

How Much Do People Pay for Car Insurance?

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 article, “Driver Alert: Car Insurance Will Cost You,” and look at data from the Insurance Information Institute (III) about national insurance rates. Students learn about the components and types of car insurance (i.e. liability, comprehensive and collision). They are asked to interpret and analyze car insurance by state and represent data through bar graphs and box plots. If computers with Excel are available, students learn to make bar graphs and sort data in Excel.

≡ NBEA STANDARD(S):

- Computation, II. Number Relationships and Operations
- Computation, III. Patterns, Functions, and Algebra
- Computation, V. Statistics and Probability

≡ 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 breakdown and types of auto insurance; 2) read and analyze data; 3) calculate percentage differences; 4) create a bar graph by hand; 5) create a box plot by hand, 6) sort data in Excel; and 7) create a bar graph in Excel.

Common Core Standards:

- S-ID.1. Represent data with plots on the real number line (dot plots, histograms, and box plots).
- S-ID.2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
- 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.

Resources/Materials:

Computers with Microsoft Excel

[Worksheet](#)

Activity:

Class Discussion: (3 mins)

1. What is insurance? What does having insurance mean?
2. What is car insurance?
3. Who needs to have it?

Have students read the WGYA Article: “[Driver Alert: Car Insurance Will Cost You](#)” (5 – 10 mins, depending on if they have read article for Computation 5)

4. Based on the article – is car insurance the same for everyone, everywhere?
(No, all 50 states have different laws about the types of insurance that a driver needs to carry and the amount of coverage required.)
5. What is a premium?
(A premium is the amount to be paid for an insurance policy.)

(10 mins)

6. What are the different types of insurances and what do they mean?

(All information from [State Farm Website](#))

These are three of the most common types of insurances.

1. *Liability* – Auto liability insurance coverage pays for the damage if you are legally responsible for accidentally injuring someone, or for damaging another vehicle or other property in an auto accident. Auto liability coverage falls into two categories: (1) **Bodily Injury Liability – which covers medical expenses, pain and suffering, lost wages, and other special damages** (2) **Property Damage Liability – which covers damaged property, and may include loss of use.**

Liability car insurance also pays legal defense and court costs. State laws usually dictate the minimum amounts of auto liability insurance required, but higher amounts are available.

2. *Collision* – This auto insurance coverage helps pay for damage to a covered vehicle caused by:

- Collision with another vehicle
- Collision with an object
- A vehicle rolloverA deductible is required.

3. *Comprehensive* – This auto insurance coverage helps pay for loss of or damage to an insured vehicle, *not* caused by a collision or vehicle rollover.

Examples of this type of damage or loss include:

- Fire
- Wind
- Hail
- Flood
- Vandalism
- Theft
- Hitting an animal

A deductible may apply.

Discuss the meanings and applications of these types of insurance. Make sure that students understand what each is for. Talk about some different scenarios and which categories different types of accidents would fall into (ex: a tree falling on your parked car – comprehensive, you hitting another car – liability and collision, you hitting a telephone pole but not causing any damages – collision).

7. Which types of insurances are most important and why?

(These might depend on what type of car you have and how much it is worth. For example, if you have a very old car only worth a few hundred dollars, it might not be worth it to pay for comprehensive or collision insurance since you might pay more in insurance than the car is worth. In all states, drivers are required to carry liability insurance at a minimum so that others are protected from any damage you might cause.)

Discuss that in Pennsylvania for example, the only type of insurance that is mandatory is liability.

8. Is insurance the same for everyone everywhere?

(No, we know that at least from the WGYP article) According to the Institute of Insurance Information Institute: Expenditures are affected by the coverage purchased as well as other factors. In **states where the economy is healthy, people are more likely to purchase new cars. Since new car owners are more likely to purchase physical damage coverage, these states will have a higher average expenditure.** The NAIC notes that **urban population, traffic density and per capita income have a significant impact on premiums.** The latest report shows that high premium states tend also to be highly urban, with higher wage and price levels and greater traffic density. **Tort liability and other auto laws, labor costs, liability coverage requirements, theft rates and other factors can also affect auto insurance prices.**

2. Student Activity: (20 mins)

Investigate the questions: *How much do people pay for car insurance in the United States?*

The data below shows average annual expenditures for auto insurance by state in 2008 ([from III website](#)).

