Test Form: SS3A

Test Number:_____

TEST ON SCIENTIFIC SKILLS

The following experiment was performed:

Question:

How will sugar, salt and baking soda react differently when placed in vinegar?

Materials:

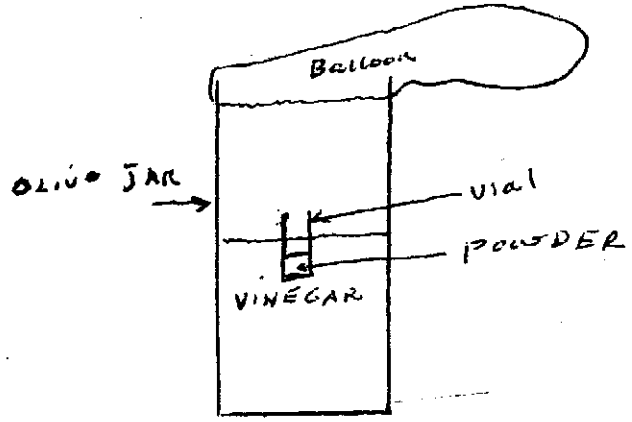
1 empty olive jar
1 glass vial
1 balloon
1 ½-cup measurer
1 bottle of colorless vinegar

Procedures:

½ -cup of colorless vinegar was poured into the jar. Then, the vial was filled 1/3 full with baking soda. The vial was then lowered carefully, with tongs, so that it floated on the vinegar. Next, the balloon was stretched, and placed over the mouth of the jar, so that it was airtight.

Next, the jar was shaken gently, so that the vinegar could enter the vial, but not so vigorously that any liquid would get into the balloon. Then, the bottle and vial were observed in order to determine whether any bubbles had formed in the vinegar. Also, the balloon was observed in order to determine whether it had inflated at all.

This same experiment was repeated twice, with all of the same materials and ingredients, except that the first time, sugar was placed in the vial, and the second time salt was placed in the vial.



Results:

When the baking soda was mixed with the vinegar, many bubbles appeared, coming out of the vial, and the balloon inflated to a stand-up position within 5 minutes. However, when the sugar and salt were mixed with the vinegar, no bubbles formed, and the balloon did not inflate at all.

Test Questions

All of the following questions refer to the experiment described on the previous page. On your answer sheet, circle the letter corresponding to the best answer. In some cases, more than one answer is correct, but there will always be one best answer.

1. Name a control group.

   A. The sugar in the vinegar
   B. The salt in the vinegar.
   C. The baking powder in the vinegar.
   D. Both A and B, above.

2. Name a manipulated variable,

   A. Baking powder.
   B. Sugar.
   C. Salt.
   D. All of the above.

3. Name a controlled variable:
   A. Baking powder.
   B. Sugar.
   C. Salt.
   D. the bottle.

4. Name an experimental group.
   A. The baking powder in the vinegar.
   B. The vial.
   C. Cornmeal in the vinegar.
   D. The balloon.

5. Name a responding variable,
   A. Bubbles forming.
   B. Measuring the height of the vinegar.
   C. Measuring the amount of baking soda.
   D. None of the above.

6 Several students offered predictions before the results were obtained. They' were:
   A. Bubbles will not form when sugar is added to vinegar.
   B. Bubbles will form when baking soda is added to vinegar.
   C. Bubble will not form when salt is added to vinegar.
   D. All of the above.

   Which of the above predictions is supported by the results?

7. Which of the following conclusions is refuted by the results?
   A. Sugar reacts with vinegar.
   B. Baking soda reacts with vinegar.
   C. Salt doesn't react with vinegar.
   D. Vinegar is an acid.

8. Suppose that after the described experiment was completed, you were told that when baking soda reacts with an acid, carbon dioxide bubbles form. On the basis of this new information, it is valid to conclude that:
   A. the bubbles that formed with the vinegar and baking soda were carbon dioxide.
   B. vinegar is acidic.
   C. Both of the above.
   D. Neither of the above.

9. Suppose that instead of using vinegar in the experiment, you used battery acid (sulfuric acid). Which of the following results would you predict in this new experiment?
   A. The sugar would give off bubbles.
   B. The baking soda would give off bubbles.
   C. The salt would give off bubbles.
   D. Both A and B, above.

10. Which of the following conclusions is supported by the results of all of the experiments performed thus far?
   A. Baking soda contains carbon.
   B. Sugar contains carbon.
   C. Salt contains carbon.
   D. Sugar contains sodium.

Suppose that the experiment was repeated, but this time distilled water was used instead of vinegar. This time, none of the powders gave off bubbles.

11. Which of the following conclusions is supported by the results of all of the experiments performed thus far?
   A. Distilled water is not acidic.
   B. Sugar dissolves in water.
   C. Salt contains chlorine.
   D. Sugar does not contain carbon.

12. Which of the following conclusions is refuted by the results of all of the experiments performed thus far?
   A. Baking soda contains carbon.
   B. Sugar contains carbon.
   C. Distilled water is acidic.
   D. Salt does not contain carbon.

You have now finished the Test on Scientific Skills. Be sure that your name and test number are on your answer sheet. Then turn them over, and pursue some quiet activity until the instructor announces that everyone is finished with the test.

Student's first and last name (please print) ANSWER KEY

Test Form 553A **Test Number** _____

1.	A	B	C	**D**	E
2.	A	B	C	**D**	E
3.	A	B	C	**D**	E
4.	**A**	B	C	D	E
5.	**A**	B	C	D	E
6.	A	B	C	**D**	E
7.	**A**	B	C	D	E
8.	A	B	**C**	D	E
9.	A	**B**	C	D	E
10.	**A**	B	C	D	E
11.	**A**	B	C	D	E
12.	A	B	**C**	D	E
13.	A	B	C	D	E
14.	A	B	C	D	E
15.	A	B	C	D	E
16.	A	B	C	D	E
17.	A	B	C	D	E
18.	A	B	C	D	E
19.	A	B	C	D	E
20.	A	B	C	D	E

Test Form: SS4A

Test Number:_____

TEST ON SCIENTIFIC SKILLS

The following experiment was performed:

Question:

Does the volume of water change when it freezes (changes from a liquid to a solid)?

Materials:

1	empty olive jar
1	permanent marker
1	cup of water
1	freezer

Procedures:

