

Teen Drivers: Facts and Figures

SUBMITTED BY: Nina Hoe, University of Pennsylvania

SUBJECT(S): Computation

GRADE LEVEL(S): 9, 10, 11, 12

≡ OVERVIEW:

In this lesson, students read the Wharton Global Youth Program (WGYP) article, “Driver Alert: Car Insurance Will Cost You,” and look at statistics about teen drivers presented by the Center for Disease Control. Students are asked to interpret graphs and charts, and convert between raw data, percentages, and proportions.

≡ WHARTON GLOBAL YOUTH PROGRAM ARTICLE:

- [“Driver Alert: Car Insurance Will Cost You”](#)

Purpose: The purpose of this lesson is for students to 1) better understand the realities of teen driving – both being a driver and a passenger, 2) read and analyze charts and graphs, and 3) compute conversions between raw data, proportions and percentages.

WGYP Standards:

- Number Relationships
- Statistics and Probability

Common Core Standards:

N-Q.1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and

the origin in graphs and data displays.

Activity:

Student Worksheet

Class Discussion:

1. Intro: (2 mins) Who has a license? Who has a car? Who pays his/her own car insurance?

Have students read the WGYF Article: “Driver Alert: Car Insurance Will Cost You.”

Being able to understand and read data is an important skill for anyone. Data in the form of tables, bar graphs, pie charts, frequency tables, etc. are commonly found in newspapers, magazines, and online.

2. Based on the article, what do we know about teen driving and safety?
3. Why are teenagers subject to higher car insurance rates?
4. What are some concerns about teen drivers?

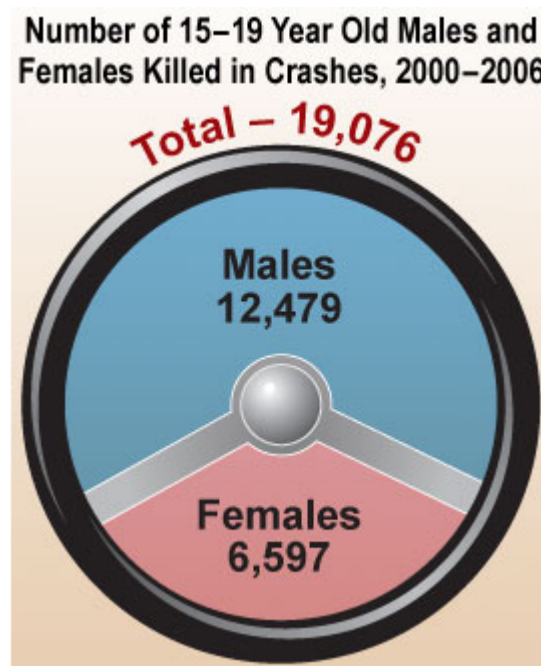
In this lesson, students will be examining and interpreting a pie graph, a bar graph, and a data table. If your students need to review any of these concepts, perhaps do so beforehand. Ask students to identify the meanings and uses of these statistical tools?

5. What is a pie graph? What kind of information is a pie graph useful for displaying?
(Shows parts of a whole. The numbers in a pie graph can be raw numbers or percentages. It is useful for comparing make-up or composition of a population or the representation of particular features within a whole.)
6. What is a bar graph? What kind of information is a bar graph useful for displaying?
(Compare data side-by-side.)
7. What is a data table? What kind of information is a data table useful for displaying? ***(A data table may include statistics and facts of many types. It is a useful tool for representing numerical information, comparing information, or representation different, but related information, compared with other information.)***

Students should work in small groups on the activity sheet.

Student Activity:

(Information from this lesson was found from the [Center for Disease Control website](#).)



1. The following is a pictorial representation of the number of 15 – 19 year old males and females killed in crashes in 2000 – 2006.

a. Replicate this pie graph using percentages instead of raw numbers (i.e. what percent of teens killed were males and females?).

(Males = 65%, Females = 35% – same circle)

b. According to the CDC, the crash risk for teens driving at night is nearly twice as high as the crash risk during the day. Based on this information and the information in the pie chart above:

i. How many males were killed during the day and night?

(This means that for every 1 day crash there are 2 night crashes, so 1 out of every 3 crashes is during the day and the other 2 are at night. Thus, $12,479 / 3 = 4,159.67$)

Male Day Crashes = 4,160; Male night crashes = 8,319

Check answer: $4,160 + 8,319 = 12,479$)

- ii. How many females were killed during the day and night?

(Female Day Crashes = 2,199; female night crashes = 4,398)

2. According to the CDC, compared with other age groups, teens have the lowest rate of seat belt use. In 2005, 10.2% of high school students reported they rarely or never wear seat belts when riding with someone else.

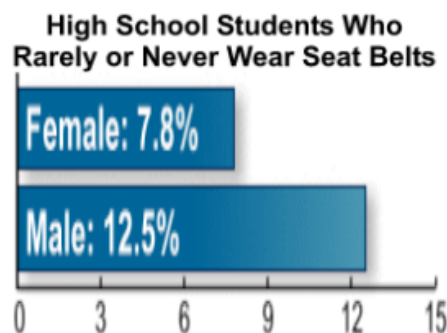
- a. Approximately how many students attend your high school?

(Answers will vary)

- b. Based on this statistic, how many of them rarely or never wear seat belts when riding with someone else?

