(Teachers who purchase the "Thinking With Science" kit may make multiple copies of these tests for administration to their students without infringing on the copyright.)

Table of Contents

PREFACE

This booklet is intended to be used for the following purposes:

1. As a teaching guide for teachers.

2. As a study guide for students.

3. As a help-study guide for parents of students.

At the end of the 20-lesson "Thinking With Science" program, three tests will be administered to all students in the program. Those tests measure the student's attainment of the following concepts and skills:

1. Major science concepts.

2. Scientific skills.

3. Cognition Enhancement skills (questioning skills and thinking skills).

If a student pays attention in class and learns the answers to the tests in this booklet (and the reasons for them), he or she should do well on the final tests.

Each of the three final tests will be one of the four forms for that type of test in this booklet, or a scrambled version of one of them.

Test Form: SC1A

Test Number _____

Test Of Science Concepts

Do not mark on this test. Indicate your answers to the test questions by circling the letter of your choice on the answer sheet.

1. If you took an inflated balloon from a cold room into a hot room and left it in the hot room, the most likely result would be:
   a. the balloon would get bigger.
   b. the balloon would get smaller.
   c. the balloon would explode.
   d. the balloon would stay the same size,

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2. Suppose that the same midget race car is driven over the same course by three different people at three different times. Each time, the car starts out with a full tank of gasoline. The same amount of power Is applied by the engine all three times. If the car was driven by the people listed in the possible answers, which would go the farthest distance.
   a. the car driven by a 65-pound boy.
   b. the car driven by a 70-pound girl.
   c. the car driven by a 75-pound boy.
   d. they would all go the same distance.

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3. Where a freshwater river runs into the sea, which of the following is most likely to happen?
   a. a layer of freshwater forms over the sea water.
   b. the freshwater forms a layer under the sea water.
   c the freshwater and the seawater mix immediately.
   d. none of the above is very likely to happen.

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4 Suppose you wanted to lift a car's wheel off the pavement in order to change a tire. If you lifted the car by putting the end of a thick board under the frame, then placing a block of wood under the board, and standing on the outer end of the board, it would be easier to lift the car if the block of wood was:
   a. five feet from the car.
   b. four feet from the car.
   c. three feet from the car.
   d. two feet from the car.

5. If you put 1 cup of peanut oil and 1 cup of water In a jar and stirred them, which of the following would most likely happen?

A. peanut butter would form
b. the peanut oil would rise above the water.
c. the water would rise above the peanut oil.
d. the two would mix to form a single solution.

6. If you were shown two bean plants, and if Plant X was bright green and Plant Y was pale yellow, the best way to explain the difference In color would be:

a. Plant X was grown at a higher temperature.
b. Plant X received less water.
c. Plant X received more light.
d. Plant X received too little fertilizer.

7. Jar X contains 4 tablespoons of salt in 1 pint of water. Jar Y contains 4 tablespoons of sugar in 1 pint of water. Which statement below best describes what would happen to a piece of wood if it were floated first in Liquid X, then in Liquid Y?

a. More of the wood would be above the surface of Liquid X.
b. More of the wood would be above the surface of Liquid Y.
c. About the same amount of wood would be above the liquids in both X and Y.
d. None of the wood would be above the liquids' surface in either X or Y.

8. The reason why we feel cooler when a fan is blowing on us is:

a. the fan cools the air.
b. the fan makes water evaporate faster from our skin.
c. the fan causes water from the air to condense on our skin.
d. none of the above explanations is true.

9. John went fishing with his father at the ocean. John fell into the very clear ocean water with his clothes on. He then changed Into dry clothing, without wringing the water out of his wet clothing. When he got home, he hung his wet clothing on the clothesline to dry. Two days later, when he went to get his dry clothing off the clothesline, they were covered all over with glassy-looking particles. The most likely explanation for the particles is:

a. they were the shells of small, floating sea animals.
b. they were the skeletons of small, floating sea plants.
c. they were small pieces of glass.
d. they were small pieces of salt.