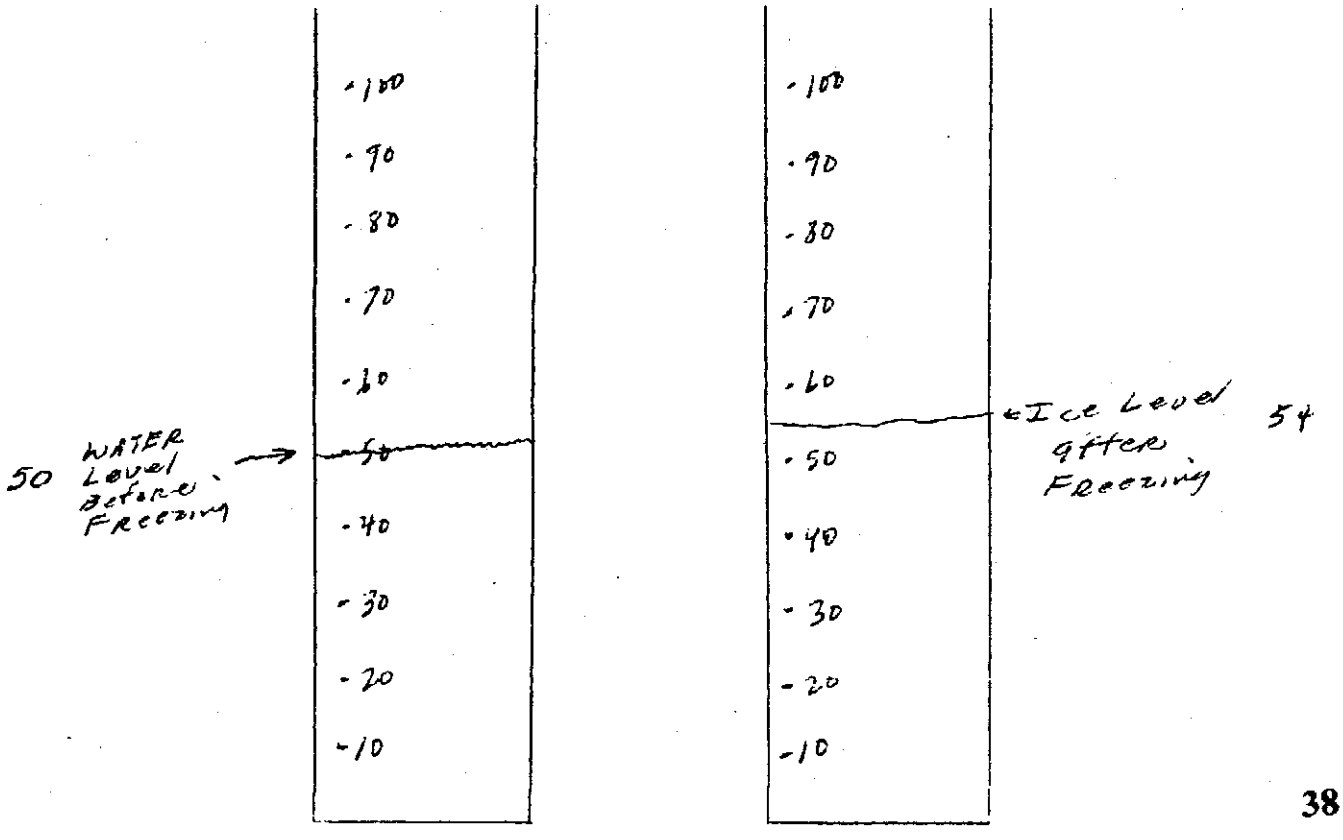
On the side of a tall, narrow jar (an olive jar will do), marks are made, starting at the bottom, every 10 millimeters (mm). The marks range, in order, from 10 mm to 100 mm.

Water is poured into the jar, until the water level is at the 50 mm mark. The jar is then placed in a freezer.

One day later, the jar is examined.

Results:

The level of the frozen water (ice) is now at the 54 mm level.



Test Questions

All of the following questions refer to the experiment described on the previous page. On your answer sheet, circle the letter corresponding to the best answer. In some cases, more than one answer is correct, but there will always be one best answer.

1. Name a control group.
   A. The jar.
   B. The jar with the liquid water in it.
   C. The jar with the ice in it.
   D. The water.

2. Name a manipulated variable,
   A. The jar.
   B. The liquid water.
   C. The ice.
   D. The freezing of the liquid.

3. Name a controlled variable:
   A. The jar.
   B. The liquid water.
   C. The ice.
   D. The freezing of the liquid.

4. Name an experimental group.
   A. The empty jar.
   B. The jar with the liquid water in it.
   C. The jar with the ice in it.
   D. The liquid water.

5. Name a responding variable,
   A. The change in the level after the water freezes.
   B. The water.
   C. The ice.
   D. None of the above.

6. Several students offered predictions before the results were obtained. They were:
   A. Ice will form.
   B. The level of the solid water will end up higher than that of the liquid water.
   C. Both A and B, above.
   D. Neither A nor B, above.

   Which of the above predictions is supported by the results?

Suppose that at this point, the jar is allowed to stand at room temperature until all of the ice melts. The level of the liquid water is now at 50 mm. once again.

7. Which of the following conclusions is refuted by the results?
   A. Ice contracts when it melts.
   B. Ice expands when it melts.
   C. Water expands when it freezes, but ice contracts when it melts.
   D. Ice is the solid form of water.

8 Which of the following conclusions is best supported by the results observed thus far?
   A. Ice contracts when it melts.
   B. Ice expands when it melts.
   C. Water expands when it freezes, but ice contracts when it melts.
   D. Ice is the solid form of water.

9. Which of the following statements explains why ice floats in water?
   A. The density of solid water is less than the density of liquid water.
   B. The density of water decreases when it freezes, because a given weight of water takes up more volume after it freezes.
   C. Liquid water is more dense than solid water.
   D. All of the above.

Next, a new experiment is tried with the same equipment and materials. An ice cube that is small enough to not rub the sides of the olive jar is placed in the jar. Then water is added until the water level reads 50 mm. The jar is then allowed to warm up to room temperature until all of the ice cube has melted. The water level still reads 50 mm.

10. Which of the following conclusions is supported by the results of all of the experiments performed thus far?
   A. Ice melts.
   B. Water freezes.
   C. Water expands when it freezes.
   D. Ice expands when it melts.

11. When the ice cube was floating in the jar, about how much of it was showing above the water level?
   A. 4/50
   B. 8 per cent
   C. 8/100
   D. All of the above.

12. Which of the following conclusions is refuted by the results of all of the experiments performed thus far?
   A. Ice doesn't melt at room temperature.
   B. About 92 per cent of an iceberg is below the water level.
   C. A pound of water takes up more space if it is frozen than if it is in the liquid state.
   D. Water doesn't freeze when it is exposed to temperatures below freezing.

You have now finished the Test on Scientific Skills. Be sure that your name and test number are on your answer sheet. Then turn them over, and pursue some quiet activity until the instructor announces that everyone is finished with the test.

Student's first and last name (please print) ANSWER KEY

Test Form SS4A **Test Number** _____

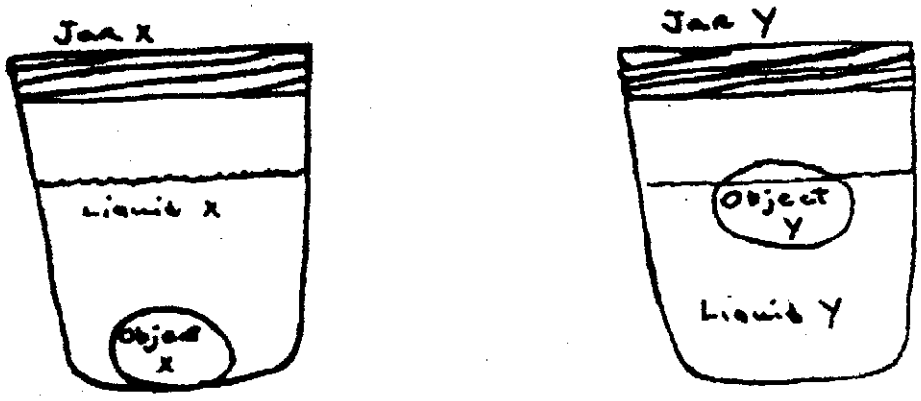
1. A **B** C D E
2. A B C **D** E
3. **A** B C D E
4. A **B** C D E
5. **A** B C D E
6. A B **C** D E
7. A **B** C D E
8. A B **C** D E
9. A B C **D** E
10. A B **C** D E
11. A B C **D** E
12. **A** B C D E
13. A B C D E
14. A B C D E
15. A B C D E
16. A B C D E
17. A B C D E
18. A B C D E
19. A B C D E
20. A B C D E

Test Form: CE1A

Test Number_____

TEST ON COGNITION ENHANCEMENT SKILLS

The questions on this test are all aimed at the focus which is pictured below and described below.



