Scientific Method: Exercise 1

1. Define each of the following:

a) Fact	a statement that can be confirmed.
b) Data	observations + measurements made during an experiment.
c) Hypothesis	an educated guess to explain an event
d) Experiment	a test conducted to support/reject ~~an exp~~ a hypothesis
e) Control	variable that is not changed in an experiment to provide a comparison
f) Theory	tested hypotheses which have been supported by a great amount of evidence over a long period of time.

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2. What characteristics describe a good hypothesis?

is testable, is a statement, written in the form of cause/effect "if ... then ..."

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3. True or false?

T	F	a) Scientific research is restricted to investigating what is already known
T	F	b) Scientists are trained to look for things and events that a non-scientist might not notice.
T	F	c) Scientists typically ask philosophical questions such as "should abortion be legalized?"
T	F	d) When investigating a problem, all evidence, whether factual or not, or relevant of not, must be taken into account.
T	F	e) In order for facts to be valid, observations or experiments must be repeated and verified under the same conditions.
T	F	f) An "if...then" statement is typically used in a hypothesis.
T	F	g) Experimental data can prove that a hypothesis is true.
T	F	h) Mathematical data may allow a scientist to find a relationship between variables in an experiment.
T	F	i) the more often a hypothesis is tested and supported, the more confidence scientists have in its validity.

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4. Patty and Peter wanted to find out if temperature affects the growth of mould on bread. At lunch, they asked nine (9) of their friends to donate a piece of bread for this experiment.

They put nine pieces of bread in nine flasks as follows:
a) Three of the flasks were kept in a refrigerator (temperature about 4C)
b) Three of the flasks were kept at room temperature (about 20C)
c) Three of the flasks were kept in a lab oven at 90C

The nine flasks were examined after four (4) days.

Questions:

1. Give a title for this experiment.
Temperature + growth rate of bread mould.

2. What was the purpose of the experiment?
does temp affect growth of bread mould.

3. Make a hypothesis.
If bread is placed in a warm environment then bread mould will grow faster

4. What was the major difference between the nine flasks?
Temperatures @ which they are kept.

5. Name three (3) controls for Patty and Peter's experiment.
Three flasks @ room temp.

6. Would the flasks need to be closed on top? Explain.
No → mould need O_2 to undergo cellular respiration

7. The students made at least one error in performing the experiment described above. Suggest what this error is and explain how the error could be corrected.

• Bread not all from the same sources
∴ different breads could facilitate different bread mould growth rates.
ie. Organic vs Refined flour

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