(Answers will vary: Answer A x .102 = _____. Note: 10.2% = .102)

3. The following bar graph shows seatbelt usage by gender:



- a. Based on this data, if 1,000 males and 1,000 females were interviewed, how many of each rarely or never wear seatbelts?

(Females = 78; Males = 125)

- b. Based on this data, if 3,478 males and 5,012 females were interviewed, how many rarely or never wear seatbelts?

(Females = 5,012 x 0.078 = 391; Males = 3,478 x .125 = 435)

- c. Based on this data and the pie chart shown in question #1, what speculations could you make about the relationship between seatbelt usage and fatal accidents?

(Well, males have a higher rate of being involved in crashes, and also have a higher rate of not wearing a seatbelt. Maybe there is a correlation.)

d. Why do you think there is a gender disparity in seatbelt usage?

(Answers will vary... Good opportunity for class discussion, but be careful not to let conversation go towards – boys are bad, girls are good.)

4. Below is a data table displaying a variety of information about age of drivers, number of licensed drivers in that age group, and the number of drivers in accidents. Spend some time looking at this data table and understanding the relationships between the numbers.

Age group	Licensed drivers		Drivers in accidents			
	Number (1,000)	Percent	Fatal		All	
			Number	Percent	Number (1,000)	Percent
Total	208,100	100.0	52,500	100.0	17,300	100.0
19 years old and under	10,275	4.9	4,500	8.6	2,130	12.3
..Under 16 years old	491	0.2	200	0.4	180	1.0
..16 years old	1,334	0.6	600	1.1	330	1.9
..17 years old	2,221	1.1	800	1.5	490	2.8
..18 years old	2,989	1.4	1,400	2.7	580	3.4
..19 years old	3,240	1.6	1,500	2.9	550	3.2
20 to 24 years old	17,211	8.3	7,400	14.1	2,520	14.6
..20 years old	3,345	1.6	1,500	2.9	490	2.8
..21 years old	3,375	1.6	1,500	2.9	510	2.9

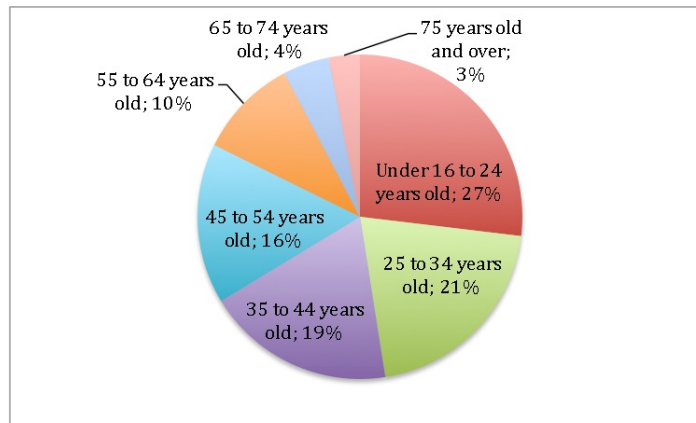
..22 years old	3,442	1.7	1,600	3.0	470	2.7
..23 years old	3,534	1.7	1,400	2.7	450	2.6
..24 years old	3,515	1.7	1,400	2.7	600	3.5
Under 16 to 24 years old	27486	13.2	11,900	23.3	4,650	26.9
25 to 34 years old	36,082	17.3	9,900	18.9	3,570	20.6
35 to 44 years old	38,969	18.7	8,400	16.0	3,260	18.8
45 to 54 years old	41,560	20.0	8,500	16.2	2,770	16.0
55 to 64 years old	32,118	15.4	6,200	11.8	1,730	10.0
65 to 74 years old	18,406	8.8	3,600	6.9	790	4.6
75 years old and over	13,479	6.5	4,000	7.6	530	3.1

Based on this data, complete the following statements

- Teenagers make up 4.9% of the people with driver's licenses, but are involved in 12.3% of all driver accidents.
- Proportionally, teenagers are drivers in 2.5 ($12.3/4.9 = 2.5$) times as likely to get in an accident than their population would predict. (i.e. if they represent 4.9% of licensed drivers they should get in 4.9% of the accidents)
- The age group with the most number of drivers is 45 to 54 year olds.
- Notice that the majority of the age group categories span 10 years. Create a row that combines the "19 years old and under" group and the "20 – 24 year old" group to form a group "under 16 to 24 years old." This will allow you to be able to compare with the other groups that cover a 10-year span. (Fill in the bolded row.) (**Just add**)
- Looking at the percent column only, what happens to percentages of driver accidents, as drivers get older? (**They decrease.**)
- What percentage of all accidents are fatal? ($52,500 / 17,300,000 = .00303 = 0.3\%$)
- Create a pie graph displaying the distribution/breakdown of all drivers in accidents (by

percentage). Use the 8 categories highlighted in gray. can use that.

i. If you have access to Excel, you



ii. If not, use a percent circle.

iii. Answer: How does a pie graph explain this data? What are the benefits of this?

(Visually highlights the discrepancies and decreases.)

Tying It All Together:

Have students write their solutions on the board.

Class Discussion:

Call on a few students to articulate some of the things they learned through reading and interpreting this data.

What Worked and What I Would Do Differently: