

THE LIGHTER SIDE OF VELOCITY

As a mass cart travels down an incline, you will determine its rate using the distance formula $D = rt$ and the data you collect using light probes and the AE 100 Data Analyzer.

MATERIALS NEEDED:

2 ring stands, 2 light probes, tape, 1 AE 100, 1 Casio 9850G , link cable.

PROCEDURE :

1. Using an incline plane longer than 1m , construct an incline. Use a protractor to measure the angle.
2. Attach a flashlight to a mass cart.
3. Using clamps, attach 2 light probes to the ring stands, place one meter apart on the incline.
4. Attach the ends of the light probes in Channel 1 and Channel 2 of the AE 100 .
5. On the AE 100
 - a. press the red ON button to activate.
 - b. Push MODE
means you are in the communication mode.
SHIFT MODE to enter set up.
dataLOG key to scroll to 10
msec. Press TRIGGER to make your choice.
 - e. The next setting is the number of samples you want. Use the dataLOG TRIGGER .
The final setting is the time recording mode. Use the dataLOG key to choose 1 so the actual time will be recorded. Do not press TRIGGER until you are ready to release the mass cart at the top of the incline.
6. Place the mass cart at the top of the incline and turn the light on. Release the cart and at the same time press TRIGGER . “ Done “ will appear on the screen when the sampling is completed.
7. Link the AE 100 to the calculator. Turn the calculator on.

8. Select **PRGM** on the calculator from the main menu. Press **EXE** .
9. Use the arrow key to locate "Receive". Press **EXE** .
10. When the screen says "done" , the data is ready to be viewed. From the main menu press:
 - a. **STAT** then **EXE**
 - b. **F₁**(graph)
 - c. **F₆** (set)
 - d. highlight **Graph type**
 - e. **F₂** (xy line)
 - f. scroll to list then press "**F₂**"
 - g. scroll to next list; then press "**F₁**"
 - h. scroll to mark type and select **F₃** (.)
 - i. then **Graph 2**
 - j. xy line
 - k. scroll to list and then press "**F₂**"
 - l. scroll to next list and then press "**F₃**"
 - m. scroll to mark type and select **F₃** (.)
 - n. press **EXIT**
 - o. sel
 - p. draw (two graphs should appear)
 - q. To store this for later reference: while the graph is on the screen, **SHIFT F₂** (Zoom) ; **F₅** (auto) ; choose **OPT** ; **F₁** (picture); **F₁** (STO) ; **F₁** (picture #).

11. Press **SHIFT F₁** (Trace) and use the arrow keys to move the cursor to the top of the first peak on the graph. On the lab report record the time (t_1). Continue using the arrow key to move the cursor to the top of the second peak. On the lab report record the time (t_2). These two values represent the number of msec it took the mass cart to reach each light probe.

CALCULATING THE RATE :

Subtract the values obtained from your data that you recorded as t_1 and t_2 . This is the total time t . ($t = t_2 - t_1$). Since $D = rt$, the rate $r = \frac{D}{t}$.

LAB REPORT:

t_1 t_2 $t = t_2 - t_1$ D $r = \frac{D}{t}$
