UNIT: Measurement

Ruler Runway

GOAL:

Investigate how the height of a ramp affects the speed and distance of a moving object (toy car or marble). Learn how height, speed, and kinetic energy are connected!

Materials:

* Ramp (build with a binder, clipboard, or stack of books)
* Toy car or marble
* Ruler or measuring tape
* Stopwatch or timer (a phone works)
* Notebook or worksheet to record your data

STUDENT DIRECTIONS:

#### **Step 1: Build Your Ramp**

1. Use 1 book to start. Lay a ruler, clipboard, or flat board on top to make a ramp.
2. Place the **bottom of the ramp on the floor** and the top on the book stack.

#### **Step 2: Test Run**

1. Place the toy car or marble at the top of the ramp.
2. **Let it go—don’t push it!** Start your timer as it begins to move.
3. Stop the timer when the car reaches the bottom of the ramp.

#### **Step 3: Measure**

1. Use the ruler to measure how far the car or marble travels after it leaves the ramp (distance).
2. Record how long it took (time).
3. Repeat the run **2 times for each ramp height** to get an average.

#### **Step 4: Change Ramp Height**

1. Add one more book under the ramp. Repeat the test steps above.
2. Do the same again with 3 books.

### **What to Record:**

Use a table like this in your notebook:

|  |  |  |  |
| --- | --- | --- | --- |
| **Ramp Height (Books)** |  **Distance Traveled (cm)** | **Time (s)** | **Speed = Distance ÷ Time (cm/s)** |
| 1 Book |  |  |  |
| 2 Books |  |  |  |
| 3 Books |  |  |  |

* What did you notice when the ramp got taller?

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**Reflection & Discussion:**

* What happened to the distance and speed as the ramp got taller?

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* What does this tell you about energy and motion?

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* If we used a heavier object, what might happen? Why?

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Standards Alignment

NGSS: MS-PS3-1, MS-PS3-5, 2-PS1-1 STEL: STEL 1E, STEL 2E, STEL 6F, STEL 7F, STEL 11F CCSS: CCSS.MATH.CONTENT.HSN.Q.A.1, CCSS.MATH.CONTENT.HSN.Q.A.2, CCSS.MATH.CONTENT.HSN.Q.A.3, CCSS.MATH.PRACTICE.MP4, CCSS.MATH.PRACTICE.MP5