

Name _____

Date _____

Scientific Method Read & Write Handout

Is Green the New Clean?

Sally loved to keep her house clean. She always cleaned the kitchen counter with a cleaner that contained bleach.

One day Sally was shopping and found a green cleaner, which was environmentally friendly, in the grocery store. It did not contain bleach. Sally knew that bleach was bad for the environment, but she also liked her kitchen germ free. She wondered if the green cleaner killed as many germs as her bleach cleaner.

While doing some research, she discovered that germs were living bacteria that could not survive exposure to bleach. She remembered from reading the label on the green cleaner that it did not contain bleach and that it only contained natural ingredients. She thought the green cleaner would not kill as many bacteria as the bleach cleaner, although she hoped it would.

She swabbed her desk with a sterile q-tip and then rubbed it onto a petri dish that contained nutrient agar. Agar is a blend of nutrients and water that bacteria love.

Then she cleaned half the desk with bleach cleaner and half with green cleaner. She then re-swabbed each of those areas on the desk. She did the same with the telephone, door knob, and computer keyboard. She put all of these petri dishes, along with one that had not been swabbed with anything, into the incubator. An incubator is like a little oven that keeps the bacteria nice and warm so they can grow. She left the petri dishes in the incubator for 3 days. When she removed them, she counted the number of bacteria colonies in each petri dish.

The dish with nothing swabbed in it had no colonies. The bleach dishes had an average of 12 colonies and the green cleaner dishes had an average of 87 bacteria colonies. The 'before' dishes had an average of 1200 colonies. The bleach cleaner had killed 99% of the bacteria and the green cleaner had killed 96.75% of the bacteria. Sally decided that even though she proved her hypothesis correct, she would switch to the green cleaner. She decided she was willing to kill less of the germs in her kitchen if it meant being kinder to the environment.

1. State the problem.

2. List two things Sally learned in her research about bleach and the green cleaner.
 - a. _____
 - b. _____
3. Circle Sally's hypothesis.
4. Why do you think Sally uses sterile q-tips in her experiment?

5. Underline all of the places Sally swabs. Why so many?

6. Why do you think Sally chose these surfaces to test?

7. Box-in Sally's analyzed data.
8. What was Sally's conclusion?

9. Underline where Sally makes an ethical decision.
10. Name one way Sally could add to this experiment to make it better.

Scientific Method Read & Write Handout

Is Green the New Clean?

Sally loved to keep her house clean. She always cleaned the kitchen counter with a cleaner that contained bleach.

One day Sally was shopping and found a green cleaner, which was environmentally friendly, in the grocery store. It did not contain bleach. Sally knew that bleach was bad for the environment, but she also liked her kitchen germ free. She wondered if the green cleaner killed as many germs as her bleach cleaner.

While doing some research, she discovered that germs were living bacteria that could not survive exposure to bleach. She remembered from reading the label on the green cleaner that it did not contain bleach and that it only contained natural ingredients. She thought the green cleaner would not kill as many bacteria as the bleach cleaner, although she hoped it would.

She swabbed her desk with a sterile q-tip and then rubbed it onto a petri dish that contained nutrient agar. Agar is a blend of nutrients and water that bacteria love.

Then she cleaned half the desk with bleach cleaner and half with green cleaner. She then re-swabbed each of those areas on the desk. She did the same with the telephone, door knob, and computer keyboard. She put all of these petri dishes, along with one that had not been swabbed with anything, into the incubator. An incubator is like a little oven that keeps the bacteria nice and warm so they can grow. She left the petri dishes in the incubator for 3 days. When she removed them, she counted the number of bacteria colonies in each petri dish.

The dish with nothing swabbed in it had no colonies. The bleach dishes had an average of 12 colonies and the green cleaner dishes had an average of 87 bacteria colonies. The 'before' dishes had an average of 1200 colonies. The bleach cleaner had killed 99% of the bacteria and the green cleaner had killed 96.75% of the bacteria. Sally decided that even though she proved her hypothesis correct, she would switch to the green cleaner. She decided she was willing to kill less of the germs in her kitchen if it meant being kinder to the environment.

1. State the problem. _____ Do green cleaners kill as many germs as bleach cleaners? _____
2. List two things Sally learning in her research about bleach and the green cleaner.
 - a. _____ Many germs are living bacteria _____
 - b. _____ Bacteria die when exposed to bleach. _____
3. Circle Sally's hypothesis.
4. Why do you think Sally uses sterile q-tips in her experiment? _____ Sally used sterile q-tips because she wanted to know if there were bacteria on the surfaces, not the q-tips. _____
5. Underline all of the places Sally swabs. Why so many? _____ Sally needed to prove that her data were true regardless of the location. _____
6. Why do you think Sally chose these surfaces to test? _____ Sally chose these places to test because they would be places you would expect to find bacteria. _____
7. Box-in Sally's analyzed data.
8. What was Sally's conclusion? _____ Sally concluded that while both cleaners killed a large amount of bacteria, the bleach cleaner did kill more than the green cleaner. _____
9. Underline where Sally makes an ethical decision.
10. Name one way Sally could add to this experiment to make it better. _____ Sally could re-test, test different surfaces, or leave the petri dishes in the incubator for a longer period of time... anything that is an extension. _____

Name _____

Date _____

Scientific Method Read & Write Handout

Terrific Toothpaste Stain Remover

Laura loved to do crafty things. One day, while wearing a brand new shirt, Laura accidentally got black permanent marker on her new, white shirt.