10. Which of the following Is heaviest?
    a. a pound of hot water.
    b. a pound of cold water.
    c. 5 gallons of hot water.
    d. 5 gallons of cold water.

11. If you wanted water to conduct electricity better, you could add:
    a. sugar.
    b. alcohol
    c. salt
    d. mineral oil.

12. If you put some yeast in a bottle of sugar water:
    a. carbon dioxide bubbles would form after a while.
    b. the yeast would use the sugar as food.
    c. the yeast would die after all of the sugar was used up.
    d. all of the above,

13. If you had some way of sucking all of the air out of a sealed, air-filled plastic soda pop bottle, the most likely result would be:
    a. the bottle would explode.
    b. the bottle would float better.
    c. the bottle would collapse.
    d. all of the above would happen.

14 Anything that floats in water will, when placed In alcohol:
    a. float better.
    b. float not as well,.
    c. float the same.
    d. sink

15. It would be easiest to lift a sunken car from the bottom of a large swimming pool if the pool was filled with:

    a. tapwater.
    b. peanut oil.
    c. saltwater
    d. none of the above would make it any easier than any of the others.

16. The substance that makes leaves green:
    a. is called chlorophyll.
    b. dissolves In alcohol.
    c. needs light to form.
    d. all of the above.

17. If you were a scuba diver, and if you took an air-filled balloon with you on a dive, then as you went deeper in the water, the balloon would:
    a. get smaller.
    b. get larger,.
    c. float better.
    d. explode.

18. If you want to keep carrot sticks crisp and hard:
    a. place them in a mixture of salt and water.
    b. place them in pure tapwater.
    c. place them in a mixture of sugar and water.
    d. none of the above.

19. Many years ago, people had bottles of milk delivered to their front porches every morning. Often, on days when the temperature was below freezing, the homeowners would discover that the top of the milk had risen about an inch out of the bottle, with the paper cap sitting on top, This probably happened because:
    a. the milk fat (cream) separated from the milk and rose to the top.
    b. the cold temperature made the milk fat expand.
    c. the bottle contracted from the cold temperature,
    d. the water in the milk expanded when it froze.

You have now finished the test. If time permits, review your answers or work on questions that you didn't answer the first time through the test. Then turn over your test and your answer sheet, and do not turn it right-side-up again.

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

Test Form SC1A **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: SC2A

Test Number: _____

Test Of Science Concepts

Do not mark on this test. Indicate your answers to the test questions by circling the letter of your choice on the answer sheet.

1. If you took an inflated balloon from a hot room into a cold room and left it in the cold room, the most likely result would be:

a the balloon would get bigger.
b. the balloon would get smaller.
c. the balloon would explode.
d. the balloon would stay the same size.

---

2. Suppose that the same midget race car is driven over the same course by three different people at three different times. Each time, the car starts out with 1 gallon of gasoline in the tank. The same amount of power is applied by the engine all three times. If the car was driven by the people listed in the possible answers, which would go the farthest distance.

a. the car driven by a 140-pound man..
b. the car driven by a 140-pound woman.
c. the car driven by a 120-pound woman.
d. they would all go the same distance.

---

3. Where the salty drain from a salt factory runs into a lake, which of the following is most likely to happen?

a. a layer of lake water forms over the drain water.
b. the lake water forms a layer under the drain water.
c the drain water and the lake water mix immediately.
d. all of the above could happen.

4. Suppose you wanted to lift a covered wagon wheel off the road in order to repair the broken wheel. If you lifted the wagon by putting the end of a tree pole under the wagon, then placing a block of wood under the pole, and pushing down on the outer end of the pole, it would be easier to lift the wagon if the block of wood was:

A. 56 inches from the frame.
B. 24 inches from the frame.
C. 35 inches from the frame.
D. 48 inches from the frame.

5. If you put 1 cup of olive oil and 1 cup of water in a jar and stirred them, which of the following would most likely happen?

A. the olive oil would rise above the water.
B. salad dressing would form.
C. the water would form a layer on top of the olive oil.
D. the two would mix to form a single layer.

6. If you were shown two bean plants, and if Plant X was bright green and Plant Y was pale yellow, the best way to explain the difference In color would be:

a. Plant X was grown at a higher temperature.
b. Plant X received less water.
c. Plant X received less light.
d. Plant Y received less fertilizer.

7. Jar X contains 2 tablespoons of salt in 1 pint of water. Jar Y contains *4* tablespoons of sugar in 1 pint of water. Which statement below best describes what would happen to a piece of wood if it were floated first in Liquid X, then in Liquid Y?

a. More of the wood would be above the surface of Liquid X.
b. More of the wood would be above the surface of Liquid Y.
c. About the same amount of wood would be above the liquids in both X and Y.
d. None of the wood would be above the liquids' surface in either X or Y.

8. The reason why we feel cooler when a cold breeze is blowing on us is:

a. the breeze cools our skin.
b. the breeze makes water evaporate faster from our skin.
c. the breeze causes water from the air to condense on our skin.
d. both a and b are possible.

9. John went fishing with his father at a freshwater lake. John fell into the very murky lake water with his clothes on. He then changed into dry clothing, without wringing the water out of his wet clothing. When he got home, he hung his wet clothing on the clothesline to dry. Two days later, when he went to get his dry clothing off the clothesline, they were covered all over with glassy-looking particles. The most likely explanation for the particles is:
   a. they were the shells of small, floating sea animals.
   b. they were the skeletons of small, floating freshwater plants.
   c. they were small pieces of glass.
   d. they were small pieces of salt.

---

10. Which of the following is most dense?
   a. a pound of hot water.
   b. a pound of cold water.
   c. 5 gallons of hot water.
   d. they would all have the same density..

---

11. If you wanted water to conduct electricity better, you could add:
   a. sugar.
   b. battery acid.
   c. salt
   d. either b or c, above.

---

12. If you put some yeast in a bottle of sugar water:
   a. oxygen bubbles would form after a while.
   b. the yeast would use the sugar as food.
   c. the yeast would die from sugar overload.
   d. none of the above,

---

13. If you had some way of sucking all of the air out of a sealed, air-filled plastic soda pop bottle, the most likely result would be:
   a. the bottle would collapse..
   b. the bottle would float better.
   c. the bottle would disintegrate.
   d. none of the above would happen.

14 Anything that floats in water will, when placed vegetable oil:
   A. float the same.
   B. float better.
   C. sink.
   D. float not as well.

15. It would be hardest for a two truck to lift a sunken car from the bottom of a large swimming pool if the pool was filled with:

a. tapwater.
b. peanut oil.
c. saltwater.
d. none of the above would make it any harder than any of the others.

---

16. The substance that makes leaves green:
a. is called cellulose.
b. is produced by glucose.
c. needs light to form.
d. all of the above.

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17. If you were a scuba diver, and if you took a helium-filled balloon with you on a dive, then as you went deeper in the water, the balloon would:
a. get smaller.
b. get denser.
c. neither a or b above.
d. both a and b above..

---

18. If you want to make carrot sticks soft and rubbery:
a. place them in a mixture of salt and water.
b. place them in pure tapwater.
c. place them in a mixture of sugar and water.
d. either a or c, above.

---

19. If you put a 1-gallon glass bottle of milk, that has a screw cap, in the freezer, it will probably crack. This probably happens because:
a. the water in the milk expands when it freezes.
b. the milk fat (cream) separates from the milk and rises to the top.
c. the cold temperature makes the milk fat expand.
d. the bottle contracts from the cold temperature,

You have now finished the test. If time permits, review your answers or work on questions that you didn't answer the first time through the test. Then turn over your test and your answer sheet, and do not turn it right-side-up again.

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

Test Form SC 2A **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: SC3A

Test Number: _____

Test Of Science Concepts

Do not mark on this test. Indicate your answers to the test questions by circling the letter of your choice on the answer sheet.

1. If you take a sport tube out of your boat on a hot day, and put it in the lake water, it gets softer because:
   A. the rubber of the tube expands.
   B. the air in the tube contracts.
   C. both A and B above.
   D. neither A or B above.

