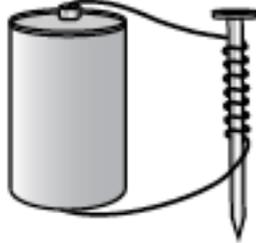


CAPT PRACTICE TEST # 2 INQUIRY
DEVELOPED FROM RELEASED QUESTIONS AND OTHER SOURCES.

INQUIRY QUESTIONS: *Inquiry questions are organized by strand. They are labeled by strand and Inquiry topic 1-9.*

Strand I: Energy Transformations

A group of students was studying simple electromagnets. They carried out the following experiment.



1. Take a nail and wrap a 10-cm wire around the nail five times.
2. Connect both ends of the wire to a 1.5-volt battery.
3. Measure how many paper clips can be lifted by the end of the nail.
4. Repeat for three trials.
5. Repeat steps 1–4 using the same wire and increasing the number of loops of wire around the nail by five.

Number of Loops of Wire	Number of Paper Clips Lifted			
	Trial 1	Trial 2	Trial 3	Average
5	4	2	3	3.0
10	4	5	5	4.7
15	7	5	6	6.0

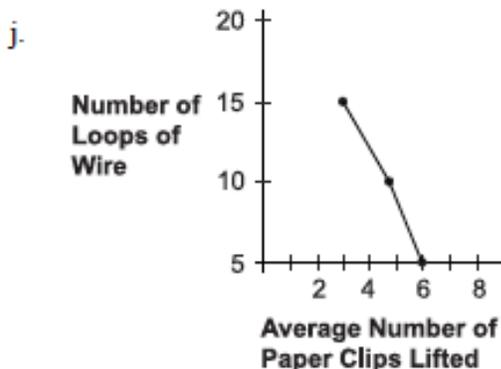
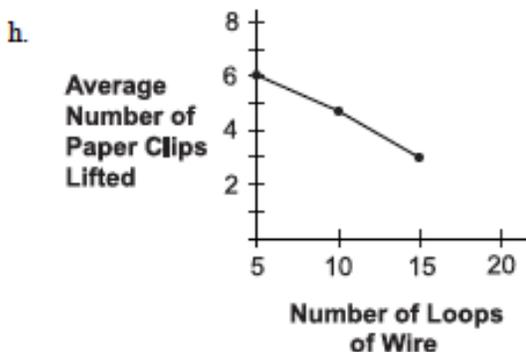
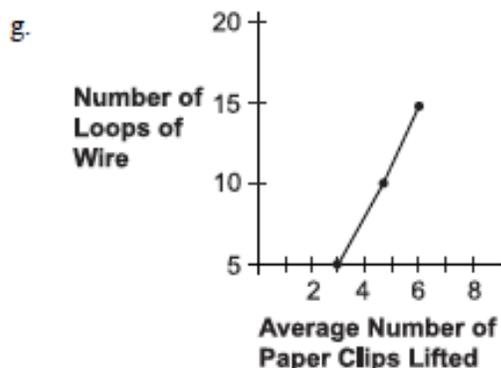
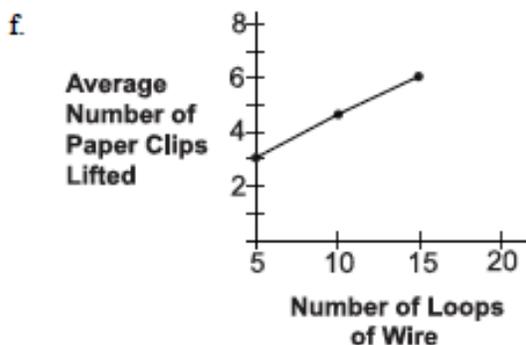
1. Which of the following would **most** improve the design of the experiment?
 - a. Replace the nail with a wood pencil.
 - b. Increase the length of the wire as the number of loops is increased.
 - c. Keep the number of paper clips lifted constant in the experiment.
 - d. Increase the number of loops of wire beyond fifteen.

Strand I: Energy Transformations

Expected Performance: D INQ.4 Design and conduct appropriate types of scientific investigations to answer different questions.

CAPT PRACTICE TEST # 2 INQUIRY
DEVELOPED FROM RELEASED QUESTIONS AND OTHER SOURCES.

2. Which graph correctly displays the results of the experiment?



Strand I: Energy Transformations

Expected Performance: D INQ.8 Use mathematical operations to analyze and interpret data, and present relationships between variables in appropriate forms.

Strand II: Chemical Structures and Properties

3. Researchers have developed a biopolymer made from orange peels and carbon dioxide. According to the researchers, using CO₂ to make polymers could reduce the amount of greenhouse gas emitted into the atmosphere. What question would an environmentalist **most likely** want answered before accepting this statement as credible?

- f. How long will it take the biopolymer to decompose?
- g. Is the biopolymer as strong as hydrocarbon polymers?
- h. Can other types of citrus be used to produce biopolymers?
- j. What happens to the CO₂ when the biopolymer decomposes?

Strand II: Chemical Structures and Properties

Expected Performance: D INQ.1 Identify questions that can be answered through scientific investigation.

CAPT PRACTICE TEST # 2 INQUIRY
DEVELOPED FROM RELEASED QUESTIONS AND OTHER SOURCES.

4. The following data are recorded during a supervised investigation.

Experimental Data

Type of Container	Total Burning Time (min.)	Amount of Fuel at Start (grams)	Amount of Fuel Remaining (grams)
Closed	5	100	73
Open	12	100	0

What question was the investigator **most likely** trying to answer?

- How does the presence of oxygen affect combustion?
- At what point is equilibrium reached in a combustion reaction?
- What are the byproducts of an incomplete combustion reaction?
- Does the amount of fuel in a combustion reaction affect the burn time?

Strand II: Chemical Structures and Properties

Expected Performance: D INQ.1 Identify questions that can be answered through scientific investigation.

Petroleum-based Polymers vs. Plant-based Polymers

A petroleum-based (inorganic) polymer is commonly used for grocery bags. Recently there has been a push by environmentalists to make grocery bags out of plant-based (organic) polymers.

Students in a science class decided to investigate the strength of the two types of polymers. They obtained one petroleum-based (inorganic) polymer bag and one plant-based (organic) polymer bag of the same size and thickness. They added 100-gram weights to each bag until it broke.

5. The students found that the plant-based polymer grocery bag held 500 grams before breaking and the petroleum-based polymer grocery bag held 600 grams before breaking. In order to increase confidence in their results, the students should repeat the investigation using _____.

- only plant-based polymer bags
- two other types of polymer bags
- a double thickness of each polymer bag
- both the plant and petroleum polymer bags

Strand II: Chemical Structures and Properties

Expected Performance: D INQ.4 Design and conduct appropriate types of scientific investigations to answer different questions.

6. What is the independent variable in the investigation?

- the size of the bags
- the type of polymer
- the thickness of the bags
- the amount of weight of the bags

Strand II: Chemical Structures and Properties

Expected Performance: D INQ.5 Identify independent and dependent variables, including those that are kept constant and those used as controls.

CAPT PRACTICE TEST # 2 INQUIRY
DEVELOPED FROM RELEASED QUESTIONS AND OTHER SOURCES.

Strand III: Global Interdependence

A teacher provides her class with a table displaying the relative greenhouse effect per molecule of different gases compared to carbon dioxide.