Description of focus

Jar X and jar Y both contain colorless liquids. Object X is placed into liquid X and it sinks; object Y is placed into liquid Y and it floats.

Focus question

Why does object X sink and object Y float?

1. Without further data, which of the following hypotheses could be true?
   A. Because object X is heavier than object Y.
   B. Because object X is hard-boiled and object Y *is* not hard-boiled.
   C. (Both hypothesis A and hypothesis B, above.)
   D. (Neither hypothesis A nor hypothesis B, above.)

2 Without any further data, which of the following could not be an acceptable hypothesis?
   A. Because there is salt in liquid Y.
   B. Because there is more sugar in liquid Y than in liquid X.
   C. (Both hypothesis A and hypothesis B, above, are not acceptable.)

3 Which question, by itself, could best help you to form a hypothesis if its answer were "yes"?
   A. Is liquid X colder than liquid Y?
   B. Is there any tapwater in either jar X or jar Y?
   C. Is there any vinegar in jar Y?
   D. Is object X an egg?

4 Which one of the following questions, if answered "yes", would give you the most important data?
   A. Is liquid X cold?
   B. Is there any oil in liquid Y?
   C. Is there any salt in either liquid X or liquid Y?
   D. Is liquid Y heavier than liquid X?

5 Which one of the questions below could best be answered by performing a single experiment?
   A. Is there any salt in liquid X?
   B. Is there any sugar in either liquid X or liquid Y?
   C. Would object X float if you put it into liquid Y?
   D. If there is water in liquid X, is it tap water

6. Suppose you asked the following question: "What would happen if object Y were hard-boiled?" The most acceptable way to re-word it would be:
   A. If object X weren't hard-boiled, would it float?
   B. If object Y were hard-boiled, would it float?
   C. If object Y were hard-boiled, what would happen?

7. Which of the following questions has the hidden meaning of asking whether a conclusion is true?
   A. Does object Y float because it is hollow?
   B. Does it have anything to do with salt in the liquid?
   C. Is object X sinking on account of its density?
   D. (All three of the above questions - A, B, and C.)

8. Which one of the following questions is best?
   A. Is there any rubbing alcohol in the liquid in jar X?..
   B. Is there rubbing alcohol in X?
   C. Is there any alcohol in the liquid?
   D. Is there anything in X?

9. Suppose you had just asked the following question as your first question asked, and had been given the answer indicated in parentheses: "Is there any alcohol in jar X? (yes)

   Which of the following questions would be best to ask next?

   A. Is there anything else in jar X?
   B. Is there more than one tablespoonful of alcohol in jar X?
   C. Is there more alcohol in jar Y than in jar X?
   D. Is there any alcohol in jar Y?

10. Which of the following questions should be asked first?

   A. Is there any sugar in jar Y? (yes)
   B. Is there more sugar in jar Y than in jar X? (no)
   C. Is there anything besides tapwater in jar Y? (yes)

11. Suppose that you are considering the following conclusion: "Because egg Y contains more air than egg X does."

   Which one of the following questions, with its answer, does <u>not support or confirm</u> that conclusion?

   A. Is there any air in egg X? (yes)
   B. If egg X had the same amount of air that egg Y has, would it float in liquid X? (no)
   C. Is there more air in egg Y than in egg X? (yes)
   D. Is there any air in egg Y? (yes

12. Suppose that you are considering the following conclusion: "Because the total amount of sugar and salt in liquid Y is greater than the total amount of sugar and salt in liquid X."

Which of the following questions, with its answer, indicates that this conclusion is not true?

A. Is there any salt in liquid Y? (yes)
B. Is there any sugar in liquid Y? (yes)
C. Is there any tapwater in liquid Y? (yes)
D. Is there any vinegar in liquid Y? (no)
E. (None of the questions A, B, C, or D, above.)

13. Suppose that you are considering the following conclusion: "Because egg Y contains more air than egg X does."

Which of the following questions, with its answer, indicates that this conclusion is not true?

A. Is there any tapwater in liquid X? (no)
B. Is there any air in egg Y? (yes)
C. Is there any air in egg X? (yes)
D. If you placed egg Y in liquid X, would it float? (no)
E. (All of questions A, B, C, and D, above.)

14. Suppose that the following questions had been asked about the focus, in the order given:

Is there any salt in liquid X? (no)
Is there more sugar in liquid Y than in liquid X? (yes)
Is one of the liquids warmer than the other? (no)
Is egg X hard-boiled? (yes)

Now, considering the answers to all of those questions, which of the following conclusions is best supported by the data?

A. Because there is more sugar in liquid Y than in liquid X.
B. Because liquid Y is warmer than liquid X.
C. Because egg X is hard-boiled, but egg Y isn't.
D. Because there is more salt in liquid Y than in liquid X.

15. Suppose that the following questions have been asked in the order listed:

Is there anything besides tapwater in liquid Y? (yes)
Is there any salt in liquid Y? (yes)
Is there any salt in liquid X? (no)
Is the salt in liquid Y epsom salt? (yes)

Then, which one of the following conclusions would be the best one?

A. Because there is something in liquid Y that isn't in liquid X.
B. Because there is salt in liquid Y, but not in liquid X.
C. Because there is epsom salt in liquid Y, but not in liquid X.
D. Because there is epsom salt in Y, but not in X.

16. Suppose you are considering the following conclusion: "Because liquid Y contains more sugar than liquid X does."
Then suppose the following questions were asked:
Is there more sugar in liquid Y than in liquid X? (no)
If you took all of the sugar out of liquid Y, would egg Y still float? (no)
Is there salt in liquid Y? (yes)
Is there more salt in liquid Y than in liquid X? (yes)
Is there more total salt and sugar in liquid Y than in liquid X? (yes)
If you took all of the salt out of liquid Y, would egg Y still float? (no)

Now, because of the answers to these questions, how would you change the original conclusion,?
A. Because there is more salt in liquid Y than in liquid X.
B. Because the total of the sugar and salt in liquid Y is greater than in liquid X.
C. Because liquid X contains more sugar than liquid Y.
D. Because object X is denser (heavier).

17. Read all of the questions. Then decide which is the best order for them to be asked if you were going to ask a series of questions. First select the letter of the question you would ask first, then the letter of the one you would ask second, and so on, until you have selected all of the letters. Whenever you are considering two questions whose only difference is jar X or jar Y, select the jar X question just before the corresponding jar Y question.

