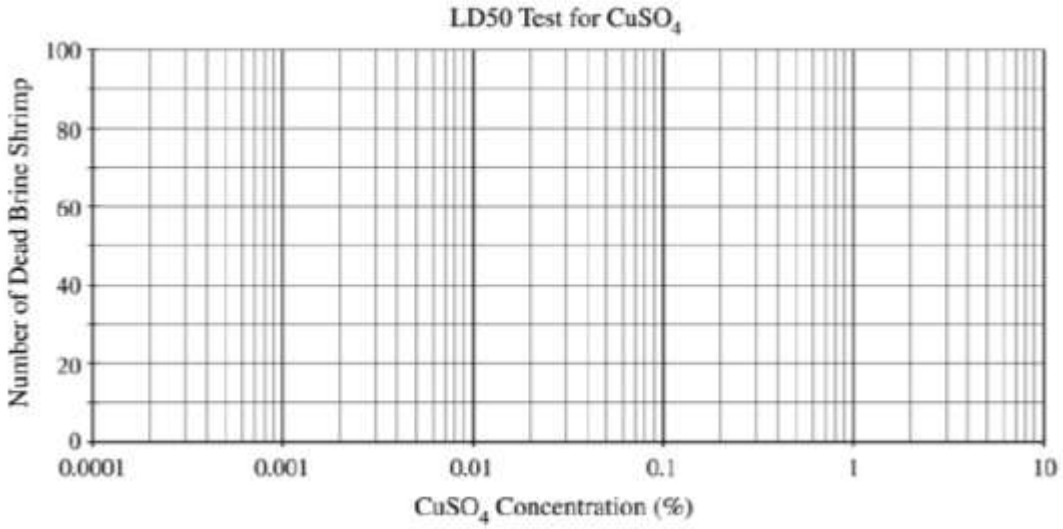
 Date _____

TOXICOLOGY Review Questions

An experiment is performed to test the toxicity of copper sulfate ($CuSO_4$) using brine shrimp as a test organism. Six different concentrations of $CuSO_4$ solution are prepared in separate petri dishes, and 100 brine shrimp are placed in each dish. After 24 hours, the number of brine shrimp that have died are counted and recorded. The results of this experiment are shown in the table below.

$CuSO_4$ Concentration (%)	Number of Dead Brine Shrimp
<0.0001	10
0.001	10
0.01	20
0.1	55
1	90
10	100

1. Plot these data on the semi-log graph provided below. Draw a smooth curve through the data points to illustrate the overall trend of the data.



2. Explain the meaning of the term "threshold level of toxicity". What is the threshold level of toxicity of $CuSO_4$ for brine shrimp? Label this point on the graph.

3. What is the LD50 concentration of $CuSO_4$ for brine shrimp? _____

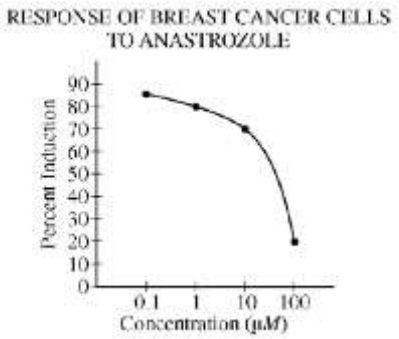
4. In addition to the characteristics related to the brine shrimp, name two other significantly different variables that would need to be controlled to ensure the validity of the experiment.

5. Provide one argument for extending these toxicity results to humans and one argument against doing so.

6. The LD_{50} of caffeine is 200mg/kg (as tested in laboratory rats). If the average cup of coffee contains 100 mg caffeine, how many cups of coffee would you estimate that it would take to kill a human that weighs 154 pounds (1kg = 2.2 pounds).

7. The LD_{50} of cyanide is catalogued at 1.5mg/kg. A human can ingest 40% of the lethal dose before seeing any side effects. The average adult male weighs approximately 80kg. Based on this information, approximately what dose of cyanide would start to have adverse side effects in the average human male?

Questions 8-10 refer to the graph showing the relationship between the induction of cancer in breast cells and the concentration of anastrozole .



8 Toxicologists say "the dose makes the poison," meaning that most substances are harmful in high enough concentrations. The data for anastrozole
(A) supports this concept because as concentration increases, so does response
(B) supports this concept because as concentration increases, response decreases
(C) does not support this concept because as concentration increases, response increases
(D) does not support this concept because as concentration increases, response decreases
(E) does not support this concept because the experiment was not done in animals

9. Based upon the data, what is the best description of this relationship?
(A) As the concentration of anastrozole increases, the percent induction of breast cancer also increases.
(B) As the concentration of anastrozole increases, the percent induction of breast cancer decreases.
(C) There is a direct relationship between the concentration of anastrozole and induction of breast cancer.
(D) It is more advantageous to be exposed to low amounts of anastrozole.
(E) Anastrozole has no effect on breast cancer induction.

10. How would including a control group be useful in an experiment when testing anastrozole?
(A) It would provide a reference for the effects of environmental factors.
(B) It would provide a greater number of individuals receiving the treatment of anastrozole.
(C) It would provide a standard number to test for statistical uncertainty.
(D) It would provide an end data point for graphical analysis.
(E) A control group would be unnecessary in the case of a study such as this.