Algebra Functions Safe Driving Lesson Plan

Should I Buckle Up?

Created by Emili Serghie
Stuarts Draft High School, Stuarts Draft, VA

Should I Buckle Up?

Part I

One student in the group will push the car, a student will operate the camera, and the other students should organize and check the work of the teammates.

	Names
Cameraman	
Car Driver	
Manager/Writer	

- Place the obstacle at 9 feet away from the start line. Place the car at the start line. Practice to make sure that the car will hit the obstacle with a high speed.

- Observe if the "driver" is projected out of the car. If the "driver" is not projected, you will either increase or decrease the starting distance. If you change the distance, measure and record the new distance between the starting point and the obstacle.

Starting distance

_____

Once you think that you are ready to take a video, place the camera on the side and ***make sure you can see 3ft before the obstacle and 3ft after the obstacle.*** Do **NOT move** the camera while filming.

- Check your video to make sure that the whole experiment was recorded and the quality of the video is appropriate. Measure the distance from the point of impact to the point of lending for the driver.

Flying distance _____

- Verify with your teacher so that she can approve your video.

Teacher's Initials

_____

Part II

Step 1: Turn the camera ON and then use the USB connection to insert into the computer.

Step 2: ***Find the video you recorded*****.** There are multiple ways to do this. If the window does not automatically pop up, then open the documents of the camera by going to MY COMPUTER and choosing the flip-camera. Look through the videos until you find yours. **Download and save** the video on the computer of **all** the members of your group and place a copy in the teacher's drop box.

Step 3: Right click on the file name and chose from open with the option WINDOWS LIVE MOVIE MAKER.

Step 4: Chose the Edit Menu and use the trim tool to cut the movie. The beginning should be the moment when the car first appears in the video and the end should be after the "driver" landed. Save your new video. Name it "BUCKEL UP-your name"

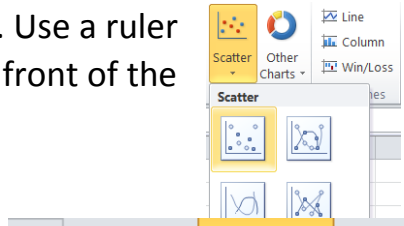
Step 5: Right click on the video and open it with Windows Media Player (not the one with the traffic cone) and follow these steps:

1. Pause the video

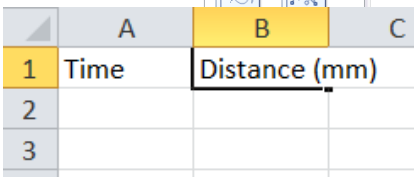
2. Right click on the bar at the top. Choose ENHANCEMENTS and then PLAY SPEED SETTINGS.

3. A box should pop up called PLAY SPEED SETTINGS**.** Drag the box to the left corner of the screen. Make the video as big as possible without covering the PLAY SPEED SETTINGS box.

4. Chose **16.0** as your option. Click on the arrow to the right. Use a ruler to measure the distance from one side of the video to the front of the car at that moment.



5. Open an Excel page. You will use the first two columns, A and B. Label column A as *Time* (this should go in A1). Label column B as *Distance(mm)* (this should go in B1). In type A you will type in for each frame: =0/33, =1/33, =2/33 and so forth for each frame.



6. Click again on the right arrow repeat step 5. Make sure that each time you measure the distance you start from the same point and you always end to the front of the car.

7. The last distance you will measure is the moment of the impact.

8. Select all the data points (both column A and B with all the points – do not include the first row where you wrote time and height) and INSERT a SCATTER PLOT. Chose the first option where the points are not connected (see image to the right).

9. Right click on one of the points and select ADD TRENDLINE**.** Mark the regression that you think model the best your data. Select also Mark Equation on Chart and close the window.

10. Chose two points on the line graph and plot them on the graph paper. Draw the line and use the two points to find the slope of the line. Compare the result with the equation from step 9. Make sure that you marked on each axis if coordinate the units you used for that measure.

11. What is the meaning of "a" in the equation?

Theoretically_____

In this experiment_____

12. Repeat steps 4 to 9, but this time measures the height of the “flying driver” from the ground. The last point it will be when the driver hit the ground.

13. Use a graphic calculator and type the equation for “Y1=” to determine the x-intercept of this function.

x-int1=_____ **x-int2=**_____

Meaning of x-int for this experiment_____

SHOULD I BUCKLE UP?

AFDA SOL

AFDA.1 The student will investigate and analyze function (linear, quadratic, exponential, and logarithmic) families and their characteristics. Key concepts include

a) continuity;
b) local and absolute maxima and minima;
c) domain and range;
d) zeros;
e) intercepts;
f) intervals in which the function is increasing/decreasing;
g) end behaviors; and
h) asymptotes.

AFDA.3 The student will collect data and generate an equation for the curve (linear, quadratic, exponential, and logarithmic) of best fit to model real-world problems or applications. Students will use the best fit equation to interpolate function values, make decisions, and justify conclusions with algebraic and/or graphical models

Needed Materials

Car (big truck)with open windshield. Fill the sits with putty and cover with a paper so the "driver" .

A big/ heavy brick as an obstacle

Balls with the size that will fit trough the windshield as "driver"(the best was a cesnut).

Measuring tape / a stop watch(in the end I didn't use the stop watch)

Rulers

Video camera with tripod

Hand outs

A mat for the lending area

Computers and graphic calculators

Lesson Plan created by Emili Serghie
Stuarts Draft High School
Stuarts Draft, VA