| Lesson: The Scientific Method | Name: |
| Teacher: | Date: |

Friction Experiment Guide – STEM Scholars Hub

Objective

Students will investigate how different surfaces affect the distance a toy car travels, using the **scientific method** to collect data, analyze results, and draw conclusions.

Key Learning Goals:

- Apply each step of the scientific method
- Identify independent, dependent, and controlled variables
- Collect, organize, and analyze data
- Draw evidence-based conclusions

Materials

- Small toy car (same car for all tests)
- Measuring tape or ruler
- 3 different surfaces (e.g., tile, carpet, sandpaper)
- Notebook and pencil
- Stopwatch (optional)
- Masking tape (to mark start line)

Instructions (Follow the Scientific Method)

Step 1: Observation

- Look at how toy cars move on different surfaces.
- Write down what you notice.

Guided Question: What differences do you see in how far or fast the car moves on each surface?

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Step 2: Question (Decide what you want to investigate.)

Guided Question: What problem are you trying to solve with this experiment?

Step 3: Hypothesis

- Make a prediction based on your observations and prior knowledge.
- Write it in **If…Then…Because…** format.

Guided Question: What do you think will happen and why?

Step 4: Experiment / Test Ideas

- Set up your surfaces side by side.
- Place the toy car at the starting line on each surface and release it without pushing.
- Keep all other variables constant (same car, same starting line, same rolling force).

Guided Question:
What is your independent variable (what you change)?
What is your dependent variable (what you measure)?
What are your controlled variables (what you keep the same)?

Step 5: Data Collection

- Measure the distance the car travels on each surface.
- Repeat at least **3 trials per surface** for accuracy.
- Record all measurements in a table.

Example Data Table:

Surface	Trial 1 (cm)	Trial 2 (cm)	Trial 3 (cm)	Average Distance (cm)
Tile				
Carpet				
Sandpaper				

Guided Question: What patterns do you notice in your data?

Step 6: Analysis and Conclusion

- Calculate the **average distance** for each surface.
- Compare results to your hypothesis.

Guided Questions:

- Was your hypothesis supported?
- Which surface allowed the car to travel the farthest?
- How does friction affect motion based on your results?

Step 7: Communication

- Present your findings in a graph, chart, or written report.
- Explain your results with **evidence from your data**.

Suggested Graph: Bar graph showing **average distance traveled for each surface**.