Mc Graw Hill

Texas Science

Investigations in the New TEKS

TEKS Introduction 1.A:

Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are **descriptive**, **correlative**, **comparative**, or **experimental**. The method chosen should be appropriate to the grade level and question being asked.

Descriptive Investigation:

Descriptive investigations use careful observations and measurements to develop descriptive findings that answer questions about an organism, substance, reaction, event, system, or natural process.

TEKS 5.12A: Observe and describe how a variety of organisms survive by interacting with biotic and abiotic factors in a healthy ecosystem.

Question: Do biotic factors in a marine ecosystem affect a killer whale's ability to survive?

Materials: Ecosystem coloring page, coloring materials

Texas Education Agency, Texas TEKS for Professional Communications, 2999,TEA

Descriptive Investigation Directions:

1. Hang up the blank ecosystem coloring page.
2. Have a student close their eyes and randomly select an organism on the poster.
3. The student should describe one way that the selected organism's survival depends on a biotic factor or describe one way the organism survives by interacting with an abiotic factor.
4. After describing the dependence or interaction, the student can color in the organism on the poster.
5. Repeat for each student or until the ecosystem coloring page is complete.

Experimental Investigation:

Experimental investigations involve a process in which a hypothesis is designed and tested with variables that are actively manipulated, controlled, and measured to gather evidence to support or refute a causal relationship.

TEKS 8.7B: Investigate and describe how Newton's three laws of motion act simultaneously within systems such as in vehicle restraints, sports activities, amusement park rides, Earth's tectonic activities, and rocket launches.

Question: Does a tape seatbelt affect the distance a clay person in a toy car travels after hitting a wall?

Sample Hypothesis: If the clay person has a seatbelt on, then the clay person will remain in the toy car because the tape seatbelt will hold the clay person in place.

Materials: Books, poster board, clay, toy car, meter stick, tape/rubber band, paper, writing utensil

Texas Education Agency, Texas TEKS for Professional Communications, 2999,TEA

Experimental Investigation Directions:

1. Set up a poster board “ramp” on a pile of books. Place a big book at the bottom of the ramp to create a short “wall” for the toy car to crash into. Place the meter stick horizontally under the wall.

2. Form a person out of clay and place the clay person on a toy car.

3. Let the clay person and toy car roll down the ramp and crash into the wall. Measure the distance the clay person flies out of the toy car over the wall. Create a data table to record the distance.

4. Complete three trials and record the results.

5. Secure the clay person in the toy car using tape as a seat belt. Roll the toy car down the ramp and observe what happens to the clay person.

6. Complete three trials with the seat belt and record the results. Measure the distance the clay person flies out of the toy car over the wall. Record the distance in a data table.

Comparative Investigation:

Comparative investigations involve collecting data on different organisms/objects/features, or collecting data under different conditions (e.g., times of year, temperatures, locations) to make a comparison.

TEKS 5.6C: Compare the properties of substances before and after they are combined into a solution.

Question: Is there a difference in the physical state of salt after it is combined with water to form a solution?

Sample Hypothesis: The physical state of salt will change from a solid to a liquid when added to water because salt dissolves in water.

Materials: Kosher salt, teaspoon, water, clear plastic cup, petri dish (optional)

Texas Education Agency, Texas TEKS for Professional Communications, 2999,TEA

Comparative Investigation Directions:

1. Examine the kosher salt and describe its properties.
2. Place 1 teaspoon of salt into a clear plastic cup.
3. Add about 20 mL (4 teaspoons) of water to the cup with the salt and swirl until most or all the salt dissolves.
4. Observe and describe the properties of the dissolved salt and compare to the properties of the undissolved salt.
5. EXTEND: Pour the salt water into a shallow container (e.g., petri dish, yogurt container lid) and set aside. After 24 hours, describe the salt's properties again.

Correlative Investigation:

Correlative investigations examine relationships between variables without the researcher controlling or manipulating any of them. A correlation reflects the strength and/or direction of the relationship between two (or more) variables.

TEKS IPC.5C: Describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed velocity, frames of reference, and acceleration.

Question: What is the relationship between the amount of sleep a person gets and their reaction time?

Sample Hypothesis: If a person gets more sleep, they will be able to grab the meter stick in a lower position because they will react more quickly.

Materials: Meter stick, computer with Excel or other graphing software, paper, writing utensil

Texas Education Agency, Texas TEKS for Professional Communications, 2999,TEA

Correlative Investigation Directions:

1. Find a partner. Ask your partner how many hours of sleep they got last night. Create a data table to record results.
2. Have your partner sit or stand with their arm on a flat surface so that their wrist extends beyond the edge.
3. Hold the meter stick vertically above your partner's hand with the "0" end of the stick just above their thumb and forefinger.
4. Instruct your partner to catch the meter stick as quickly as possible once they see it begin to fall.
5. Without warning your partner, drop the meter stick.
6. Record how far the meter stick fell before your partner caught it. Repeat at least two more times.
7. Switch places with your partner and repeat.
8. Repeat the experiment every day for as many class periods as possible (one week minimum).
9. When the data is complete, use the computer to create a scatter plot representing the relationship between hours of sleep and reaction distance.