Carbon Dioxide	Methane	Nitrous Oxide	CFCs
1	30 times	160 times	17,000 times

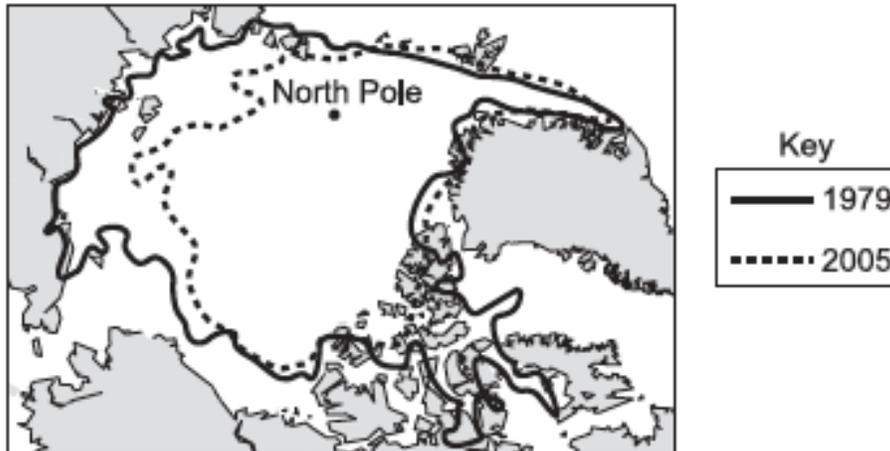
7. Based on this table, a student made the conclusion that carbon dioxide is not the main cause of the greenhouse effect. What other data are needed to make a stronger conclusion?

- a. data about the origin of the gases
- b. data about the size of each type of molecule
- c. data about the absorption of these gases by plants
- d. data about the amount of each gas in the atmosphere

Strand III: Global Interdependence

Expected Performance: D INQ.2 Read, interpret and examine the credibility and validity of scientific claims in different sources of information.

The picture below shows the extent of summer Arctic Sea ice in 1979 and 2005.



8. Which hypothesis is **best** supported by the changes in sea-ice coverage?

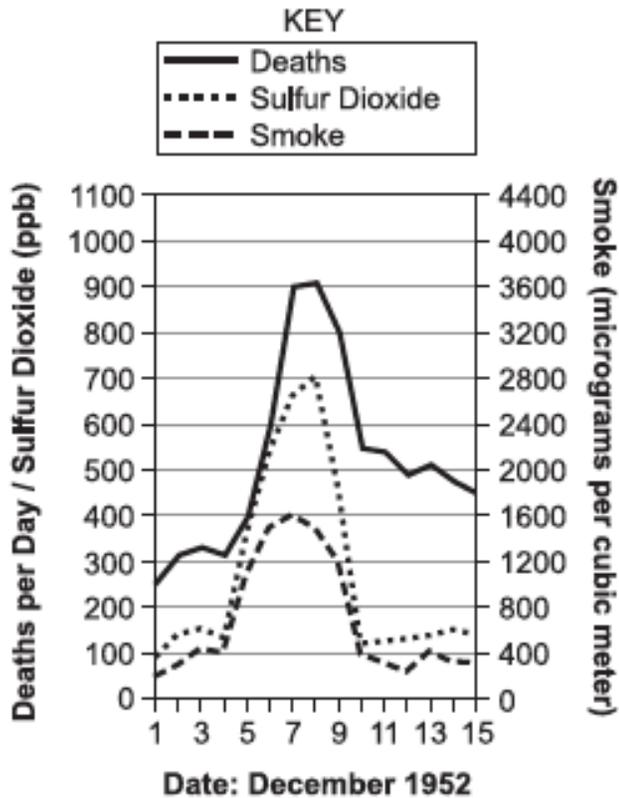
- a. Earth's climate is gradually warming.
- b. Arctic Sea ice is migrating away from Earth's poles.
- c. Global warming is caused by human activity, not nature.
- d. Global warming occurs only at Earth's poles during the summer.

Strand III: Global Interdependence

Expected Performance: D INQ.3 Formulate a testable hypothesis and demonstrate logical connections between the scientific concepts guiding the hypothesis and the design of the experiment.

CAPT PRACTICE TEST # 2 INQUIRY
DEVELOPED FROM RELEASED QUESTIONS AND OTHER SOURCES.

9. The graph below shows the correlation between pollutants and human deaths during the London smog disaster of 1952. Which conclusion is best supported by the data?



- a. Acid rain fell from December 4 to December 10.
- b. Smoke caused more deaths than sulfur dioxide.
- c. Sulfur dioxide remains in the air longer than smoke.
- d. Air pollution peaked between December 7 and December 8.

