

Life

Physical

Earth and Space

## LESSON 38

### Investigating how the steepness of an inclined plane affects the distance a toy car travels

#### ***Lesson Preparation***

##### ***Program Materials***

- Lesson Chart 38
- Experiment 38
- Children's Booklet C *Investigating Forces and Work*
- Lesson Review 38

##### ***Tool Kit Materials***

- 6 meter sticks
- 6 cardboard pieces
- 6 plastic toy cars (see *The Night Before*)

##### ***Teacher Collected Materials***

- 18 copies of the same hardback book (see *The Night Before*)
- Optional: File folders
- Children's toy cars from home

##### ***The Night Before***

- The books should be about 1" thick.
- Remove the balloons from the cars. Balloons will not be used in the lesson.

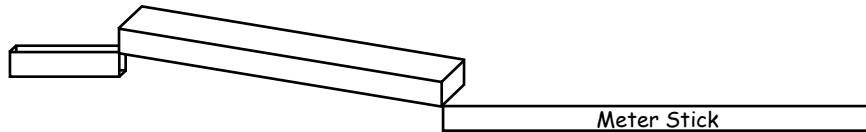
## ***The Lesson***

- Post Lesson Chart 38.
  - Seat children in a circle on the floor around a demonstration area.
- "In our last science lesson we learned how gravity and friction affect movement on an inclined plane."**
- "How did friction affect the distance the cars traveled?" *The salt caused more friction, and the cars didn't go as far.***
- "Today we will conduct an experiment to test how the steepness of an inclined plane affects how far a car will roll across the floor."**
- Show children the six plastic toy cars.

**“For this experiment we will use these plastic cars.”**

**“We will begin with an inclined plane that is one book high.”**

- Make an inclined plane using a hardback book and a piece of cardboard. Place one edge of the cardboard on the edge of the book. Place the zero end of the meter stick on the floor next to the end of the inclined plane. The meter stick should be to one side so the car will not hit it when it rolls across the floor.



- **Note:** If this activity is being done on a carpeted floor, place file folders at the end of the inclined planes so that cars will roll more easily.

**“I want to measure how far my car will travel down this inclined plane with the steepness of one book.”**

**“I will place the back tires of my car at the top of the inclined plane.”**

- Place the car in the center of the inclined plane.

**“I will let my car go without pushing it.”**

- Release the car.

**“Now I will use the meter stick to find the number of centimeters my car traveled beyond the end of the inclined plane.”**

**“I will measure from the end of the inclined plane to the front tire of the car.”**

- Show children how to determine the distance the car traveled.

**“How far did my car travel?”**

- Write the distance the car traveled as # cm next to “one book” and below “Trial 1” on the lesson chart.

**“That was my first trial.”**

**“I want to try that again.”**

- Repeat, recording on the lesson chart the distance traveled.
- Repeat for Trial 3.

**“Which distance is the greatest?”**

**“Which distance is the least?”**

**“Which distance is between the other two?”**

**"I will circle the number that is between the other two."**

**"Which number will I circle?"**

- Circle the number.

**"This is the average distance my car rolled."**

- **Teacher Note:** This is an example of one type of average in mathematics. This average is called the median.

**"This inclined plane was one book high."**

**"How can I make a steeper inclined plane?"** *add more books*

**"Adding more books will make a steeper inclined plane."**

**"What do you predict will happen to the distance the car rolls if the inclined plane is steeper?"**

- Allow children to make predictions.

**"Now you will check your predictions."**

- Distribute Experiment 38.
- Point to the following information on the lesson chart as the children follow along on their papers.

**"The title of this experiment is 'Inclined Plane Experiment.'"**

**"What does the first word under the title say?"** *Purpose*

**"The purpose is the reason we are doing the experiment."**

**"Point to the words as I read the Purpose."**

**"The purpose is to observe if changing the steepness of an inclined plane changes the distance a toy car will travel."**

- Use a piece of the cardboard to demonstrate an inclined plane that is steeper than the previous inclined plane.

**"The Materials are what we will use to do the experiment."**

**"Point to the words as I read the list of materials."**

**"The materials we will use are a toy car, a board to make an inclined plane, three identical books, and a meter stick."**

**"The Directions tell us what to do in the experiment."**

**"Point to the words as I read the directions."**

- Read the directions to the children.

**“Point to the words ‘Collect Data.’”**

**“Collecting data means writing down what happens during the experiment.”**

**“When we finish collecting data, we will write our conclusions.”**

**“Our conclusions are what we learned from the experiment.”**

**“Now you will work with partners to see how far a car will travel down an inclined plane with a steepness of one book, two books, and three books.”**

**“There will be three trials for each inclined plane.”**

**“You will record your data for each trial in the chart on your paper.”**

- Divide children into six groups.
- Give each group three books, a piece of cardboard, a plastic toy car, and a meter stick.