2. Suppose that you have just the right amount of gasoline in your car's gas tank that it totals five gallons. Under which of the following conditions would the car run out of gasoline first, if you ran it over the same exact route?
   A. hauling 5 sacks of cement mix.
   B. hauling 2 sacks of cement mix.
   C. hauling 4 sacks of cement mix.
   D. hauling 7 sacks of cement mix.

3. When the ice from a glacier drops off into the ocean as an iceberg and then melts, what happens to the water from the melting iceberg?
   A. It immediately mixes thoroughly with the ocean water to form a single solution.
   B. It sinks toward the bottom of the ocean.
   C. It floats to the top of the ocean.
   D. It remains as pure water forever.

4. Suppose that you wanted to pull a nail out of a board with a wrecking bar (crowbar) that had a pulling-claw on the lower end. Which length of the upper (prying) end would make it easier to pull the nail out?
   A. 24 inches.
   B. 64 inches.
   C. 35 inches.
   D. 47 inches.

5. If you poured a cup of vegetable oil into a cup of water, and stirred them vigorously for one minute, what would be most likely to happen after you allowed it to sit for ten minutes?

A. A single layer would form in the container.
B. The oil would form a layer on top of the water..
C. Two layers would form in the container.
D. Both C and B above.

6. If you were shown two potato plants, and if Plant X was bright green and Plant Y was pale yellow, the best way to explain the difference in color would be:
A. Plant X was grown at a higher temperature.
B. Plant X received less water.
C. Plant X received less light.
D. Plant X received more light..

7. Jar X contains 4 tablespoons of salt in 1 pint of water. Jar Y contains *6* tablespoons of salt in 1 pint of water. Which statement below best describes what would happen to a piece of styrofoam if it were floated first in Liquid X, then in Liquid Y?
A. More of the styrofoam would be above the surface of Liquid X.
B. More of the styrofoam would be above the surface of Liquid Y.
C. About the same amount of styrofoam would be above the liquids in both X and Y.
D. None of the styrofoam would be above the liquids' surface in either X or Y.

8. The reason why a thin, plastic windbreaker makes us feel warmer is:
A. Plastic gives off heat.
B. A windbreaker holds in heat well.
C. Both A and B, above.
D. Neither A or B, above.

9. John jumped off the dock into the very clear ocean water. After he got out of the water and dried off in the sun, his skin felt "gritty". The most likely explanation for this is:
A. Sand from the water dried on his skin.
B. Algae from the water dried on his skin.
C. Salt from the water dried on his skin.
D. Microscopic animals from the water dried on his skin.

10. Which of the following is least dense?
A. a pound of hot water.
B. a pound of cold water.
C. 5 gallons of cold water.
D. 1 gallon of cold water.

11. Water with salt in it conducts electricity better than pure water because it contains:

A. ions.
B. molecules.
C. atoms.
D. chlorine.

12. Yeast lives and grows better if it can get:

A. salt.
B. sugar.
C. flour.
D. both A and B, above.

13. If you took an empty plastic soda pop bottle to a high altitude place like Paradise on Mount Rainer, then screwed the cap on tightly, and then brought it down to sea level, it would probably:

A. pop.
B. get bigger.
C. get smaller.
D. both A and B, above.

14 Anything that floats in water will, when placed in gasoline:

A. float better.
B. float not as well.
C. dissolve.
D. sink.

15. It would be easiest to lift a 20-pound rock if it were submerged in:

A. tapwater.
B. peanut oil.
C. saltwater .
D. mercury.

16. The substance that makes it possible for sugar cane to manufacture glucose is:

A. chlorophyll.
B. table sugar.
C. cellulose.
D. salt.

17. If you released a helium-filled balloon into the atmosphere, it would:
    A. get bigger.
    B. rise.
    C. both A and B, above.
    D. Neither A nor B, above.

18. When you put salt on a slug, the slug shrinks because:
    A. osmosis occurs.
    B. water comes out of the slug's cells.
    C. water is more pure inside the slug's cells than in the salt.
    D. all of the above.