P. Is there anything besides tapwater in jar X? (yes)
Q. Is there any salt in jar Y? (yes)
R. Is there more salt in jar Y than in jar X? (yes)
S. Is there any tapwater in jar Y? (yes)
T. Is there anything besides tapwater in jar Y? (yes)
U. Is there any salt in jar X? (yes)
V. Is the amount of salt in jar X and jar Y the same? (no)
W. Is there any tapwater in jar X? (yes)

Now select the best order from the possibilities listed below.
A. WSPTUQRV
B. UQWSPTRV
C. PTWSUQVR
D. WSPTUQVR
E. PTUQWSVR

18. Suppose the following questions were asked:
Is there any oil in jar Y? (yes)
Is there any oil in jar X? (yes)
Is there more oil in jar X than in jar Y? (yes)
Is there any sugar in jar X? (yes)
Is there any sugar in jar Y? (yes)
Is there more sugar in jar X than in jar Y? (no)
If there was the same amount of oil in jar X as is in jar Y, would egg X float in jar X? (no)
Is there less salt in jar X than in jar Y? (no)
If you put egg X in jar Y, would it float? (yes)

Then decide which of the following conclusions is not tested by the series of questions enough to tell whether it is true or untrue..
A. Because egg X is heavier than egg Y.
B. Because there is more oil in jar Y than in jar X.
C. Because there is less salt in jar X than in jar Y.
D. Because there is more sugar in jar Y than in jar X.
E. (all of the above A,B,C, and D are not tested enough.)

Student's first and last name (please print) ANSWER KEY

Test Form CE/A **Test Number** _____

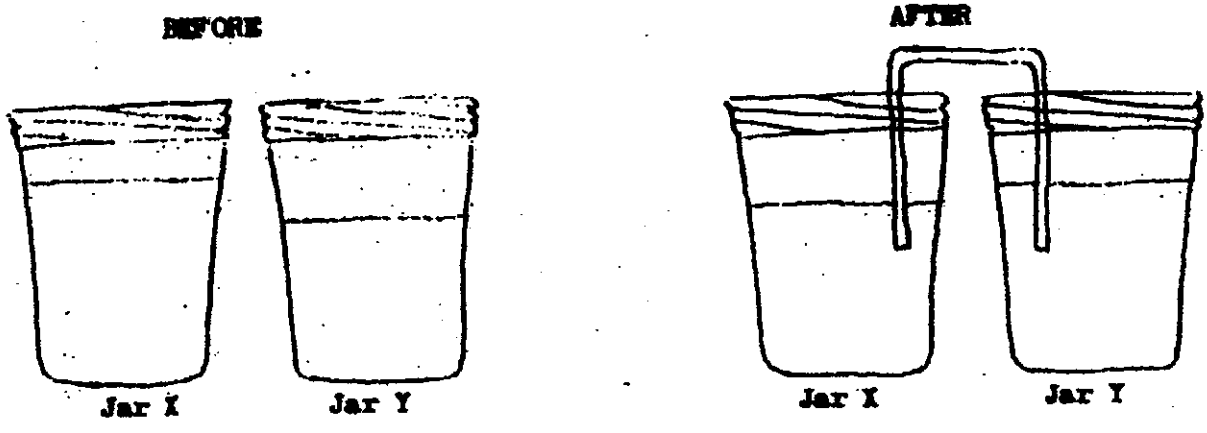
1.	A	B	**C**	D	E
2.	**A**	B	C	D	E
3.	**A**	B	C	D	E
4.	A	B	**C**	D	E
5.	A	B	**C**	D	E
6.	A	**B**	C	D	E
7.	A	B	C	**D**	E
8.	**A**	B	C	D	E
9.	A	B	C	**D**	E
10.	A	B	**C**	D	E
11.	**A**	B	C	D	E
12.	A	B	C	D	**E**
13.	A	B	C	**D**	E
14.	**A**	B	C	D	E
15.	A	B	**C**	D	E
16.	A	**B**	C	D	E
17.	A	B	C	**D**	E
18.	A	B	C	**D**	E
19.	A	B	C	D	E
20.	A	B	C	D	E

Test Form: CE2A

Test Number _____

TEST ON COGNITION ENHANCEMENT SKILLS

The questions on this test are all centered around the focus which is pictured below, and described below.



Description of focus

Before the U-tube is inserted into the two jars, the level of the liquid in Jar X is about 1 inch higher than the level of the liquid in Jar Y. Within 5 minutes after the U-tube has been inserted, the level of the liquid in Jar X is about 1/8-inch below the level of the liquid in Jar Y.

Problem

Why does the level of the liquid in Jar X become lower than the level of the liquid in Jar Y?

(Select the best answer, and circle its letter on your answer sheet. In some cases, more than one answer might be correct, but a single one will always be best.)

1. Without further data, which of the following conclusions could be true?
   - A. Because liquid X travels through the U-tube more easily than Liquid Y.
   - B. Because Liquid X is warm.
   - C. Both conclusions A and B, above.
   - 0. Neither conclusion A or B, above.

2. Without any further data, which of the following could not be an acceptable conclusion?
   - A. Because there is oil in Liquid Y.
   - B. Because there is salt in Liquid X.
   - C. (Both conclusions A and B, above, are not acceptable.)

3. Which question, by itself, could best help you to form a conclusion if its answer were "Yes"?

A. Is Liquid X cold at the start?
B. Is there more sugar in Liquid X than in Liquid Y at the start?
C. Is there any vinegar in either Jar X or Jar Y at the start?
D. Is there any salt in Jar Y?

4. Which one of the following questions, if answered "Yes", would give you the most important data?

A, Is there more oil in Liquid Y than in Liquid X at the start?
B. Is Liquid X cold at the start?
C, Is there any sugar in either Liquid X or Liquid Y at the start?
D. Is there any salt in Liquid X?

5. Which one of the following questions could <u>best</u> be answered by performing a <u>single experiment?</u>

A. Is Liquid Y thick?
B. If there is sugar in Liquid Y, is it table sugar?
C. Would the liquid levels change if there were no liquid in the U-tube?
D. Is there baking soda in either Liquid X or Liquid Y?

6. Suppose you asked the following question: "What would happen if you heated Liquid Y 10 degrees higher before inserting the U-tube?" The most acceptable way to re-word it would be:

A. If you heated Liquid Y 10 degrees higher before inserting the U-tube, would the level of the liquid in Jar X end up to be higher than the level of the liquid in Jar Y?
B. If you heated Liquid Y 10 degrees higher before inserting the U-tube, what would happen?
C. If you heated Liquid Y 10 degrees higher before inserting the U-tube, would the same thing happen?

7. Which of the following questions has the hidden meaning of asking whether a conclusion is true?

A. What is in Liquid X at the start?
B. Is Liquid X colder than Liquid Y at the start?
C. Does the Liquid in Jar Y end up to be higher because Liquid Y is warmer at the start?
D. (All three of the above questions: A, B and C.)

8. Which one of the following questions is best to ask?

A. Is there any oil in the liquid at the start?
B. Is there any oil in Liquid Y at the start?
C. Is there anything in Liquid Y at the start?
D. Is there any oil in Y?

9. Suppose you had just asked the following question as the first question asked in the session, and had been given the answer indicated in parentheses: "Is there any oil in Jar Y at the start? (Yes)". Then, which of the following questions would be best to ask next?

A. Is there more oil in Jar Y than in Jar X at the start?
B. Is there any oil in Jar X at the start?
C. is there anything else in Jar Y at the start?
D: Is there more than one tablespoonful of oil in Jar Y at the start?

10. Which of the following questions should be asked first in the session?

A. Is there more salt in Jar X than in Jar Y at the start?
B. Is there any salt in Jar X at the start?
C. Is there anything besides tapwater in Jar X at the start?

