Kansas Chase Activity

STEM Lesson for TI-Nspire™ Technology

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

About the Lesson: Kansas Speedway is a 1.5 mile track with 15 degree banking currently but is expected to be repaved in 2012 with variable banking. It is not as fast as Chicago but harder on brakes. Technically the track is not very interesting; but at four weeks into the Chase, some drivers may be getting rather desperate to improve their position in the Points Standings. Historically if one isn't in the top four in points by the end of the fourth race, then the probability of winning the championship in nearly nil. Teams use graphs to track the progress each week. This is also the first year of the new points system which harshly penalizes mistakes. A DNF is catastrophic, and there are slim rewards for taking risky chances to win. The new points system emphasizes being cautious and careful. More than one team is known to employ mathematicians to develop and plot strategies of where to finish in each race. This activity will look at point standing, Kansas qualifying, and Kansas finishing data to predict outcomes of the Chase. Test you statistical skills. Can you beat the pros at devising a championship winning strategy?

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Analysis:

You will need a few different tables for this activity.

TABLE 1: Finishes at Each Track

Driver	Car number	Week #			
		1	2	3	4
Kyle B	18	22	11	6	10
Kevin H	29	2	12	10	6
Jeff G	24	24	4	12	34
Matt K	17	21	6	5	4
Carl Ed	99	4	8	3	5
Jimmie J	48	10	18	2	1
Kurt B	22	6	21	1	13
Ryan N	39	8	25	23	18
Tony St	14	1	1	25	15
Dale Jr	88	3	17	24	14
Brad K	2	5	2	20	3
Denny H	11	31	29	18	16

TABLE 2: Points After Each Race

Driver	Car number	Week #				
		0	1	2	3	4
Kyle B	18	2012	2035	2068	2107	2141
Kevin H	29	2012	2054	2087	2122	2160
Jeff G	24	2009	2029	2071	2103	2114
Matt K	17	2006	2030	2068	2108	2149
Carl Ed	99	2003	2044	2080	2122	2161
Jimmie J	48	2003	2038	2065	2109	2157
Kurt B	22	2003	2043	2066	2113	2145
Ryan N	39	2003	2040	2060	2081	2107
Tony St	14	2000	2047	2094	2113	2142
Dale Jr	88	2000	2041	2068	2088	2118
Brad K	2	2000	2040	2083	2108	2150
Denny H	11	2000	2013	2028	2054	2082

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Using TI-Nspire Technology

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

2. Move to page **1.2**.

3. The data from the tables has been entered into the spreadsheet for each driver. The names have been abbreviated for easy reading: *kylebpos* stands for Kyle Busch's finishing position in each race, *kylebpts* stands for Kyle Busch's points after each race, *khpos* stand for Keven Harvick's finishing position in each race, etc.
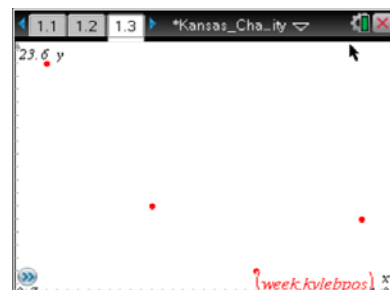
Let's look at how the Chase drivers finished in the last 4 races.

4. Move to page **1.3** to create a scatter plot of *position* vs. *week* for each driver.

5. What is the independent variable?

6. What is the dependent variable?

7. Press (var) and choose your independent variable. Press ▼ then (var) and select your dependent variable. Press (enter).
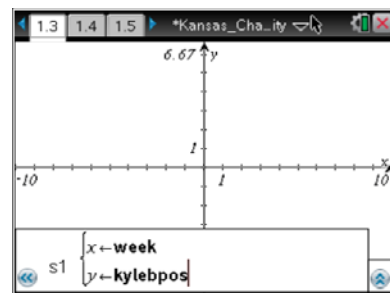
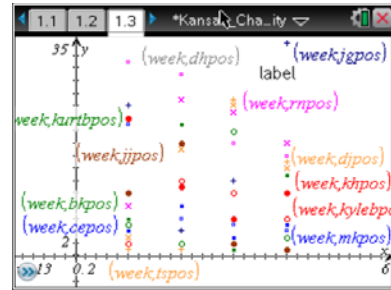8. Press (menu) then **Window/Zoom > Zoom – Data**.

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9. Press (tab) and repeat steps **7** and **8** 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.