Very upset, she turned to her friend Lisa. Lisa said that if she applied a hefty coating of toothpaste and allowed it to dry, that the toothpaste would remove the stain.

Laura didn't particularly enjoy reading about science, so she took her friend's advice.

That night she applied a thick coating of toothpaste to both sides of the stain. She allowed it to dry for 24 hours. The following evening she hand-washed her shirt in the sink and much to her delight, the stain was gone!

1. Underline the sentence where a problem is encountered.

2. In this case, from where does Laura's research come?

3. If you were going to turn this into a scientific experiment, what are some hard-to-get-out stains you could test it on? Name four.
 - a. _____
 - b. _____
 - c. _____
 - d. _____
4. Why is the scientific method an important process?

Name _____ Key _____

Date _____

Scientific Method Read & Write Handout

Terrific Toothpaste Stain Remover

Laura loved to do crafty things. One day, while wearing a brand new shirt, Laura accidentally got black permanent marker on her new, white shirt.

Very upset, she turned to her friend Lisa. Lisa said that if she applied a hefty coating of toothpaste and allowed it to dry, that the toothpaste would remove the stain.

Laura didn't particularly enjoy reading about science, so she took her friend's advice.

That night she applied a thick coating of toothpaste to both sides of the stain. She allowed it to dry for 24 hours. The following evening she hand-washed her shirt in the sink and much to her delight, the stain was gone!

1. Underline the sentence where a problem is encountered.
2. In this case, from where does Laura's research come? _____ Laura's research comes from her friend, Lisa's, advice. _____
3. If you were going to turn this into a scientific experiment, what are some hard-to-get-out stains you could test it on? Name four.
 - a. ___Ketchup___
 - b. ___Dirt___
 - c. ___Paint___
 - d. ___Lipstick___
4. Why is the scientific method an important process?
_____ The scientific method is important because it helps us solve real-life problems. _____

Name _____

Date _____

Scientific Method Read & Write Handout

Musical Memory

Nathan and his brothers loved to listen to music while they did their homework. Their mother did not like this. She told them to turn it off. The boys argued that listening to music was beneficial to their studies.

For his science fair project, Nathan decided to test this idea. While writing his research paper, he discovered that certain types of music relaxed people and was helpful in learning new material. He was confident that he would be proving his mother wrong.

Nathan tested three groups of students, all the same age. Group 1 listened to no music, group 2 listened to classical music and group 3 listened to rap music. While they did this, each group studied the same list of 20 words. This went on for five minutes. At the end of that time, the music was turned off and each person wrote down as many words as they could remember from the list.

Group 1 remembered an average of 12 words. Group 2 remembered an average of 16 words. Group 3 remembered an average of 11 words. Nathan proved to his mother that listening to music would in fact help him study. He also proved, however, that he should listen to classical music and not rap, which he preferred.

His mother happily agreed to play classical music while her boys studied each evening.

1. State the problem.

2. Underline Nathan's research.

3. What is the control in this experiment?

4. Why is it important that all of the students tested be the same age?

5. How could Nathan improve this experiment? Name two ways.

a. _____

b. _____

6. Circle the analyzed data.

7. Box-in the conclusion.

8. How is the conclusion useful in real life?

How could we apply this to our daily lives?

Name _____ Key _____

Date _____

Scientific Method Read & Write Handout

Musical Memory

Nathan and his brothers loved to listen to music while they did their homework. Their mother did not like this. She told them to turn it off. The boys argued that listening to music was beneficial to their studies.

For his science fair project, Nathan decided to test this idea. While writing his research paper, he discovered that certain types of music relaxed people and was helpful in learning new material. He was confident that he would be proving his mother wrong.

Nathan tested three groups of students, all the same age. Group 1 listened to no music, group 2 listened to classical music and group 3 listened to rap music. While they did this, each group studied the same list of 20 words. This went on for five minutes. At the end of that time, the music was turned off and each person wrote down as many words as they could remember from the list.

Group 1 remembered an average of 12 words. Group 2 remembered an average of 16 words. Group 3 remembered an average of 11 words. Nathan proved to his mother that listening to music would in fact help him study. He also proved, however, that he should listen to classical music and not rap, which he preferred.

His mother happily agreed to play classical music while her boys studied each evening.

1. State the problem. _____ Can listening to music help you learn? _____
2. Underline Nathan's research.
3. What is the control in this experiment? _____ The control was group 1, who listened to no music. _____
4. Why is it important that all of the students tested be the same age? _____ Making each group a different age would introduce a new variable. _____
5. How could Nathan improve this experiment? Name two ways.
 - a. ___Nathan could test long term memory___
 - b. ___Nathan could perform the test multiple times _____
6. Circle the analyzed data.
7. Box-in the conclusion.
8. How is the conclusion useful in real life? How could we apply this to our daily lives? _____ Knowing that listening to classical music helps us learn, we should play classical music in the classroom, the library, and anywhere else we might study. _____