11. Suppose that you are considering the following conclusion: "Because Liquid Y contains more alcohol at the start than Liquid X does." Then, which of the following questions, with its answer, does not support or confirm that conclusion?

A. Is there more alcohol in Liquid Y than in Liquid X at the start? (Yes)
B. Is there any alcohol in Liquid Y at the start? (Yes)
C. Is there any alcohol in Liquid X at the start? (Yes)
D. If you took all of the alcohol out of Liquid Y at the start, would the liquid level still end up higher in Jar Y? (No)

12 Suppose that you are considering the following conclusion: "Because the total amount of oil and alcohol in Liquid Y is greater than the total amount of oil and alcohol in Liquid X." Then, which one of the following questions, with its answer, indicates that this conclusion is not true?

A. Is there any alcohol in Liquid X at the start? (Yes)
B. Is there any oil in Liquid Y at the start? (Yes)
C. Is there any alcohol in Liquid Y at the start? (Yes)
D. Is there any oil in Liquid X at the start? (Yes)
E. (None of the questions, A,B,C or D, above.)

13. Suppose that you are considering the following conclusion: "Because there is more alcohol in Jar Y at the start than in Jar X at the start." Then, which of the following questions, with its answer, indicates that this conclusion is untrue?

A. Is there any alcohol in Jar X at the start? (No)
B. Is there any gasoline in Jar Y at the start? (No)
C. Is there any alcohol in Jar Y at the start? (No)
D. If you switched the liquids at the start, would the liquid in Jar X end up being higher than the Liquid in Jar Y? (Yes)
E. (All of the questions, A,B,C and D, above.)

14. Suppose that the following questions had been asked about the focus, in the order given:

Is there any alcohol in Liquid X at the start? (No)
Is there any oil in Liquid X at the start? (Yes)
Is there any water in Liquid Y at the start? (No)
If you switched the liquids at the start, would the level of the liquid in Jar X end up higher than the level of the liquid in Jar Y? (Yes)
Is there any alcohol in Jar Y at the start? (Yes)
Is there any salt in Jar X at the start?: (No)
Is there any oil in Liquid Y at the start? (Yes)

Now, considering the answers to all of the above questions, which of the following conclusions is best supported?

A. Because there is more salt in Liquid X at the start than in Liquid Y at the start.
B. Because Liquid Y is warmer at the start than Liquid X is at the start.
C. Because there is more alcohol in Liquid Y at the start than in Liquid X at the start.
D. Because there is more oil in Liquid Y at the start than in Liquid X at the start.

15. Suppose that the following questions have been asked, in the order listed:

Is there something in Liquid Y at the start that is not in Liquid X at the start? (Yes)
Is there any oil in Liquid Y at the start? (Yes)
Is the oil in Liquid Y mineral oil? (Yes)
Is there any oil in Liquid X at the start? (No)

Then, which of the following conclusions would be the best one?

A. Because there is mineral oil in Y, but not in X.
B. Because there is oil in Liquid Y at the start, but not in Liquid X at the start.
C. Because there is something in Liquid Y at the start that is not in Liquid X at the start.
D. Because there is mineral oil in Liquid Y at the start, but not in Liquid X at the start.

16. Suppose that you are considering the following conclusion: "Because there is something in Liquid X at the start that is not in Liquid Y at the start."

Then, suppose the following questions were asked:

Is Liquid X warm at the start? (Yes)
Is there any water in Liquid X at the start? (Yes)
Is there any alcohol in Liquid X at the start? (Yes)
Is there any salt in Liquid X at the start? (Yes)
Is there any water in Liquid Y at the start? (Yes)
Is there any alcohol in Liquid Y at the start? (Yes)
Is there any salt in Liquid Y at the start? (No)

Now, because of the answers to the above questions, how would you change the original conclusion?

A. Because there is salt in Liquid X at the start, but not in Liquid Y.
B. Because Liquid X is warm at the start, but Liquid Y isn't.
C. Because Liquid X contains water, alcohol, and salt at the start.
D. Because Liquid X is warm at the start, and it contains water, alcohol and salt.

17. Read all of the following questions. Then decide which is the best order for them to be asked if you were going to ask a series of questions. First, select the letter of the question you would ask first, then the letter of the one you would ask second, and so on, until you have selected all of the letters.

P. Is the amount of salt in Liquid X at the start the same as in Liquid Y? (No)
Q. Is there any tapwater in Liquid X at the start? (Yes)
R. Is there anything besides tapwater in Liquid X at the start? (Yes)
S. Is there any salt in Liquid Y at the start? (Yes)
T. Is there more salt in Liquid Y at the start than in Liquid X? (Yes)
U. Is there any tapwater in Liquid Y at the start? (Yes)
V. Is there anything besides tapwater in Liquid Y at the start? (Yes)
W. Is there any salt in Liquid X at the start? (Yes)

Now, select the best order from the possibilities listed below.

A. QURVWSTP
B. QURVWSPT
C. QUWSRVPT
D. RVQUWSPT
E. RVQUWSTP

18. Suppose the following questions were asked:

Is there any salt in Liquid X at the start? (Yes)
Is Liquid Y warm at the start? (Yes)
If the liquids were switched in the jars at the start, would the level of the liquid in Jar X end up being higher than the level of the liquid in Jar Y? (Yes)
Is there any alcohol in Liquid Y at the start? (Yes)
Is Liquid X warm at the start? (No)
Is there any salt in Liquid Y at the start? (Yes)
Is the amount of salt in Liquids X and Y the same at the start? (No)
Are the temperatures of Liquid X and Liquid Y the same at the start? (No)

Then, decide which of the following conclusions could be true.

A. Because Liquid X is different from Liquid Y.
B. Because there is more salt in Liquid X at the start than in Liquid Y.
C. Because Liquid Y is warmer at the start than is Liquid X.
D. Because there is alcohol in Liquid Y at the start, but not in Liquid X.
E. (All of the above: A, B, C and D could be true.)

Student's first and last name (please print) ANSWER KEY

Test Form CE2A **Test Number** _____

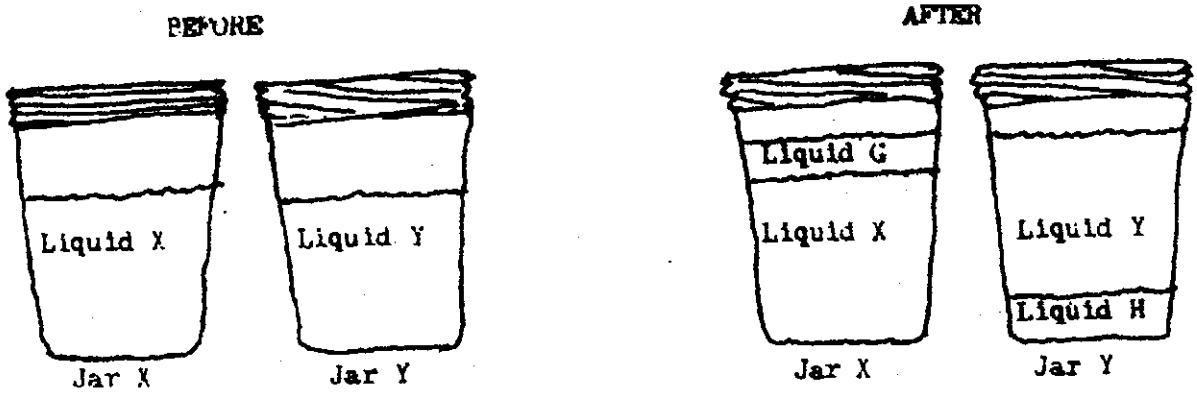
1.	A	B	**C**	D	E
2.	A	B	**C**	D	E
3.	A	**B**	C	D	E
4.	**A**	B	C	D	E
5.	A	B	**C**	D	E
6.	**A**	B	C	D	E
7.	A	B	C	**D**	E
8.	A	**B**	C	D	E
9.	A	**B**	C	D	E
10.	A	B	**C**	D	E
11.	A	B	**C**	D	E
12.	A	B	C	D	**E**
13.	A	B	**C**	D	E
14.	A	B	**C**	D	E
15.	A	B	C	**D**	E
16.	**A**	B	C	D	E
17.	A	**B**	C	D	E
18.	A	B	C	D	**E**
19.	A	B	C	D	E
20.	A	B	C	D	E

