Performance Assessment
Friction Investigation

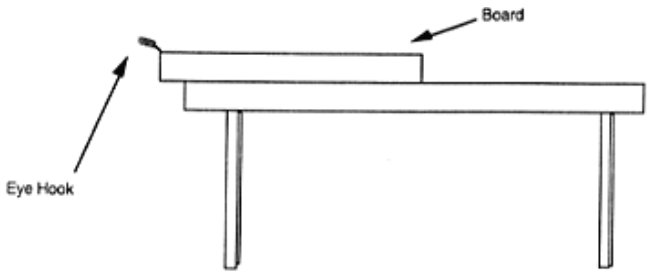
Task: Your task is to investigate how the surface of a material affects how easily it will move over a surface. Your role in this activity is as member of a design team planning a new playground sliding hill. Your challenge is to recommend materials that students can sit on to make their slide down the new hill safe and fun. You will share the results and conclusions from your investigation with the other members of the playground design team in a written report.

Materials:

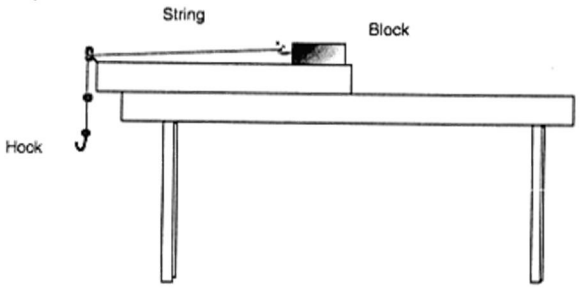
- 1 wooden block with hook
- String with hook
- 1 plain wood board with eye hook
- Pieces of felt, sandpaper, wax paper and other surface material for testing
- 35 metal washers (may need more during testing)

Directions:

Put the plain wood board on the table so that the end of the board with the eye hook hangs over the table. It should look like this:



Put the small **block** on the board. Place it <u>behind</u> the red starting line. Take the string with the big metal hook and pull it through the small eye hook. Now loop the string onto the hook on the block. It should look like this:



Practice pulling the block along the board by putting washers on the hook. ***The back end of the block should cross the starting line.*** The number of washers on the hook is a measure of the amount of **force** needed to pull the small block forward.

Design and perform an investigation that will help you decide which material to recommend to the design team. You may select as many different materials as you have time to test. Be sure to do at least three trials for each material you test.

Your project will be evaluated on how well you conduct this investigation, analyze the information collected, connect your findings with your recommendations and communicate to the design team.

Science Investigation Report: Friction Investigation

What I already know about how friction affects motion:

Question to investigate:

How does the type of surface affect the amount of effort needed to move a block?

My Hypothesis:

I think that the _____type of material will require the most effort and that the _____material will take the least effort because:

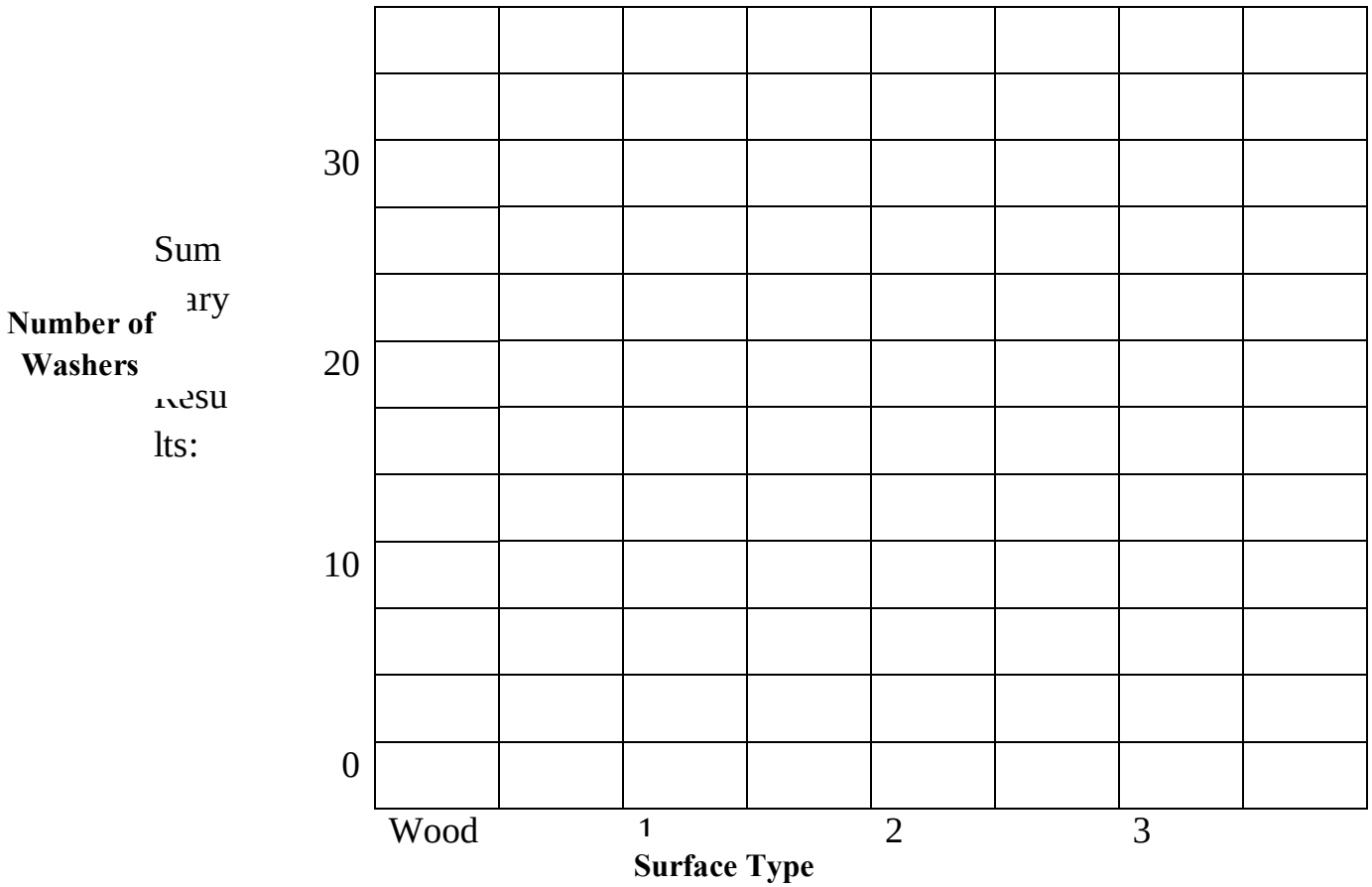
Materials:

Procedure:

Results:

Surface Material	Number of Washers			
	Trail 1	Trail 2	Trail 3	Average
Plain board				
Material 1:				
Material 2:				
Material 3:				

Bar Graph:



Sum
ary
Resu
lts:

Conclusion:

Scientific Explanation:

How would you convince a team with different explanation that your explanation is correct?

What is another scientific question you could investigate to learn more about designing a safe and fun hill slide?

Name:_____ Date:_____

Friction Investigation Follow up questions

1. How did adding more force to your system affect the motion of the block?

2. What recommendations, based on your investigation, would you make to the design team charged with the job of selecting the material children will sit on when sliding down the new playground hill?

3. If the child going down the hill is older and larger, how do you think that will affect his/her speed down the hill?

4. Describe an experiment (using the same materials from your investigation) that could test your answer to question #2.

5. Based on your investigation, what might you recommend to make the same hill slide safer for older and larger children?

6. What evidence do you have from your investigation to support your recommendation?

Friction Investigation CheckBric (Grade 5):

Student Name _____ **Overall Score _____**

Teacher Name _____

Conducts Investigations	**1 2 3 4**	**Comments**
Used tools and equipment appropriately Made careful observations and measurements Followed procedures/directions accurately		
Analyzes information	**1 2 3 4**	**Comments**
Recorded data collected appropriately Based summary and conclusion on experimental evidence Generated additional scientific questions related to investigation		
Makes Connections	**1 2 3 4**	**Comments**
Made appropriate connections with related science concept/content Uses evidence to make appropriate recommendations Demonstrates ability to design a fair test		
Communicates Findings	**1 2 3 4**	**Comments**
Clearly and accurately described all elements of investigation on report form Used appropriate organization and conventions (writing rubric)		

4 Exemplary	Work at this level is of exceptional quality. It is both thorough and accurate. It exceeds the standard. It shows a sophisticated application of knowledge and skills.
3 Proficient	Work at this level meets the standard. It is acceptable work that demonstrates application of essential knowledge and skills. Minor errors or omissions do not detract from the overall quality.
2 Developing	Work at this level does not meet the standard. It shows basic, but inconsistent application of knowledge and skills. Minor errors or omissions detract from the overall quality. Your work needs further development.
1 Emerging	Work at this level shows a partial application of knowledge and skills. It is superficial (lacks depth), fragmented or incomplete and needs considerable development. Your work contains errors or omissions.