Strand III: Global Interdependence

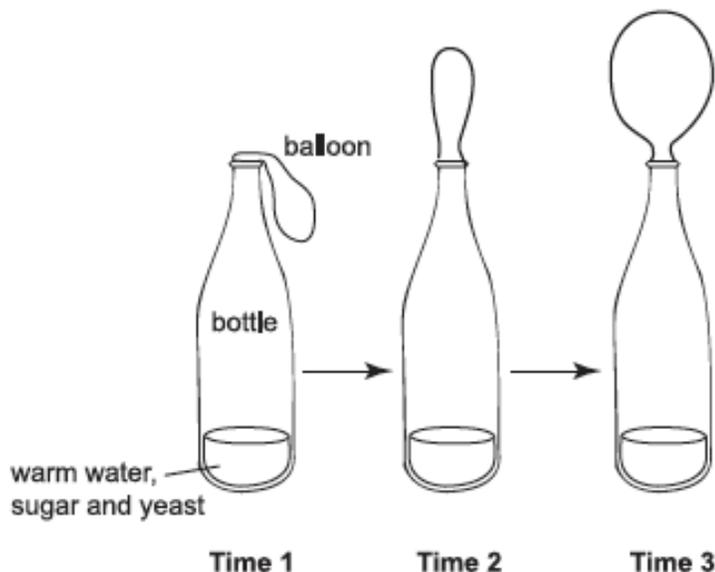
Expected Performance: D INQ.7 Assess the reliability of the data that was generated in the investigation.

CAPT PRACTICE TEST # 2 INQUIRY
DEVELOPED FROM RELEASED QUESTIONS AND OTHER SOURCES.

Strand IV: Cell Chemistry and Biotechnology

Laboratory Investigation

In a laboratory investigation, a student mixes 1 cup of warm water (30°C) with 30 grams of sugar and 5 grams of yeast. She pours the mixture into a glass bottle and secures a balloon over the opening. After several minutes, she observes that the balloon begins to inflate, as shown in the picture below.



The student performs two additional trials. In trial 2 she uses water at 25°C , and in trial 3 she uses water at 20°C . She observes that the colder the water, the longer it takes the balloon to inflate.

10. After reviewing her data, the student decides to perform an additional trial at 35°C . She observes that the balloon inflates faster than during the trial in which the 30°C water was used. **This additional trial supports which of the following hypotheses?**

- f. Warmer temperatures are more favorable for yeast fermentation.
- g. Yeast require less sugar when maintained at lower temperatures.
- h. The optimum temperature for yeast fermentation is less than 35°C .
- j. The time required for fermentation increases with increasing temperature.

Strand IV: Cell Chemistry and Biotechnology

Expected Performance: D INQ.3 Formulate a testable hypothesis and demonstrate logical connections between the scientific concepts guiding the hypothesis and the design of the experiment.

CAPT PRACTICE TEST # 2 INQUIRY

DEVELOPED FROM RELEASED QUESTIONS AND OTHER SOURCES.

Students are exploring what happens to potatoes when placed in liquid. They cut one potato into slices and placed the slices in 3 different solutions, as described in the table below.

Solution	Amount of Solute (in grams)	Initial Mass of Potato (in grams)	Mass of Potato after 25 Minutes (in grams)
100 cc distilled water	0	10	12
100 cc saltwater A	7	10	10
100 cc saltwater B	25	10	8

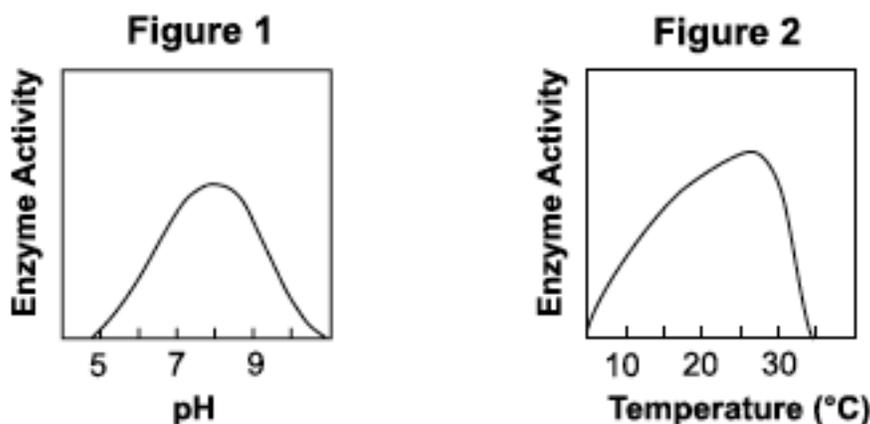
11. Which of the following is the independent variable in the students' experiment?