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19. The part of whole milk that expands when it freezes is the:

    A. cream.
    B. whey.
    C. curds.
    D. water.

You have now finished the test. If time permits, review your answers, or work on questions that you didn't answer the first time through the test. Then turn over your test and your answer sheet, and do not turn it right-side-up again.

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

Test Form SC3A **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: SC4A

Test Number: _____

Test Of Science Concepts

Do not mark on this test. Indicate your answers to the test questions by circling the letter of your choice on the answer sheet.

1. The reason why the spinning tire on a moving car is harder than the same tire on the car when it is standing still is:
   A. the rubber of the tire contracts when it gets hot.
   B. spinning air is hotter than still air.
   C. the air in the spinning tire is heated by the friction.
   D. all of the above.

2. Suppose you fill your gas tank, and then drive the car at 50 miles per hour until it runs out of gas. Under which of the following conditions would the car run out of gas after the longest time , if you were traveling the same route each time? (All of your passengers weigh 100 pounds each.)
   A. You're carrying 3 passengers.
   B. You're carrying 1 passenger.
   C. You're carrying 2 passengers.
   D. You're carrying 4 passengers.

3. If you opened a bottle of ocean water under the water in an aquarium filled with tap water, the ocean water would:
   A. rise.
   B. sink.
   C. stay in the bottle.
   D. none of the above.

4. If you wanted to pull a nail out of a board with a hammer, it would be easiest to do if you pulled on the handle the following distance up the handle from the claw:
   A. 6 inches.
   B. 12 inches.
   C. 3 inches.
   D. 8 inches.

5. Why do oil-spill cleanup people put a floating tube around the oil spill from a boat?
   A. Oil floats.
   B. The tube keeps the oil from floating away.
   C. Neither of the above.
   D. Both of the above.

6. If you were shown two bean plants, and if Plant X was standing up straight and Plant Y was limp, the best way to explain the difference would be:
   A. Plant X was grown at a higher temperature.
   B. Plant X received more water.
   C. Plant X received more light.
   D.. Plant X received more fertilizer.

7. Where would the same piece of driftwood float best?
   A. In the ocean.
   B. In a freshwater lake.
   C. In a river.
   D. In a barrel of tap water.

8. The reason why we perspire is:
   A. Our skin needs moisture.
   B. Our skin is cooled by the evaporating water.
   C. Our skin needs the salt in the perspiration.
   D. Our body can't get rid of the moisture any other way.

9. If you put some ocean water in a dish, and then let it sit until it evaporated, the following would happen:
   A. salt crystals would form in the dish.
   B. the sea salt would became visible.
   C. the size of the salt crystals would depend on the evaporation rate.
   D. all of the above.

10. Which of the following Is most dense?
   A. a pound of hot water.
   B. a pound of cold water.
   C. a pound of vegetable oil.
   D. a pound of mercury.

11 The most ions are found in:
   A. tap water.
   B. ocean water.
   C. sugar water.
   D. distilled water.

12. Yeast makes bread dough expand because:
   A. the yeasts multiply.
   B. the yeasts form carbon dioxide bubbles.
   C. yeasts can convert wheat starch into glucose.
   D. all of the above.

13. If you had some way of sucking all of the air out of a sealed, air-filled plastic soda pop bottle, the most likely result would be:

A. the bottle would collapse.
B. the air pressure on the outside would be greater than inside.
C. both A and B, above.
D. neither A nor B, above.

14. Anything that floats in alcohol will:

A. float better in olive oil.
B. float better in water.
C. float better in mineral oil.
D. none of the above.

15. You would weigh more after you got out of a pool filled with:

A. water.
B. oil.
C. alcohol.
D. none of the above.

16. The substance that makes leaves green:

A. is called cellulose.
B. needs light to form.
C. is not found in radish seedlings.
D. also forms proteins..

17. If you were a scuba diver, and if you took a nitrogren-filled sealed plastic bottle with you on a dive, then as you went deeper in the water, the bottle would:

A. collapse.
B. expand.
C. dissolve.
D. evaporate.

18. If you want to make a potato soft and rubbery, put it in::

A. vegetable oil.
B. alcohol.
C. saltwater.
D. gasoline.

19. Many years ago, people had bottles of milk delivered to their front porches every morning. Often, on days when the temperature was below freezing, the homeowners would discover that the top of the milk had risen about an inch out of the bottle, with the paper cap sitting on top, This probably happened because:

A. the milk fat rose to the top.
B. the water in the milk froze.
C. curds formed in the milk.
D. the whey rose to the top.

