelter, a factory where raw lead ore is processed. Scientists measured the concentration of lead in the children's blood over time. Psychologists also performed tests on the children to determine their IQ. You will analyze the data to see if you can find a pattern.

OBJECTIVES

Analyze the relationship between lead poisoning and children's IQ.

Graph experimental data.

Interpret graphical data.

MATERIALS

- notebook
- pen or pencil

Procedure

1. Design a hypothesis for the relationship between the lead concentration in the blood, the IQ, and the age of the children. As the blood-lead concentration increases, how would you expect the person's IQ to change? How do you think this relationship would change as the children grow older?

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Lead Poisoning and Mental Ability *continued*

Group of children		Average blood-lead concentration (micrograms per deciliter)	Average IQ score
6 mo	1	8.3	109.4
	2	12.6	104.7
	3	16.8	102.9
	4	24.2	100.0
15 mo	1	11.8	109.3
	2	18.6	106.5
	3	24.4	102.9
	4	34.4	101.3
3 yr	1	11.6	110.2
	2	17.4	106.5
	3	22.4	102.2
	4	30.2	100.0
5 yr	1	8.3	109.3
	2	12.6	106.1
	3	17.2	104.1
	4	23.6	98.8
7 yr	1	6.6	109.6
	2	10.1	107.7
	3	13.7	102.7
	4	20.0	98.7

2. The table above lists the blood-lead concentration and IQ data for a group of 494 children. The children were measured five times as they grew up. The first measurement was made when they were six months old, and the last measurement was made when they were seven years old. The children were divided into four groups according to the amount of lead in their blood. Group 1 had the lowest concentration of lead, and group 4 had the highest concentration of lead. Prepare a graph on the next page for the data in the table. Plot lead concentration on the x-axis and IQ on the y-axis. Label each axis with the correct units. Choose an appropriate scale for each axis so that the entire range of data in the table will fit on the graph.

Lead Poisoning and Mental Ability *continued*

3. Plot the data from the table on your graph. Connect all data points for a single age group with a single line. You should have five lines of data on your graph and have one line for each age group.

Analysis

1. Analyzing Data For a single age group, how does IQ vary with lead concentration? Is this true for all age groups?

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2. Analyzing Data How does the relationship between lead concentration and IQ change as a child grows older?

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| Lead Poisoning and Mental Ability *continued*

Conclusions

3. Drawing Conclusions What conclusions can you draw from your analysis about the effect of lead on IQ?

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4. Applying Conclusions Based on your conclusions, what long-term effects might lead poisoning have on a community?

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Extension

1. Analyzing a Viewpoint Based on the data presented in this lab, do you think the CDC's limit of 10 micrograms per deciliter is reasonable? Explain your answer.

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