- the amount of time in the solution
- the shape of the slices
- the mass of the potatoes
- the concentration of the solutions

Strand IV: Cell Chemistry and Biotechnology

Expected Performance: D INQ.5 Identify independent and dependent variables, including those that are kept constant and those used as controls.

12. The figures below show the reaction rate of a specific enzyme at different temperatures and different pHs.



What can be concluded about the enzyme?

- The enzyme works best at a pH of 8 and a temperature of 25°C.
- The enzyme only works at a pH of 8 and a temperature of 25°C.
- The enzyme is used up at a pH of 11 and a temperature of 35°C.
- The enzyme works better at a pH of 8 than a temperature of 25°C.

Strand IV: Cell Chemistry and Biotechnology

Expected Performance: D INQ.7 Assess the reliability of the data that was generated in the investigation.

CAPT PRACTICE TEST # 2 INQUIRY

DEVELOPED FROM RELEASED QUESTIONS AND OTHER SOURCES.

13. Students placed a sample of red blood cells (RBC) and a sample of skin cells in 2 test tubes that contained the same glucose solution. After 24 hours, the students observed the cells under the microscope and found that the cells in both samples increased in size.

What conclusion might be drawn from this observation?

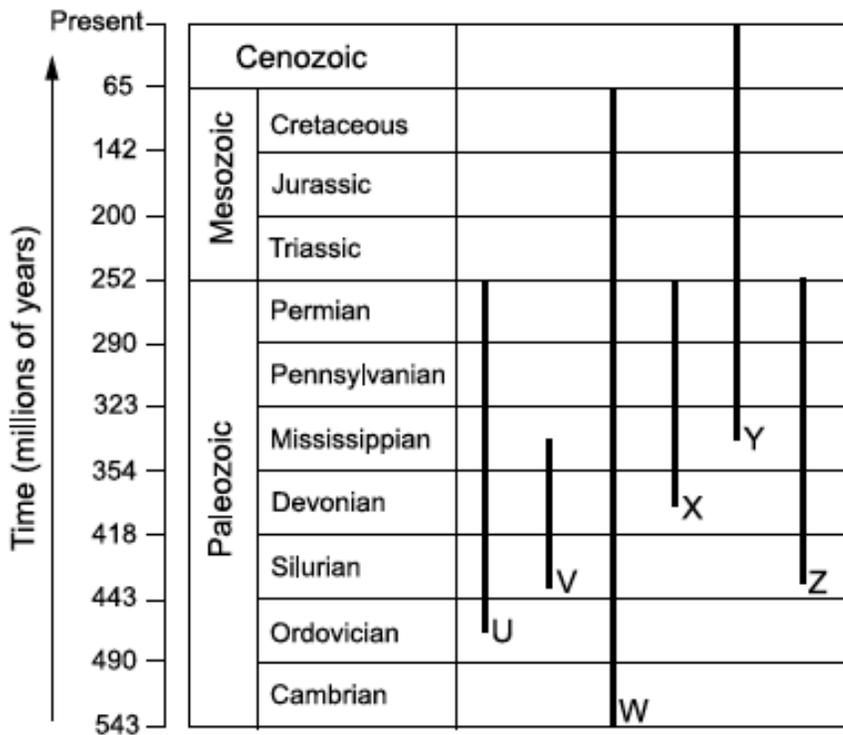
- f. The cytoplasm of the red blood cells is more concentrated than that of the skin cells.
- g. Skin cells absorb water faster than the red blood cells.
- h. Both cells absorb water when placed in the glucose solution.
- j. Both cells absorb water when placed in any solution.