You have now finished the test. If time permits, review your answers or work on questions that you didn't answer the first time through the test. Then turn over your test and your answer sheet, and do not turn it right-side-up again.

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

Test Form 5C4A **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: SS1A

Test Number: _____

TEST ON SCIENTIFIC SKILLS

The following experiment was performed:

Question:

What difference will there be between two bean plants, if one gets tap water only, and the other gets tap water containing 1 per cent Miracle Gro fertilizer?

Prediction:

The bean plant that gets the fertilizer will grow faster and will end up bigger.

Materials:

2 bean seeds from the same package.
2 styrofoam cups, 8 ounces.
Pure washed sand to put in the cups.
Measuring ruler
Miracle Gro fertilizer

Procedures:

A bean seed was planted in the sand in Cup 1. Another bean seed was planted in the sand in Cup 2. The cups were identical. Both cups were kept at room temperature in the same place, where they could get the same amount of light. Both cups got the same amount of water. However, the water given to Cup 1 was plain tapwater, but the water given to Cup 2 was tapwater containing 1 per cent of Miracle Gro fertilizer. The cups were watered at the same time each day, with the same amount of water. At those times, the height of the resulting bean plants were measured each day, until the end of the experiment.

Results:

Day of experiment	Height of bean plants	
	Cup 1	Cup 2
1	Not visible	Not visible
2	Not visible	Not visible
3	Not visible	Not visible
4	5 mm.	5 mm.
5	8 mm.	8 mm.
6	14 mm.	13 mm.
7	21 mm.	22 mm.
8	28 mm.	32 mm.
9	34 mm.	44 mm.
10	35 mm.	47 mm.
11	36 mm.	55 mm.
12	36 mm.	64 mm.
13	37 mm.	73 mm.
14	37 mm.	84 mm.

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 bean seeds
   B. Plant 1
   C. the fertilizer
   D. None of the above.

2. Name a manipulated variable,
   A. the sand
   B. Plant 2
   C. the fertilizer
   D. None of the above.

3. Name a controlled variable,
   A. the light
   B. Plant 1
   C. the fertilizer
   D. None of the above.

4. Name an experimental group.
   A. beans, fertilizer and sand
   B. fertilizer and water
   C. Plant 1
   D. Plant 2

5. Name a responding variable,
   A. light
   B. fertilizer
   C. temperature
   D. None of the above.

6 Several students offered predictions before the results were obtained. They' were:
   A. Plant 1 will die:
   B. Plant 2 will die.
   C. Plant 2 will become larger than Plant 1.
   D. Plant 1 will not grow at all.

   Which of the above predictions is supported by the results?

7. Which of the following conclusions is refuted by the results?
   A. Plant 1 grew at first from food in the seed,
   B. Both plants were the same height after 5 days because they were getting food from the seeds.
   C. Plant 2 grew taller because it got fertilizer for 14 days,
   D. None of the above.

8. Suppose that on the 15th day, you started giving both plants the same water containing the fertilizer. Which of the following results do you predict after 20 days?
   A. Plant 1: 37 mm; Plant 2: 84 mm.
   B. Plant 1: 47 mm; Plant 2: 98 mm.
   C. Plant 1: 47 mm; Plant 2: 84 mm.
   D. Plant 1:105 mm; Plant 2: 98 mm.