**“Make your inclined plane on the floor so that a car will have room to roll at the end of the inclined plane.”**

**“Place one book under one end of the inclined plane.”**

**“Place your meter stick at the bottom of the inclined plane.”**

- Circulate and check the children’s inclined planes and meter sticks.

**“Now you will take turns rolling a car down the inclined plane.”**

**“When it is your turn, place the car at the top of the inclined plane and let it go without pushing the car.”**

**“Make sure the wheels on the car are close to the end of the card and are turning freely.”**

**“When the car stops, work with your group members to find the number of centimeters from the end of the inclined plane to the front tire of the car.”**

**“Everyone in your group will write the distance in the first box on the chart on your papers.”**

- Circulate and assist children as they measure the distance their cars traveled from the end of the inclined plane.
- If some groups finish before others, allow them to repeat the activity with their own toy cars and record the results on the back of the paper.
- When all groups finish, continue.

**“Let’s review our data.”**

**“Take your paper back to your seat.”**

- Collect the cars, books, meter sticks, and pieces of cardboard.

**“How many centimeters did your car travel when the inclined plane was one book high?”**

- Write each group’s distance on the lesson chart in the box with the words “1 book.”

**“How many centimeters did your car travel when the inclined plane was two books high?”**

- Write each group’s distance on the lesson chart in the box with the words “2 books.”
- Repeat with 3 books high.

**“What do you notice happened to the distance a car traveled when the inclined plane became steeper?”** *The car traveled farther.*

**“An inclined plane that is steeper will make a car travel farther.”**

- **Teacher Note:** If the steepness of the inclined plane becomes too great, the car will not travel as far when it hits the flat surface.

**“At the bottom of the page, you will write a conclusion that summarizes what you learned from this experiment.”**

**“What could you write?”** *An inclined plane that is steeper will cause a toy car to travel farther.*

- Allow time for the children to explain in writing what happened in the experiment.
- Ask several children to read what they wrote. Write the children’s explanations on the lesson chart.

**“Who would like to share something you learned in today’s science lesson?”**

- Allow time for the children to share.

**“In our next science lesson we will learn what happens when objects of different masses travel down an inclined plane.”**

- Collect the children’s toy cars.

**Lesson Review**

- **Note:** Lesson reviews may be completed on the same day the lesson is taught or on the following day.
- Distribute children’s booklets *Investigating Forces and Work* and Lesson Review 38.
- Read the directions and questions one at a time to the children, allowing time for the children to answer each question before continuing. Allow children to use their physics booklets to answer the questions.
- Circulate and assist children as they work. If children have difficulty reading, pair children and allow them to work with a partner.
- Review the answers with the children.
- Collect the children’s booklets and papers. Record on the Lesson Review Recording Form the completion of the lesson review. Return the papers to the children to take home or store in a science folder.

Name \_\_\_\_\_ Experiment 38  
Date \_\_\_\_\_ Science 2 Lesson 38

**Inclined Plane Experiment**

**Purpose:** To observe if changing the steepness of an inclined plane changes the distance a toy car will travel.

**Materials:** Toy car, board to make inclined plane, three identical books, meter stick.

**Directions:**

1. Use a book and the board to make an inclined plane.
2. Place the zero on the meter stick at the end of the inclined plane.
3. Let your car roll down the inclined plane. Do not push the car.
4. Write the distance your car travels from the end of the inclined plane.
5. Repeat this two more times.
6. Repeat by using two books and then three books.

**Collect Data:** Write the distance your toy car travels down an inclined plane.

Inclined Plane	Distance Traveled		
	Trial 1	Trial 2	Trial 3
1 book high			
2 books high			
3 books high			

**Conclusion:** What did you learn from this experiment?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_


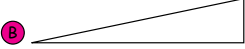
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Name \_\_\_\_\_ **Answer Key** \_\_\_\_\_ Lesson Review 38  
Date \_\_\_\_\_ Science 2 Lesson 38

**Steepness of Inclined Plane**

Fill in the circle next to the correct answer.

1. Which inclined plane will cause a toy car to travel the farthest distance across the floor?

(A)  (B) 

**Look Back**

Fill in the blanks with a word from the Word Box.

work	force	friction
gravity	lubricant	wheel

2. A **lubricant** is used to reduce the amount of friction between two objects. (p. 5)
3. A round object that can roll and makes it easier to move an object is called a **wheel**. (p. 7)
4. Any push or pull is called **force**. (p. 3)
5. An invisible force that can slow or stop a moving object is **friction**. (p. 5)
6. Scientists say **work** has been done when an object is moved by a force pushing or pulling it. (p. 6)
7. An invisible force that pulls objects is **gravity**. (p. 4)

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