#3 Using Math to Get to the Source

Answer Key

1-3. List the blood lead level (µg/dl) of each of the three children. 16 24.5

4. Find the average (mean) blood lead level for this group, our initial "sample."

Show your calculation. 59.5 / 3

19.83

5. How does this compare with the Centers for Disease Control's "level of concern"?

Almost double 10 µg/dl.

6. After our three children were diagnosed, the other mothers in the playgroup checked their kids' blood as well. Let's look at the blood lead levels of the other children belonging to the playgroup, a bigger sample:

4, 7, 10, 3, 13, 8, 5, 6, 9

Find the average blood lead level for the whole playgroup (all 12 kids).

Show your calculation. 124.5/12

10.38

7. What is the range of values for all the children?

21.5 µg/dl
8. Plot the blood lead measurements and the mean blood lead level on a graph.

![Blood Lead Levels of Playgroup](image)

9. Explain how it is possible that twice as many data points fall above the mean as below. Shouldn't there be an equal number of points on either side? Measure the length of the segment from each point to the line which denotes the mean as part of your answer.

> The lengths of the segments from each point to the mean are equal. It is not the number of data points but the distance from the mean that is equal. (The median is the number at which the data points fall equally above and below the mean.)

10. Should we include the blood lead levels of the mothers who bring the children to the group? Why or why not?

> No. The adults' bodies are different and their behavior is different. Since the problem is poisoning in children, it is best to keep a consistent sample of children's levels.

11. We know from large studies of many children that in the United States on average 4.4% of children have elevated blood lead levels (i.e. > 10µg/dl). However, a study in Miami showed that in some central areas of Miami 8.4% of children had elevated blood levels. Why might the children in some areas of Miami have a higher percent of children with lead poisoning than the rest of the nation?

> Miami has high rates of child poverty, many old houses, and hot weather so people are outside a lot. Also, Miami is home to many industries which use lead
and many immigrants from places where lead is still more available in the environment.

12. If we assume that the 8.4% figure is correct for Miami, how many children would we expect to have elevated blood levels in the playgroup?

   1.008, round down to 1 child

13. How many kids in the playgroup really do have "elevated" blood lead? Express this number as a percent of the whole playgroup.

   5, 42%

14. This represents an increase of how many percent over what we expected?

   +400%

15. What is the next step in identifying a common source? Where might you begin the next part of your investigation?

   Test the soil, paint etc. where playgroup meets.

16. **BONUS QUESTION** -- Could these children's high blood lead levels be purely the result of "chance"? Why or why not?

   Yes, unusual findings can be the result of chance. The way we try to determine the likelihood of a result being caused by chance is by using "significance testing", a statistical procedure based on probability.