Success in the Scientific method!

Dr. Stuart traveled to the KwaZulu –Natal Clinic. This clinic is in the town of Esikhawini, South Africa and many of the people in the community were complaining of diarrhea and fever. Most patients who become ill recovered within 7 - 10 days with no adverse side effects.

After weeks of careful observation and study, Dr. Stuart believed he might have found a pattern in those stricken with this uncomfortable sickness. It appeared that the majority of people that had been afflicted with this disease were farmers that lived on the outskirts of the village. Very few of the sick people lived in the more modern part of the village. Dr. Stuart realized that the affected farmers from the rural areas must be exposed to something that those in the more modern part of the village were not exposed to. The doctor decided to visit the farmers in the rural areas. He noticed they were getting their drinking water from the river. He remembered that the villagers drank water taken from a well. He believed that bacteria in the water was causing the farmers to get sick.

Dr. Stuart decided to test his idea. He formed 3 groups of 20 farmers that lived in the region most affected by this disease and asked each group to perform a specific task.

Group A: 20 healthy patients

They were asked to drink only bottled water and take a sugar pill (no actual medicine) that the clinic brought to their houses for the next 10 days.

Group B: 20 healthy patients

They were asked to take a pill that was a sugar pill (no actual medicine) every day for the next 10 days.

Group C: 20 healthy patients

They were asked to go about their normal routine and not change anything for the next 10 days.

After 10 days, Dr. Stuart asked the farmers to return to the clinic. This is the information he collected about their health.

	Group A	**Group B**	**Group C**
Number of sick	4	14	16
Number not sick	16	6	4

Name _____ Class _____ Date _____

1. What problem were the people of Esikhawini, South Africa facing? (6 points)

_____

_____

2. What was Dr. Stuart's hypothesis ? (Be sure to use an if/then statement) (12points)

_____

_____

3. What does the term *constant* mean in an experiment ?(8points)

_____

4. Give 2 constants in this experiment.

A. (6 points) _____

B. (6 points) _____

5. What is the *independent variable* (manipulated variable)? (8 points)

_____

6. What was the *dependent variable*? (8 points)

_____

7. Was Dr. Hamilton's hypothesis correct? _____ (yes or no) (6 points)

Justify your answer verbally **and** computationally.

Verbal explanation and conclusion. (12 points) Computation area (12 points)

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8. Why did Dr. Stuart give one group of patients a sugar pill? (8 points)

_____

_____

9. What is one way you could improve Dr. Stuart Hamilton's experiment? (8 points)

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Anwser Key

1. What problem were the people of Esikhawini, South Africa facing? (6 points) The problem is that people are getting sick with diarrhea and fever.

2. What was Dr. Stuart's Hypothesis ? (Be sure to use an if/then statement)
If the farmers drink the bottled water then they will not be exposed to the bacteria that is in the river, then they will not become sick and suffer from the diarrhea and fever.

3. What does the term *constant* mean in an experiment? A constant is something that is kept the same in all groups being tested.

4. Give 2 constants in this experiment.
A. The number of people being tested in each group.
B. The people are being taken from the same location (farmers around the village of Esikhawini).

5. What is the *independent variable* (manipulated variable)?
The type of water that the farmers drink (bottled versus river water).

6. What was the dependent variable ?
The number of people that became sick after 10 days.

7. Was Dr. Hamilton's hypothesis correct? _____yes_____ (yes or no)
Justify your answer verbally **and** computationally.

Verbal explanation and conclusion. Computation area

The computation would show for "A" 4 divided by 20 = ¼ or 25 %
Or
Students may choose to subtract the original 20 healthy patients minus the 4 sick to equal 16 healthy

The computation would show for "B" 14 divided by 20 = 7/10 or 70 %
Or
Students may choose to subtract the original 20 healthy students minus the 14 sick to equal 6 healthy

The computation would show for "C" 16 divided by 20 = 8/10 or 80 %
Or
Some students may choose to subtract the original 20 healthy students minus the 16 sick to equal 2 healthy

8. Why did Dr. Stuart give one group of patients a sugar pill? He gave patients a sugar pill to see if there was a "placebo effect". Some people might think they are getting medicine and think they didn't get sick because of the "medicine", when in reality the sugar pill did nothing.

9. What is one way you could improve Dr. Stuart Hamilton's experiment?
There could be many examples of ways to improve the experiment. Some examples…..
A. One way to improve the experiment is to have a larger sample size.
B. A second way would be to have another group of farmers drink water from the village well.