Name: Key Date: _____ Core: _____

The Scientific Method

LT: I can describe the steps of the Scientific Method.

Step 1: Ask a question

The question must be .... (Testable) / Untestable (circle one)

Testable means that you can design an experiment, make observations, and gather evidence to answer the question.

Practice: Remember -the key to a good research question is that it can be tested. If the question is based on opinions or personal preferences, then it is not testable.

Read each research question below. If it is testable, circle "YES". If it cannot be tested, circle "NO".

1. Does the amount of fertilizer affect how tall a flower grows?	(YES)	NO
2. Are roses prettier flowers than tulips?	YES	(NO)
3. How can we make cut flowers stay fresher for a longer time?	(YES)	NO
4. Can daisies grow in different types of soil?	(YES)	NO
5. Do daffodils smell better than carnations?	YES	(NO)

Step 2: Gather Information (or Background Research)

Find information about your topic and determine your variables.

A variable is a factor that can change in an experiment, possibly affecting the results.

There are 3 types of variables:

1. IV or independent variable. This is the (ONE) factor that the experimentor changes. (cause)
2. DV or dependent variable. This is the factor that can be changed or affected as a result of changing the independent variable. This is the factor we measure. (affect)
3. CV or constant variable. These factors are kept the same during an experiment. ↳ can also be called controlled variable

Practice: *Determine the IV and DV for each inquiry. Suggest at least 3 constant variables (CV) for each.*

1. What amount of sunlight makes pea plants grow tallest?
   IV: amount of sunlight
   DV: height of pea plant
   CVs: amount of soil, water, fertilizer; location - inside/outside
2. Which type of soda has more sugar?
   IV: type of soda
   DV: amount of sugar
   CVs: amount of soda, temperature, materials to measure sugar
3. Is a ball's bounce affected by the height from which it is bounced?
   IV: height from which ball is bounced
   DV: how much the ball bounces
   CVs: type of ball; amount of air in the ball, temperature

Step 3: Make a hypothesis

A hypothesis is a (n) educated, specific prediction of the outcome of an experiment based on background knowledge.

A hypothesis is usually written in the form: If the IV, then the DV

Practice: *Identify the IV, DV and write a hypothesis for the following questions.*

1. What type of music quiets a crying baby faster: jazz, classical or rock?
   IV: type of music DV: how fast a crying baby quiets
   Hypothesis: If I test 3 types of music, then classical will quiet a crying baby first.
2. Is the number of eggs a chicken lays affected by the hours of daylight?
   IV: the hours of daylight DV: # of eggs
   Hypothesis: If a chicken is exposed to more hours of daylight, then it will lay more eggs.
3. Will a rubber band or string hold more weight without breaking?
   IV: type of material DV: amount of weight held
   Hypothesis: If I test rubber band and string, then the string will hold more weight without breaking.

Step 4: Conduct an Experiment

Write a step-by-step procedure.

Your procedure should be detailed enough that anyone could repeat the steps without your input.

Step 5: Observe, record and analyze data

Use all senses, except taste to make observations.

There are 2 types of observations:

1. quantitative These observations involve numbers.
2. qualitative These observations are non-numeric.

Step 6: Draw conclusions + ~~Report~~ Share results

What did you learn?

Communicate your findings.

List the six steps of the Scientific Method:

1. Ask a question
2. Gather information
3. Make a hypothesis
4. Conduct an experiment
5. Observe, record and analyze data
6. Draw conclusions and share results