9. Suppose that in addition to the fertilizer added to Cup 2, you placed Cup 2 in a room that was 45 degrees (20 degrees cooler than the room with Cup 1). How do you predict the results to look after 14 days?
   A. Plant 1: 37 mm; Plant 2: 37 mm.
   B. Plant 1: 37 mm; Plant 2: 84 mm.
   C. Plant 1: 37 mm; Plant 2: 65 mm.
   D. There is no way to accurately predict the outcome, because there are 2 manipulated variables.

10. Which of the following conclusions is supported by the results?
   A. The more fertilizer that a plant gets, the faster it will grow,
   B. A plant will grow bigger if it gets fertilizer,
   C. Without fertilizer, a plant can't grow,
   D. None of the above.

Suppose that the experiment was repeated, but this time Cup 1 was watered two times each day, but Cup 2 was still watered only one time each day. If the results turned out exactly the same way that the first experiment did, then:

11. Which of the following conclusions is supported by the results of both the first and second experiments?
   A. The amount of plain water doesn't matter.
   B. The amount of fertilizer does matter.
   C. The amount of light matters.
   D. Both A and B above.

12. Which of the following conclusions is refuted by the results of both the first and second experiments?
   A. The amount of fertilizer matters.
   B. The amount of plain water matters.
   C. How many times Cup 1 was watered didn't matter.
   D. How much fertilizer Cup 2 got mattered.

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 SS1A **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: SS2A

Test Number: _____

TEST ON SCIENTIFIC SKILLS

The following scientific experiment was performed.

Question:

What happens when you place a lighted light globe (lamp) under one of two paper bags balanced upside-down on a suspended yardstick?

Prediction:

When the lamp is placed under the left end (L), that end rises. When the lamp is placed under the right end (R), that end rises.

Materials:

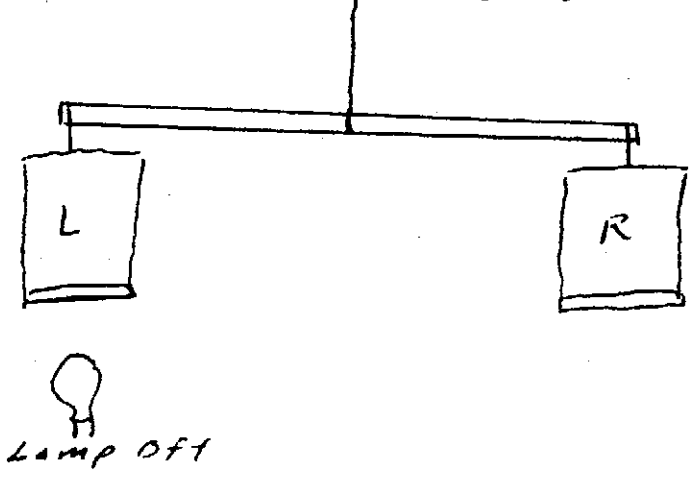
1 yardstick
1 piece of string 20 inches long
2 identical brown lunch bags, each with a 10-inch string taped to the middle of its bottom
1 100-watt light globe screwed into a an extension cord with a lamp socket

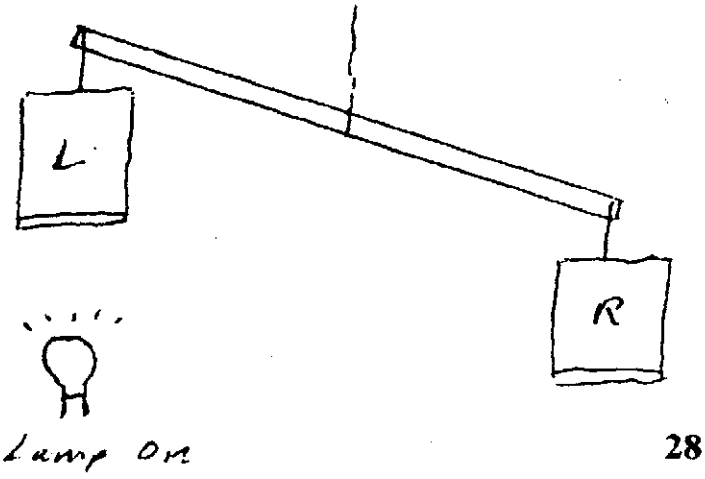
Procedures:

1. The string attached to each paper bag is tied to opposite ends of the yardstick.
2. The yardstick is suspended by a string attached to its midpoint, and that is suspended from the top of a door frame or cabinet, so that the yardstick is horizontal.
3. The lighted lamp is placed under the opening of the left bag, and the results are recorded.
4. The lighted lamp is placed under the opening of the right bag, and the results are recorded.

