Texas Chase Activity

STEM Lesson for TI-Nspire™ Technology

Objective: Students will investigate the g-forces. Students will then create scatter plots given data in a table. Students will then use the graphs to analyze the data and make predictions about who will win the Sprint Cup championship.

About the Lesson: Texas Motor Speedway is another 1.5 mile track. Patterned after Charlotte, it has 24 degree banking and is a D-shaped oval with about 650 radius turns. The original plans were to build the track with 24-degree banking on the upper portions of the turns but only 8-degree banking on the lower part. Some place between design and construction, the dual banking idea didn't work out. The steep banking actually caused trouble in the beginning because the force was so big at high speeds that when the CART series cars ran 3-5 laps they were close to blacking out. The blood drained from their brain due to the accelerations. This lesson looks at the actual g-forces for the track at average Sprint Cup car speeds. Going into this race the points for the 2011 Sprint Cup were so close the winner could be any of the top 6 or 7 guys mathematically. Can you use the Chase points' trend lines to predict a winner?

Materials: Student Worksheets

Analysis:

Using TI-Nspire Technology

1. Open the file named ***Texas_Chase_Activity.tns***.

2. Move to page **1.2**.

3. This is a graph of *g-force* vs. *velocity*. Drag the point along the curve.

4. What does the *x*-value stand for?

5. What does the *y*-value stand for?

6. Sprint Cup cars enter a turn at a velocity of 293.33 ft/sec (200 mph). What is the g-force a driver feels at this speed?

7. Sprint Cup cars slow to 264 ft/sec (180 mph) at the apex of the turn. What is the g-force a driver feels at this speed?

At any given time on a roller coaster, you would feel no more than 2 g's of force. In the F1 series, drivers could feel up to 6.2 g's at the highest rate track. Fighter pilots may reach up to 10 g's which is why they wear pressurized suits to prevent blacking out.

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Driver	Car number	Week #								
		0	1	2	3	4	5	6	7	8
Carl Ed	18	2003	2044	2080	2122	2161	2203	2237	2273	2316
Tony S	14	2000	2047	2094	2113	2142	2179	2218	2265	2313
Kevin H	29	2012	2054	2087	2122	2160	2198	2211	2252	2283
Matt K	17	2006	2030	2068	2108	2149	2196	2223	2237	2278
Jimmie J	48	2003	2038	2065	2109	2157	2168	2187	2230	2261

8. Move to page **1.3**. Enter the data from the table above into the spreadsheet for each driver. The names have been abbreviated for easy reading: *carled* stands for Carl Edwards' points after each race, *tonys* stands for Tony Stewart's points after each race, *kevinh* stands for Keven Harvick's points after each race, etc.
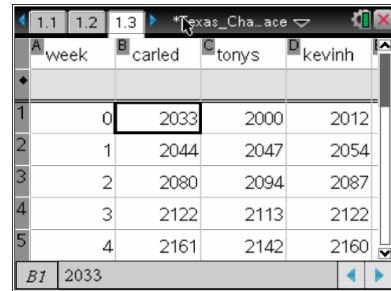
9. Move to page **1.4** to create a scatter plot of *points* vs. *week*.

10. What is the independent variable?

11. What is the dependent variable?

12. Press (var) and choose your independent variable. Press ▾ then (var) and select your dependent variable. Press (enter).

13. Press (menu) then **Window/Zoom > Zoom – Data**.

14. Press (tab) and repeat steps **12** and **13** for each driver. Adjust window to better view the data by pressing (menu) the **Window/Zoom > Window Settings** and move labels around by grabbing and dragging the text. Press (ctrl)🖑 to grab an object.
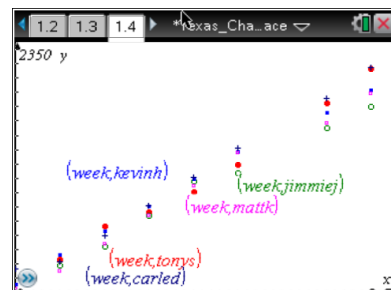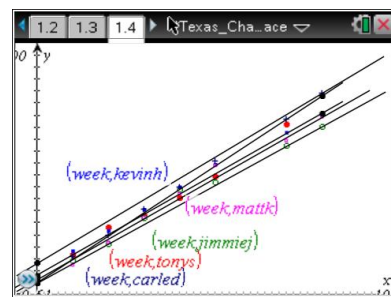
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15. Who has the most points after the Texas race?

16. Who has *gained* the most points after the Texas race?

17. Draw trend lines for each driver. Press (menu) >
Points and Lines > Line then click on the
driver's starting points and draw a line to the
driver's ending points. Repeat for each driver.

18. Investigate the trend lines by changing the window settings and grabbing the
screen to move around. You can also grab the lines and rotate them to
adjust.

19. Based on your trend lines which driver will have the most points and win the
Sprint Cup Championship?

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Analysis:

Using spreadsheet software

Driver	Car number	Week #								
		0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Carl Ed	18	2003	2044	2080	2122	2161	2203		2273	2316
Tony S	14	2000	2047	2094	2113	2142	2179		2265	2313
Kevin H	29	2012	2054	2087	2122	2160	2198		2252	2283
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1. Enter the table above into spreadsheet software.

2. Use the chart wizard to create a scatter plot of *points* vs. *week*. Chart type will be XY(Scatter) and choose the scatter with data points connected by lines. Click **Next**.

3. What is the independent variable?

4. What is the dependent variable?

5. You will have to click on the Series tab to select which data goes on which axis. Click in the box for the *x* values then highlight the data for the independent variable.

6. Click the box for the *y* values then highlight the data for the dependent variable. You will have to do this for each series. Click **Next**.

7. Click the box for the name and click on the appropriate driver for each series.

8. Create titles for the chart and each axis. You can also click the other tabs to change the appearance of your graph. Click **Next**.

9. Decide if you want the graph to appear in the same window as your table or in a new window. Click **Next** and your graph should appear.

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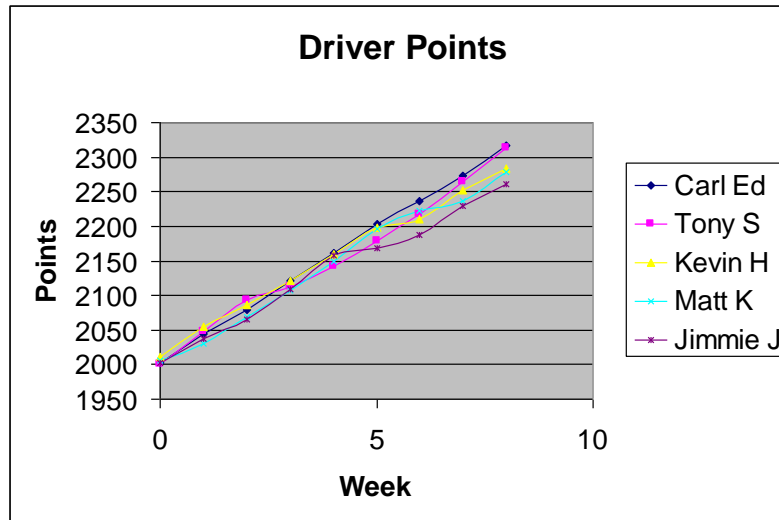
Driver Points

10. Who has the most points after the Texas race?

11. Who has *gained* the most points after the Texas race?

12. Based on the trend lines which driver will have the most points and win the Sprint Cup Championship?