10. According to the graph, which driver as the *best* average finish?

11. According to the graph, which driver as the *worst* average finish?

Now let's look at how the points changed after each race.

12. Move to page **1.4** to create a scatter plot of *points* vs. *week*.

13. What is the independent variable?

14. What is the dependent variable?

15. Press (var) and choose your independent variable. Press ▼ then (var) and select your dependent variable. Press (enter).
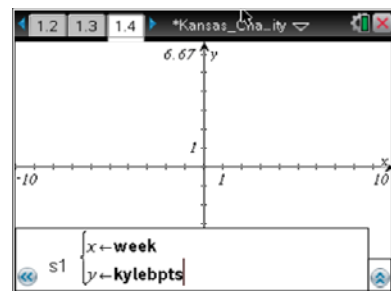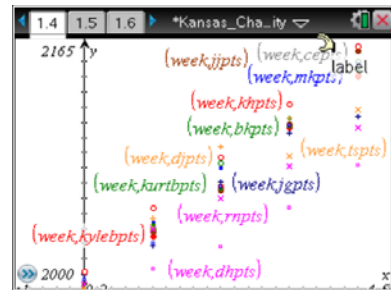
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16. Press (menu) then **Window/Zoom > Zoom –
    Data**.
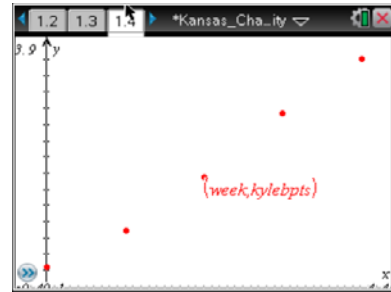
17. Press (tab) and repeat steps **15** and **16** for each
    driver. Adjust window to better view the data by
    pressing (menu) the **Window/Zoom > Window
    Settings** and move labels around by grabbing
    and dragging the text. Press (ctrl) 🔲 to grab an
    object.

18. Who has the most points after the Kansas race?

19. Who has *gained* the most points after the Kansas race?

20. Which drivers are falling behind after the Kansas race?

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Now let's look at the averages.

21. Calculate the average finishing position and average points gained for each driver after Kansas. Enter your calculations in the table below.

Driver	Average points gained	Average finishing position
Kyle B		
Kevin H		
Jeff G		
Matt K		
Carl Ed		
Jimmie J		
Kurt B		
Ryan N		
Tony St		
Dale Jr		
Brad K		
Denny H		

22. Move to page **1.5** and enter this data into the appropriate columns.

23. Move to page **1.6** to graph a scatter plot of *avg position* vs. *avg points.*

24. Which variable is the independent variable *x*?

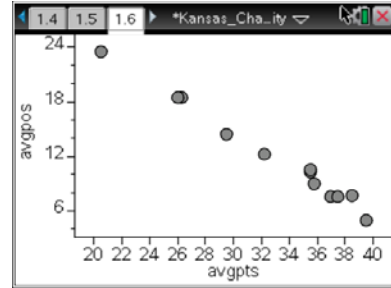*Ten80 Student Racing Challenge: NASCAR STEM Initiative*

25. What is the dependent variable *y*?

26. Move the cursor to the bottom of the screen where it says, "Click to add variable," and press 🔲.

27. Choose the independent variable.

28. Move the cursor to the right side of the screen until a rectangle appears and press 🔲.

29. Choose the dependent variable.

30. Using your answers from questions **18** and **19** and this graph, what is the lowest finishing position you can finish and stay at the top of the Points Standings?

31. Predict what the average finish will be of the winner of the Sprint Cup championship.

Using spreadsheet software

1. Enter Table 1 above into spreadsheet software.

Let's look at how the Chase drivers finished in the last 4 races.

2. Use the chart wizard to create a scatter plot of *position* 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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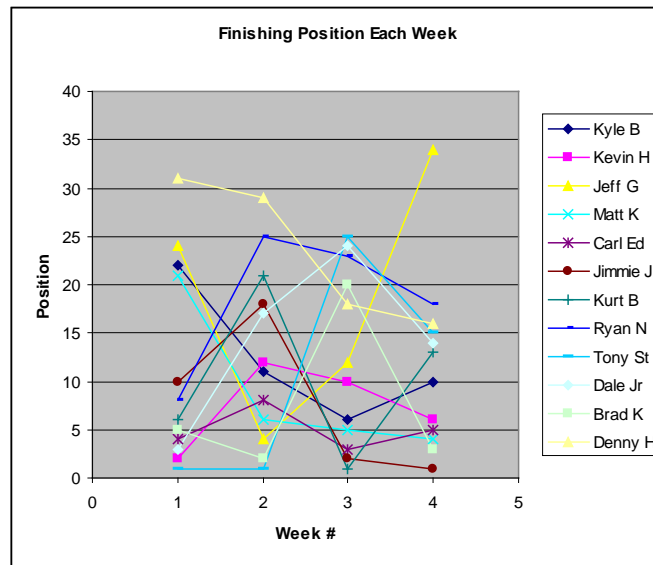
10. According to the graph, which driver as the *best* average finish?

11. According to the graph, which driver as the *worst* average finish?

Now let's look at how the points changed after each race.

12. Enter Table 2 above into spreadsheet software.

13. 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**.

14. What is the independent variable?

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15. What is the dependent variable?

16. 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.

17. 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**.

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

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

20. 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.

Points Each Week
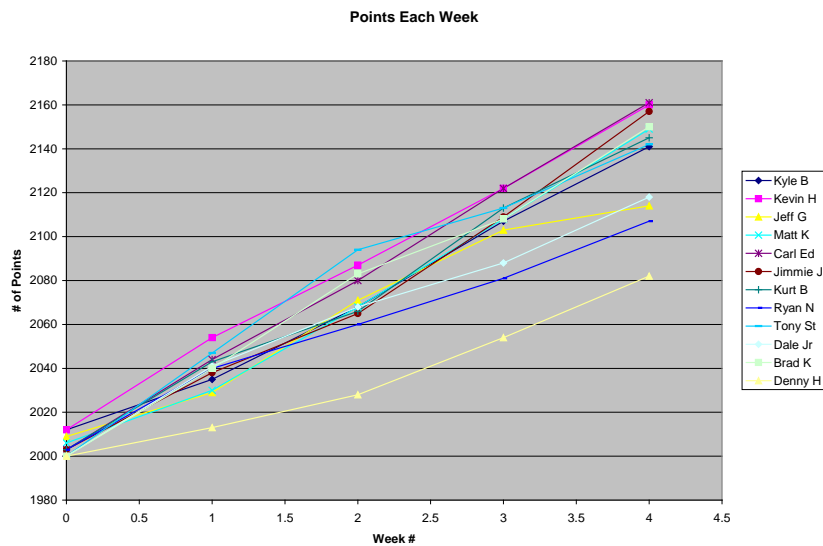
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Ryan N		
Tony St		
Dale Jr		
Brad K		
Denny H		

25. Enter this data into a new table in you spreadsheet software.

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26. Using your this table do a scatter plot of *avg position* vs. *avg points*. Use the chart wizard and select XY(Scatter). Click **Next**.

27. Which variable is the independent variable *x*?

28. What is the dependent variable *y*?

29. Click in the box for the *x* values then highlight the data for the independent variable.

30. Click the box for the *y* values then highlight the data for the dependent variable. Click **Next**.

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

32. 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.
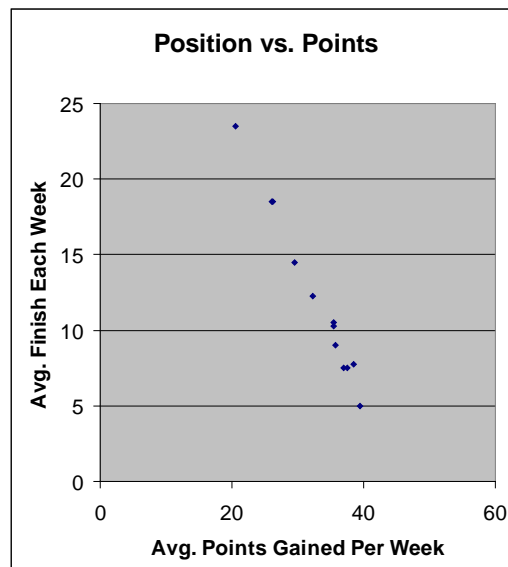
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33. Using your answers from questions **21** and **22** and this graph, what is the lowest finishing position you can finish and stay at the top of the Points Standings?

34. Predict what the average finish will be of the winner of the Sprint Cup championship.

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