Results:

1. When the lamp was placed under the left bag, that bag rose.
2. When the lamp was placed under the right bag, that bag rose





Test Questions

All of the following questions refer to the experiment described on the previous page. On your answer sheet, circle the best choice of the answers listed for each question. In some cases, there might be more than one correct choice, but one will always be_ best.

1. Name a control group.
   A. Bag L, with the lamp on, under it.
   B. Bag R, with the lamp on, under it.
   C. Bag L and Bag R, with the lamp off.
   D. Bag L and Bag R, with the lamp on.

2. Name an experimental group.
   A. Bag L, with the lamp on, under it.
   B. Bag R, with the lamp off under it.
   C. Bag L and Bag R, with the lamp off.
   D. Bag L and Bag R, with the lamp on.

3. Name a controlled variable,
   A. The bags.
   B. The strings suspending the bags.
   C.. The yardstick.
   D. all of the above

4. Name a manipulated variable
   A. The lamp on and off.
   B. The yardstick suspended by the string,
   C. The bag suspended from the yardstick.
   D. The strings.

5. Name a responding variable
   A. Bag L rose when the lamp was turned on under it.
   B. Bag R rose when the lamp was turned on under it.
   C. Neither bag rose when the lamp was off.
   D. A and B, above.

6. Several students offered the following predictions before any results were obtained:
   A. Bag L will rise when the lamp is turned on under it.
   B. Bag R will not rise when the lamp is turned on under it.
   C. Neither bag will rise when the lamp is turned on under them,
   D. Bag L will not rise when the lamp is turned on under it.

Which of the above predictions is supported by the results?

7. Which of the following conclusions is supported by the results?
   A. Heat from the lighted lamp causes a bag to rise.
   B. Light from the lighted lamp causes a bag to rise.
   C. Both A and B, above.
   D. Neither A nor B, above.

8. Which of the following conclusions is refuted by the results?
   A. Heat from the lighted lamp causes a bag to rise.
   B. Light from the lighted lamp causes a bag to rise.
   C. Both A and B, above.
   D. Neither A nor B, above.

Now, suppose that the following modifications of this experiment were tried, and the listed results were obtained.

   m. With the lighted lamp away from the bags, it was turned off, and, while still hot, it was immediately placed under Bag L. Bag L then rose,
   n. A large sheet of glass was placed between Bag L and the lighted lamp, so that the light could still shine on Bag L. Bag L did not rise,
   o. A sheet of black paper (just big enough to shield the bag from the light, but not from the heat) was placed between the Bag L and the lighted lamp. Bag L then rose

9. Which of the following conclusions is supported by the new results,
   A. Heat from the lamp caused the bags to rise.
   B. Light from the lamp caused the bags to rise.
   C. Neither A nor B.
   D. Both A and B.

10. Which of the following conclusions is refuted by these new results?
   A. Heat from the lighted lamp caused the bags to rise.
   B. Light from the lighted lamp caused the bags to rise.
   C. Neither A nor B is refuted by the results,
   D. Both A and B are refuted by the results.

11.. Suppose that you next held the lighted lamp exactly in the middle between Bag L and Bag R, about 10 inches below the bags' openings. What do you predict the result to be if you did this?

   A. Bag L would rise.
   B. Bag R would rise.
   C. Both Bag L and Bag R would rise the same amount.
   D. Neither Bag L nor Bag R would rise.

12. What do you predict would happen if you shined a flashlight under Bag R instead of putting the lighted lamp under it?
    A. Bag R would rise.
    B. Bag L would rise.
    C. Neither bag would rise.
    D. None of the above would happen.

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 552-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