TEST ON COGNITION ENHANCEMENT SKILLS

Test Form: CE3A

Test Number _____

The questions on this test are all aimed at the focus which is pictured below and described below.



Description of focus

Jar X and Jar Y both contain colorless liquids. Some of liquid G, a green liquid, is placed into jar X, and it floats over liquid X. Some of liquid H, a red liquid, is placed into jar Y, and it sinks below liquid Y.

Focus question

Why does liquid G float and liquid H sink?

1. Without further data, which of the following hypotheses could be true?
   A. Because liquid H is denser than liquid G.
   B .Because liquid X is thick.
   C..(Both hypothesis A and hypothesis B, above.)
   D.(Neither hypothesis A nor hypothesis B, above.)

2. Without further data, which of the following could not be an acceptable hypothesis?
   A. Because liquid G is oil.
   B. Because liquid H contains salt, but liquid G doesn't.
   C. (Both hypothesis A and hypothesis B, above, are not acceptable.)

3. Which question, by itself, could best help you to form a hypothesis if its answer were "yes"?
   A. Is there any oil in either liquid X or liquid Y?
   B. Is there any sugar in jar X?
   C. Is liquid X thick?
   D. Is there more salt in liquid H than in liquid G?

4. Which one of the following questions, if answered "yes", would give you the most important data?
   A. Is there any baking soda in liquid X?
   B. Is there any water in either liquid X or liquid Y?
   C. Is there more salt in liquid X than in liquid Y?
   D. Is liquid Y warm?

5. Which one of the following questions could best be answered by performing a single experiment?
   A. Would liquid G be floating if it had the same weight as liquid H?
   B. If liquid Y is warm, is it warmer than liquid X?
   C. Is there any oil in liquid Y?
   D. Is liquid X tapwater?

6. Suppose you asked the following question: "What would happen if you took all of the salt out of liquid X?" The most acceptable way to re-word it would be?
   A. If you took all of the salt out of liquid X, would liquid G still float in it?
   B. If you took all of the salt out of liquid X, would it be exactly the same as liquid Y?
   C. If you took all of the salt out of liquid X, what would happen?

7. Which of the following questions has the hidden meaning of asking whether a hypothesis is true?
   A. Does it have anything to do with the weight of liquid H?
   B. What is liquid H?
   C. Is liquid H denser than liquid G?
   D. (All three of the above questions - A,B, and C.)

8. Which one of the following questions is best?

   A. Is there anything in liquid X?
   B. Is there any salt in liquid X?
   C. Is there any salt in X?
   D. Is there anything in X?

9. Suppose you had just asked the following question as your first question asked, and had been given the answer indicated in parentheses: "Is there any salt in liquid H?" (yes). Which of the following questions would be best to ask next?
   A. Is there anything else in liquid H besides salt?
   B. Is there any salt in liquid Y?
   C. Is there more salt in liquid H than in liquid G?
   D. Is there any salt in liquid G?

10. Which of the following questions should be asked first?
   A. Is there more sugar in liquid X than in liquid Y? (yes)
   B. Is there any sugar in liquid X? (yes)
   C. Is there anything besides sugar in liquid X? (yes)

11. Suppose that you are considering the following hypothesis: "Because liquid X contains more sugar than liquid Y." Which one of the following questions, with its answer, does not support or confirm that hypothesis?

   A. Is there any sugar in liquid X? (yes)
   B. If you took all of the sugar out of liquid X, would liquid G float in it? (no)
   C. Is there more sugar in liquid X than in liquid Y? (yes)
   D. Is there any sugar in liquid Y? (yes)

12. Suppose that you are considering the following hypothesis: "Because the total amount of sugar and salt in liquid X is greater than the total amount of sugar and salt in liquid Y." Which of the following questions, with its answer, indicates that this hypothesis is not true?
   A. Is there both sugar and salt in liquid X? (No)
   B. Is there both sugar and salt in liquid Y? (Yes)
   C Is there more sugar in liquid Y? (Yes)
   D. Is there any sugar in liquid X? (Yes)

13. Suppose that you are considering the following hypothesis: "Because there is more sugar in liquid H than in liquid G." Which *of* the following questions, with its answer, indicates that this hypothesis is not true?

A. Is there any sugar in liquid G? (yes)
B. Is there any sugar in liquid H? (yes)
C. Is there any tapwater in liquid H? (yes)
D. If you took all of the sugar out of liquid H, would it still sink in liquid Y? (yes)
E. (All of questions A,B,C, and D, above.)

14. Suppose that the following questions had been asked about the focus, in the order given:

1. Does liquid Y contain oil? (yes)
2. Does liquid X contain sugar? (yes)
3. Does liquid X contain oil? (no)
4. Does liquid G contain tapwater? (yes)
5. Does liquid H contain tapwater? (no)

Now, considering the answers to all of the above questions, which of the following hypotheses is most supported by the data?

A. Because liquid X contains sugar, but liquid Y doesn't.
B. Because liquid H is denser than liquid G.
C. Because liquid Y contains oil, but liquid X doesn't.
D. Because liquid Y contains more alcohol than liquid X does.

15. Suppose that the following questions have been asked, in the order listed;

1. Is there anything in liquid X besides tapwater? (yes)
2. Is there any sugar in liquid X? (yes)
3. Is there sugar in liquid Y? (no)
4. Is the sugar in liquid X table sugar? (yes)

Then, which one of the following hypotheses would be the best one?

A. Because there is table sugar in liquid X, but not in liquid Y.
B. Because there is something in liquid X that is not in liquid Y.
C. Because there is sugar in X, but not in Y.
D. Because liquid X contains table sugar.

16. Suppose you are considering the following hypothesis: "Because there is more salt in liquid H than in liquid G." Then, suppose the following questions were asked:

1. Is there any salt in liquid H? (yes)
2. Is there any salt in liquid G? (yes)
3. Is there more salt in liquid H than in liquid G? (no)
4. Is there any sugar in liquid H? (yes)
5. Is there any sugar in liquid G? (no)
6. Is liquid G thick? (no)
7. Is liquid H heavy? (yes)
8. If you took all of the salt out of liquid H, would it still sink in liquid Y? (no)

Now, because of the answers to these questions, how would you change the original hypothesis?

