**Newton’s law of Motion- Experiment**

**Objective:** In this experiment, we will use the scientific method to determine Newton’s First Law of Motion.

Materials: tennis ball, yarn or string (3 meters- 10 Feet), paper clip, marble

**Hypothesis:**

What is a hypothesis?

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In the first experiment, you are going to observe how a ball flies through the air. What is a question you can ask yourself that you might want to know about throwing a ball in the air? Write your question down and then answer what you guess will happen. Refer to your study guide if you need help to make a question and answer your question.

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Part 1

Experiment: What is an experiment?

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What is an observation?

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Before you start your experiment, discuss how lines can take different shapes. Students will now practice drawing different type of lines. Give student string and have them figure out the different lines before they draw the lines in the box.

* Tell them to draw a straight line at the top of the box by moving from the left side of the box to the right side of the box.
* Sometimes a line has an arch. In the middle of the box draw a shallow arch and then a sharp arch.
* Sometimes lines go up and down. Draw a line dropping straight down from the top of the box to the bottom of the box.
* Sometimes lines are smooth. Draw a line at the bottom of the box moving from the left side to the right side of the box.
* Sometimes lines are rough. Draw a bumpy line above the smooth line.

Experiment Part 1:

Experiment 1

Take the tennis ball outside, and throw it as far as you can. Observe how the ball travels through the air.

*Talk about what you saw the ball do. How did it move in the air? Did it move fast or slow? What type of line did the ball form as it moved through the air?*

1. *Look at the lines you drew in your box if you need help to figure out the answer. Repeat experiment until student can determine what line the ball formed. After student figured out the answer, student will draw the ball moving through the air, the line it formed.*
2. Throw the ball 5 more times. Ask student did the ball fall different each time or did it call the same way each time.
3. Circle your answer. Different Same

Experiment 2

1. Now take the string or yarn and, using the paper clip, attach it to the tennis ball.
2. To do this, open the paper clip up on one side and curve the end.
3. Put the extended curved end of the paper clip into the tennis ball by gently pushing and twisting.
4. Next, tie the string to the end of the paper clip.
5. Holding onto one end of the string, again throw the ball into the air as far as you can.

*Talk about what you saw the ball do. How did it move in the air? Did it move fast or slow? What type of lines did the ball form as it moved through the air? Look at the lines you drew in your box earlier to help you figure out the type of line. Repeat experiment until student can determine what lines the ball formed. After student figured out the answer, student will draw the ball moving through the air, the line it formed. HINT---- You will draw 2 different lines in the box below.*

1. Throw the ball 5 more times. Ask student did the ball fall different each time or did it call the same way each time.
2. Circle your answer. Different Same
3. Throw the ball using less string and ask if the ball falls as far as the last time? Circle your answer. Longer Shorter

Explain the string changes the way the ball falls to the ground. Less string, more string, string prevents from falling naturally to the ground.

Experiment 3

Take the marble and find a straight, clear path on a smooth area of the floor or outdoors. Roll the marble, and record how it travels. Note where and how it stops or changes direction. Do this several times, and record your observations in the next box.

Experiment 4

Repeat step 1 using a rough surface on which to roll the marble. Place obstacles along the marbles path and record what happens. Do this several times. Draw your results in the box below.

Conclusion

What is a conclusion? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Help students draw conclusions based on the data they have collected.

Ask the following questions:

* Does the tennis ball always go up and then comes down? Yes No
* Does the string keep the ball from going all the way because it pulls it back? Yes No
* Does the marble travel on smooth surface in a straight line? Yes No
* Does the marble travel in a straight line on the rough surface? Yes No
* Does the marble on smooth surface change directions only when it hits something that is in its way? Yes No

After answering yes and no to the answers above what can you conclude about Newton’s First Law of Motion?

Does law of motion always stay the same when there is not another thing blocking or holding the object back? Yes No

Does the law of motion change when something that is blocking or holding the object back? Yes No

Which statement defines Newton’s First Law of Motion?

1. An object will move however it wants because it can change the law of motion whenever it wants.
2. An object will always move the same way except when another objects moves it in a different direction, because the law of motion will never change.

Review

Define the following:

Physics

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Physical Law

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List the 5 steps of the scientific method and define each one.

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