Strand IV: Cell Chemistry and Biotechnology

Expected Performance: D INQ.9 Articulate conclusions and explanations based on research data, and assess results based on the design of the investigation.

Strand V: Genetics, Evolution and Biodiversity

The diagram below shows the fossil record of different species.



14. When did a major extinction event most likely occur?

- f. at the end of the Cenozoic
- g. at the end of the Permian
- h. at the beginning of the Silurian
- j. at the beginning of the Cambrian

Strand V: Genetics, Evolution and Biodiversity

Expected Performance: D INQ.7 Assess the reliability of the data that was generated in the investigation.

CAPT PRACTICE TEST # 2 INQUIRY
DEVELOPED FROM RELEASED QUESTIONS AND OTHER SOURCES.

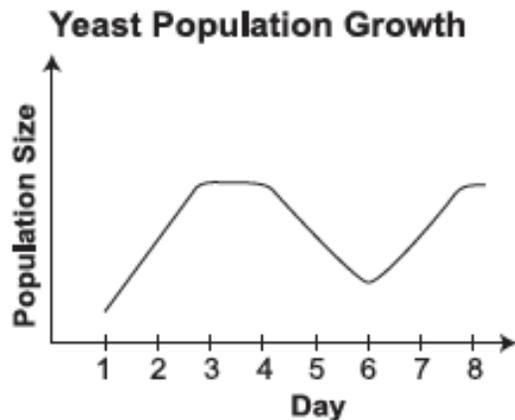
15. According to the records of fossil species V and W, which statement is most likely true?

- a. Fossil species W appeared before fossil species V, allowing fossil species W to survive longer.
- b. Fossil species W was ancestral to fossil species V because it appeared before fossil species V.
- c. Fossil species W had greater genetic variability than fossil species V, allowing fossil species W to adapt and survive longer.
- d. Fossil species W had lower reproductive success than fossil species V, allowing smaller populations to adapt and survive.

Strand V: Genetics, Evolution and Biodiversity

Expected Performance: D INQ.7 Assess the reliability of the data that was generated in the investigation.

The graph below shows changes in a yeast population over the course of several days.



16. The yeast were placed on a nutrient dish and allowed to grow. On which day was additional nutrient most likely added to the yeast culture?

- a. 3
- b. 4
- c. 6
- d. 7

Strand V: Genetics, Evolution and Biodiversity

Expected Performance: D INQ.8 Use mathematical operations to analyze and interpret data, and present relationships between variables in appropriate forms.

CAPT PRACTICE TEST # 2 INQUIRY
DEVELOPED FROM RELEASED QUESTIONS AND OTHER SOURCES.

The common cold is caused by a virus that enters the human body and causes mild, flu-like symptoms. Some people believe that the common cold can be treated by digesting the herb Echinacea. The following table shows results from a study conducted to explore the effects of Echinacea on children with colds.

Echinacea Study

Type of Treatment	A Pill Containing Echinacea	Same Type of Pill Without Echinacea
Number of children taking pills	337	370
Average length of cold infection (days)	10	10
Children having more than one cold during the study	52%	64%
Children developing a skin rash	7.1%	2.7%

17. A possible conclusion from the data is that Echinacea _____.
- a. is a safe remedy for the common cold
 - b. is effective only for children
 - c. has side effects
 - d. reduces the length of colds

Strand V: Genetics, Evolution and Biodiversity

Expected Performance: D INQ.9 Articulate conclusions and explanations based on research data, and assess results based on the design of the investigation.

18. Data in the table show that the use of Echinacea can _____.
- f. reduce the length of cold infection from 10 to 7 days
 - g. increase the incidence of colds in children from 52% to 64%
 - h. increase the percent of children with skin rash from 2.7% to 7.1%
 - j. reduce the numbers of children having colds from 370 to 337 cases

Strand V: Genetics, Evolution and Biodiversity

Expected Performance: D INQ.2 Read, interpret and examine the credibility and validity of scientific claims in different sources of information.

FOR OPEN ENDED INQUIRY QUESTIONS SEE RELEASED QUESTIONS FROM THE STATE