A. Because liquid H is heavier than liquid G.
B. Because liquid H is thicker than liquid G.
C. Because there is more sugar in liquid H than in liquid G.
D. Because there is more total sugar and salt in liquid H than in liquid G.

17. Read all of the questions. Then decide which is the best order for them to be asked if you were going to ask a series of questions. First select the letter of the question you would ask first, then the letter of the one you would ask second, and so on, until you have selected all of the letters. Whenever you are considering two questions whose only difference is liquid X or liquid Y, select the liquid X question just before the corresponding liquid Y question.

P. Is there any tapwater in liquid X? (yes)
Q. Is there anything besides tapwater in liquid X? (yes)
R. Is there any salt in liquid Y? (yes)
S. Is there more salt in liquid Y than in liquid X? (yes)
T. Is there any tapwater in liquid Y? (yes)
U. Is there anything besides tapwater in liquid Y? (yes)
V. Is there any salt in liquid X? (yes)
W. Is the amount of salt in liquid X and liquid Y the same? (no)

Now, select the best order from the possibilities listed below.

A. PTQUVRSW
B. QUVRPTWS
C. PTQUVRWS
D. VRPTQUSW
E. QTPUVRWS

18. Suppose the following questions were asked:

1. Is there any salt in liquid H? (no)
2. Is there any oil in liquid Y? (yes)
3. Is there any oil in liquid X? (yes)
4. Is the amount of oil in liquid X and liquid Y the same? (no)
5. Is there any sugar in liquid X? (yes)
6. Is liquid H dense? (Yes)
7. Is there more oil in liquid Y than in liquid X? (yes)

Then, decide which of the following hypotheses is not tested by the series of questions enough to tell whether it is true or untrue.

A. Because there is more oil in liquid Y than in liquid X.
B. Because liquid H is denser than liquid G.
C. Because there is more sugar in liquid X than in liquid Y.
D. Because there is more salt in liquid H than in liquid G.
E. (All of the above: A,B,C, and D are not tested enough.)

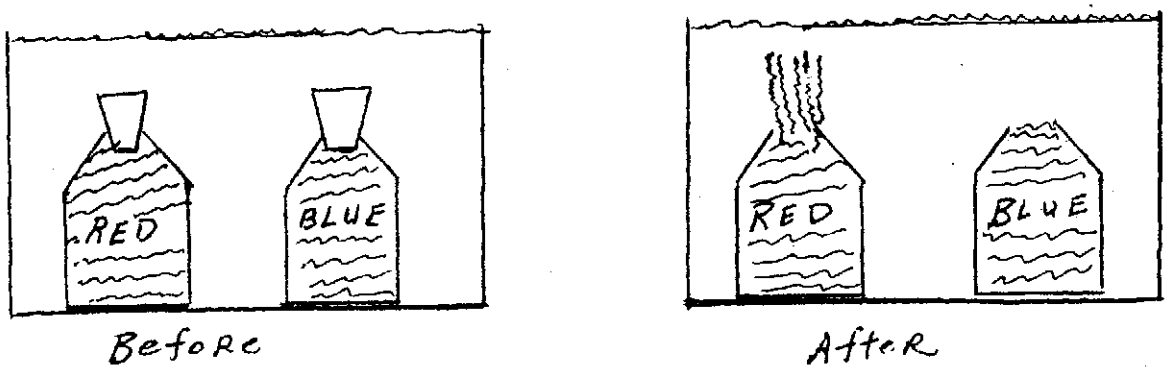
Student's first and last name (please print) ANSWER KEY

Test Form CE 3A **Test Number** _____

1. A B C D E
2. A B C D E
3. A B C D E
4. A B C D E
5. A B C D E
6. A B C D E
7. A B C D E
8. A B C D E
9. A B C D E
10. A B C D E
11. A B C D E
12. A B C D E
13. A B C D E
14. A B C D E
15. A B C D E
16. A B C D E
17. A B C D E
18. A B C D E
19. A B C D E
20. A B C D E

TEST ON COGNITION ENHANCEMENT SKILLS

The questions on this test are all centered around the focus which is pictured below, and described below.



Description of focus

The aquarium is filled with a clear, colorless liquid. The each of the two stoppered bottles contains a liquid; one is red, the other is blue. The bottles are placed into the aquarium, and then their stoppers are removed. Immediately, the red liquid rises upward, and the blue liquid stays in its bottle.

Problem

Why does the red liquid rise, but the blue liquid not rise?

(Select the best answer, and circle its letter on your answer sheet. In some cases, more than one answer might be correct, but a single one will always be best.)

1. Without further data, which of the following conclusions could be true?
   A. Because the red liquid is warm, but the blue liquid is cold.
   B. Because the red liquid contains oil.
   C. Both conclusions A and conclusion B, above.
   D. Neither conclusion A nor conclusions B, above.

2. Without any further data, which of the following could not be an acceptable conclusion?
   A. Because there is oil in the red liquid.
   B. Because there is salt in the blue liquid, but no salt in the red liquid.
   C. (Both conclusions A and B, above, are not acceptable.)

3. Which question, by itself, could best help you to form a conclusion if its answer were "Yes"?

A. Is the blue liquid cold at the start?
B. Is there more carbon tetrachloride in the blue liquid than in the red liquid at the start?
C. Is there any mineral oil in the red liquid at the start?
D. Is there any salt in the blue liquid?

4. Which one of the following questions, if answered "Yes", would give you the most important data?

A. Is the blue liquid cold at the start?
B, Is there more oil in the red liquid than in the blue liquid at the start?
C, Is there any sugar in either the red liquid or the blue liquid at the start?
D. Is there any salt in Liquid X?

5. Which one of the following questions could <u>best</u> be answered by performing a <u>single experiment?</u>

A. Would the blue liquid sink if you turned it over?
B. If there is sugar in the blue liquid, is it table sugar?
C. Is the blue liquid thick?
D. Is there baking soda in either the red liquid or the blue liquid?

6. Suppose you asked the following question: "What would happen if you heated the blue bottle 10 degrees higher before taking its stopper out ?" The most acceptable way to re-word it would be:

A. If you heated the blue bottle 10 degrees higher before taking out its stopper, what would happen?
B. If you heated the blue bottle 10 degrees higher before taking out its stopper, would anything happen?
C. If you heated the blue bottle 10 degrees higher before taking its stopper out, would the blue liquid rise?

7. Which of the following questions has the hidden meaning of asking whether a conclusion is true?

A. What is in the red liquid at the start?
B. Is Liquid X colder than Liquid Y at the start?
C. Does the red liquid rise because it contains less salt?
D. (All three of the above questions: A, B and C.)

8. Which one of the following questions is best to ask?

A. Is there any oil in the liquid at the start?
B. Is there anything in the red liquid at the start?
C. Is there any oil in the red liquid?
D. Is there any oil in the red liquid at the start?

9. Suppose you had just asked the following question as the first question asked in the session, and had been given the answer indicated in parentheses: "Is there any oil in the red bottle at the start? (Yes)". Then, which of the following questions would be best to ask next?

A. Is there more oil in the red bottle than in blue bottle at the start?
B. Is there any oil in the blue bottle at the start?
C. is there anything else in the red bottle at the start?
D: Is there more than one tablespoonful of oil in the red bottle at the start?

10. Which of the following questions should be asked first in the session?

A. Is there more sugar in the blue bottle than in red bottle at the start?
B. Is there any sugar in the blue bottle at the start?
C. Is there anything besides carbon tetrachloride in the blue bottle at the start?

11. Suppose that you are considering the following conclusion: "Because the red liquid contains more alcohol at the start than the blue liquid does." Then, which of the following questions, with its answer, does not support or confirm that conclusion?

A. Is there more alcohol in the red liquid than in the blue liquid at the start? (Yes)
B. Is there any alcohol in the red liquid at the start? (Yes)
C. Is there any alcohol in the blue liquid at the start? (Yes)
D. If you took all of the alcohol out of red liquid at the start, would the red liquid still rise? (No)

12. Suppose that you are considering the following conclusion: "Because the total amount of oil and alcohol in the red liquid is greater than the total amount of oil and alcohol in the blue liquid." Then, which one of the following questions, with its answer, indicates that this conclusion is untrue?

A. Is there any alcohol in the red liquid at the start? (No)
B. Is there any oil in the red liquid at the start? (Yes)
C. Is there any alcohol in the blue liquid at the start? (Yes)
D. Is there any oil in the blue liquid at the start? (Yes)
E. (None of the questions, A,B,C or D, above.)

13. Suppose that you are considering the following conclusion: "Because there is more oil in the red bottle at the start than in the blue bottle at the start." Then, which of the following questions, with its answer, indicates that this conclusion is untrue?

A. Is there any alcohol in the red liquid at the start? (No)
B. Is there any gasoline in the red liquid at the start? (No)
C. Is there any oil in the red bottle at the start? (No)
D. If you took all of the oil out of the red bottle at the start, would it still rise? (No)
E. (All of the questions, A,B,C and D, above.)

14. Suppose that the following questions had been asked about the focus, in the order given:

Is there any oil in the red bottle at the start? (Yes)
Is there any alcohol in the red bottle at the start? (No)
Is there any water in the blue bottle at the start? (No)
Is there any carbon tetrachloride in the blue bottle at the start? (No)
Is there any alcohol in the blue bottle at the start? (No))
Is there any salt in the red bottle at the start?: (No)
Is there any oil in the blue bottle at the start? (No)

Now, considering the answers to all of the above questions, which of the following conclusions is best supported?

A. Because there is more oil in the red liquid at the start than in blue liquid at the start.
B. Because there is more salt in the red bottle at the start than in the blue bottle at the start.
C. Because the red liquid is warmer at the start than the blue liquid is at the start.
D. Because there is more alcohol in the red liquid at the start than in the blue liquid at the start.

15. Suppose that the following questions have been asked, in the order listed:

Is there something in the red liquid at the start that is not in the blued liquid at the start? (Yes)
Is there any oil in the red bottle at the start? (Yes)
Is the oil in the red bottle mineral oil? (Yes)
Is there any carbon tetrachloride in the blue bottle at the start? (Yes)

Then, which of the following conclusions would be the best one?

A. Because there is mineral oil in the red liquid at the start, but not in the blue liquid at the start.
B. Because there is mineral oil in the red bottle, but carbon tetrachloride in the blue bottle at the start..
C. Because there is oil in the red bottle at the start, but not in the blue bottle at the start.
D. Because there is something in the red liquid at the start that is not in the blue liquid at the start.

16. Suppose that you are considering the following conclusion: "Because there is something in the red liquid at the start that is not in the blue liquid at the start."

Then, suppose the following questions were asked:

Is the red liquid warm at the start? (Yes)
Is there any water in the red liquid at the start? (Yes)
Is there any alcohol in the red liquid at the start? (Yes)
Is there any salt in the red liquid at the start? (Yes)
Is there any water in the blue liquid at the start? (Yes)
Is there any alcohol in the blue liquid at the start? (Yes)
Is there any salt in the blue liquid at the start? (No)

Now, because of the answers to the above questions, how would you change the original conclusion?

A. Because there is salt in the red liquid at the start, but not in the blue liquid.
B. Because the red liquid is warm at the start, but the blue liquid isn't.
C. Because the red liquid contains water and salt at the start.
D. Because the red liquid contains salt at the start, but the blue liquid doesn't.

17. Read all of the following questions. Then decide which is the best order for them to be asked if you were going to ask a series of questions. First, select the letter of the question you would ask first, then the letter of the one you would ask second, and so on, until you have selected all of the letters.

P. Is the amount of salt in the red liquid at the start the same as in the blue liquid? (No)
Q. Is there anything besides tapwater in the red liquid at the start? (Yes)
R. Is there any tapwater in the blue liquid at the start? (Yes)
S. Is there any salt in the blue liquid at the start? (Yes)
T. Is there more salt in the blue liquid at the start than in the red liquid? (Yes)
U. Is there any tapwater in the red liquid at the start? (Yes)
V. Is there anything besides tapwater in the blue liquid at the start? (Yes)
W. Is there any salt in the red liquid at the start? (Yes)

Now, select the best order from the possibilities listed below.

A. UQWVSTPR
B. URQVWSPT
C. URWVSQPT
D. STRWVUPQ
E. SWRVTUPQ

18. Suppose the following questions were asked:

Is there any salt in the red liquid at the start? (Yes)
Is the red liquid warm at the start? (No)
Is there any alcohol in the blue liquid at the start? (Yes)
Is the blue liquid warm at the start? (Yes)
Is there any salt in the blue liquid at the start? (Yes)
Is the amount of salt in the blue and red liquids the same at the start? (No)
Are the temperatures of the red liquid and the blue liquid the same at the start? (No)

Then, decide which of the following conclusions could be true.

A. Because the red liquid is different from the blue liquid.
B. Because there is more salt in the red liquid at the start than in the blue liquid.
C. Because the blue liquid is warmer at the start than is the red liquid.
D. Because there is alcohol in the blue liquid at the start, but not in the red liquid.
E. (All of the above: A, B, C and D could be true.)

Student's first and last name (please print) ANSWER KEY

Test Form CE 4A **Test Number** _____

1.	**A**	B	C	D	E
2.	A	**B**	C	D	E
3.	A	**B**	C	D	E
4.	A	**B**	C	D	E
5.	**A**	B	C	D	E
6.	A	B	**C**	D	E
7.	A	B	**C**	D	E
8.	A	B	C	**D**	E
9.	A	**B**	C	D	E
10.	A	**B**	C	D	E
11.	A	B	**C**	D	E
12.	A	B	C	D	**E**
13.	A	B	**C**	D	E
14.	**A**	B	C	D	E
15.	A	**B**	C	D	E
16.	**A**	B	C	D	E
17.	A	**B**	C	D	E
18.	A	B	C	D	**E**
19.	A	B	C	D	E
20.	A	B	C	D	E

Student's first and last name (please print) _____

Test Form _____ **Test Number** _____

1.	A	B	C	D	E
2.	A	B	C	D	E
3.	A	B	C	D	E
4.	A	B	C	D	E
5.	A	B	C	D	E
6.	A	B	C	D	E
7.	A	B	C	D	E
8.	A	B	C	D	E
9.	A	B	C	D	E
10.	A	B	C	D	E
11.	A	B	C	D	E
12.	A	B	C	D	E
13.	A	B	C	D	E
14.	A	B	C	D	E
15.	A	B	C	D	E
16.	A	B	C	D	E
17.	A	B	C	D	E
18.	A	B	C	D	E
19.	A	B	C	D	E
20.	A	B	C	D	E