State	Liability	Collision	Compre-hensive	Average expenditure
Alabama	\$354	\$310	\$134	\$667
Alaska	558	375	149	904
Arizona	486	296	207	858
Arkansas	365	283	152	653
California (2)	450	363	103	776
Colorado	427	263	155	729
Connecticut	592	332	121	950
Delaware	698	287	106	1,007
D.C.	583	430	250	1,126
Florida	736	281	114	1,055
Georgia	413	357	164	765
Hawaii	506	312	113	816
Idaho	330	228	116	562
Illinois	401	287	111	720
Indiana	348	243	109	612
Iowa	272	192	153	519
Kansas	299	230	190	576
Kentucky	453	256	122	699
Louisiana	651	410	214	1,105
Maine	336	255	97	600
Maryland	555	316	140	922
Massachusetts	564	293	114	903
Michigan	494	387	152	907
Minnesota	411	207	162	698
Mississippi	366	269	154	654
Missouri	368	251	148	657
Montana	404	241	184	667
Nebraska	308	201	168	547
Nevada	631	335	134	970
New Hampshire	398	277	100	727
New Jersey	721	342	134	1,081
New Mexico	442	294	171	728
New York	687	331	154	1,044
North Carolina	352	240	114	595
North Dakota	242	186	216	503
Ohio	355	239	100	617
Oklahoma	381	275	160	663
Oregon	485	230	95	727
Pennsylvania	490	299	120	817
Rhode Island	646	372	121	986
South Carolina	466	252	147	751
South Dakota	275	186	191	520
Tennessee	356	283	121	641
Texas	471	359	178	854
Utah	430	268	111	709
Vermont	340	280	115	653
Virginia	384	252	114	663
Washington	551	258	116	840
West Virginia	501	289	167	808
Wisconsin	322	202	117	581
Wyoming	322	271	202	632
United States	\$471	\$298	\$134	\$789

Analyzing the data:

1. Which 5 states have the overall highest average expenditures?

(D.C., Louisiana, New Jersey, Florida, New York)

2. Which 5 states have the overall lowest average expenditures?

(North Dakota, Iowa, South Dakota, Nebraska, Idaho)

3. What is the average expenditure for the United States as a whole?

(\$789)

4. Between liability, collision, and comprehensive insurance, which tends to be the highest? Why do you think this might be?

(Liability – it's required)

5. How does your state compare to the national average? Is it more or less? Calculate the percentage different? Use this formula for percentage difference (let A = the national average and B = the average expenditure in your state).

$$\text{Percentage Difference} = \frac{B - A}{A} * 100$$

Express your answer in terms of “The annual average expenditure for auto insurance in _____ (my state) is _____% higher/lower than the national average.”

(The annual average expenditure for auto insurance in Pennsylvania is 3.5% higher than the national average.)

6. In the WGYP article, according the Rocky Mountain Insurance Information, a policy for a newly licensed male teen driver will run about \$1,000 every six months. How does this compare to the average expenditure for the state of Colorado in general? Specifically, what is the percentage difference?

(\$1000 x 2 = \$2000. \$2000 is 174% higher than \$729, which is the state average.)

7. In the space below, create a bar graph showing the average expenditures by state for the 5 most expensive states and the 5 least expensive states. Within each category, list them in order from most-to-least expensive.

Before you start drawing...

- What information should go on the x-axis? **(states)**
- What information should go on the y-axis? **(\$)**

7. Look at a map of the United States. Including your own state, select the 9 states closest to you (10 total). Make a box plot of average annual expenditures by those states. (For example, for PA, you might use NJ, DE, NY MD, OH, WV, DC, CT, and VA.)

(if time allows – 10 mins)

9. Exploration in Excel.

In the attached Excel file, you will find the data displayed in this file.

- Produce a bar (column) graph of the annual expenditure by state in alphabetical order. To do this: 1) Highlight the 2 columns (make sure to include the headings), 2) select the “Gallery” or “Graphs” button and chose “Column” 3) the graph should generate automatically. 4) Cut and paste into a word document if desired.
- Produce a bar (column) graph of the annual expenditure by state in order of most expensive to least expensive. To do this you will need to first sort the data by the Average Annual Expenditure (\$) or Column B. 1) Highlight all of the data, 2) under the Data tab, select Sort, 3) Sort by Column B or Average Annual Expenditure (\$). Then produce a bar graph in the same way as in part 9a. To do this: 1) Highlight the 2 columns (make sure to include the headings), 2) select the “Gallery” or “Graphs” button and chose “Column” 3) the graph should generate automatically. 4) Cut and paste into a word document if desired.
- Compare the two graphs. Which is more helpful/useful? Why?
- Using the graphs, approximate the mean. On which graph is it easier to locate or approximate the mean?

Tying It All Together: (10 mins)

Have students reflect on all of the information that they have extracted from the raw data.

Class Discussion:

1. Have students report back on their answers.
2. What are useful ways to display and organize data? Consider what you have done – lists, sorted lists, bar graphs, sorted bar graphs, box plots, calculations of percentage differences. Which one(s) were the most helpful? Discuss some of the pros and cons.
3. Revisit the question – How much do people pay for car insurance? How did/could you answer that question?
 1. What do the state averages represent?

How do teen auto insurance rates fit into all of this?

