

NAME: _____ PERIOD: _____ DATE: _____

Homework Problem Set

Several students at Rufus King High School were debating whether freshmen or sophomores were more involved in after-school activities. There are three organized activities in the after-school program— intramural basketball, chess club, and jazz band. Due to budget constraints, a student can only select one of these activities. The students were not able to ask every freshman or sophomore student in the school whether they participated in the after-school program or what activity they selected if they were involved.



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- Write two questions that could be included in the survey to investigate the question the students are debating.

What is your class?

- Freshman
- Sophomore

What after school activities do you participate?

- chess club
- intramural basketball
- jazz band
- none

- Rufus King High School has approximately 1,500 students. Sam suggested that the first 100 students entering the cafeteria for lunch would provide a random sample to analyze. Janet suggested that they pick 100 students based on a school identification number. Who has a better strategy for selecting a random sample? How do you think 100 students could be randomly selected to complete the survey?



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Janet's suggestion is a better strategy for selecting a random sample. Sam's suggestion is primarily a convenience sample and is least likely to generate a random sample (certain grades or classes may have different lunch periods.)

Janet's method may be difficult to complete. Maybe collect data as students leave school. Have 1 out of every 15 students complete survey.

3. Consider the following results from 100 randomly selected students:
- Of the 60 freshman students selected, 20 of them played intramural basketball, 10 played chess, and 10 were in the jazz band. The rest of them did not participate in the after-school program.
 - Of the sophomore students, 10 did not participate in the after-school program, 20 played intramural basketball, 8 played in the jazz band, and the rest played chess.

A two-way frequency table to summarize the survey data was started. Indicate what label is needed in the blank cell.

	Intramural Basketball	Chess Club	Jazz Band	NONE	Total
Freshmen	20	10	10	20	60
Sophomores	20	2	8	10	40
Total	40	12	18	30	100

4. Complete the above table for the 100 students who were surveyed.
5. Based on the table, what is the relative frequency of students who indicated they play basketball?

$$\frac{40}{100} = 40\%$$

6. The table shows the responses to the after-school activity question for freshmen and sophomores. Do you think there is a difference in the responses of freshmen and sophomores? Explain your answer.

Possible answer:

Yes, there is a difference. More freshman were surveyed $\frac{1}{3}$ freshman selected basketball & $\frac{1}{2}$ sophomores. Quite a few more freshman selected chess club.

7. Consider the Rufus King High School data from Problem 3 regarding after-school activities.

Calculate the **row** conditional relative frequencies for each of the cells to the nearest thousandth. Place the relative frequencies in the cells of the following table. (The first cell has been completed as an example.)

	Intramural Basketball	Chess Club	Jazz Band	NONE	Total
Freshmen	$\frac{20}{60} = 0.333$	$\frac{10}{60} = 16.7\%$	$\frac{10}{60} = 16.7\%$	$\frac{20}{60} = 33\%$	
Sophomores	$\frac{20}{40} = 50\%$	$\frac{2}{40} = 5\%$	$\frac{8}{40} = 20\%$	$\frac{10}{40} = 25\%$	

8. Based on your table, what is the relative frequency of sophomores who play basketball?

50%

9. If a freshman or sophomore student was selected at random from school, do you think this student would be involved in an after-school program? Explain your answer.

yes, 70% of the students surveyed were in some kind of after school activity.

10. Why might someone question whether or not the students who completed the survey were randomly selected? If the students completing the survey were randomly selected, what do the marginal relative frequencies possibly tell you about the school? Explain your answer.

possible answer:

Since there are more freshman than sophomores, it is possible that the survey was not random. If this is random, then most students involved play basketball.

11. Why might freshmen think they are more involved in after-school activities than sophomores? Explain your answer.

They would be looking at the actual number of students from the survey, not relative frequency.

12. For what after-school activities do you think the row conditional relative frequencies for freshmen and sophomores are very different? What might explain why freshmen or sophomores select different activities?

There are relatively large differences in Chess Club and Basketball. It could be that sophomores want a more team activity and freshmen are new to the school and want a more individual activity.

13. If John, a sophomore student at Rufus King High School, completed the after-school survey, what would you predict was his response? Explain your answer.

John is more likely to choose basketball than any other activity.

14. If Beth, a freshman student at Rufus King High School, completed the after-school survey, what would you predict was her response? Explain your answer.

Beth would be more likely to choose basketball or no afterschool activity because these have the highest relative frequency.

15. Notice that 20 freshman students participate in intramural basketball and that 20 sophomore students participate in intramural basketball. Is it accurate to say that freshmen and sophomores are equally involved in intramural basketball? Explain your answer.

No, the percentages are very different. Since more freshmen were surveyed the 20 only represents 33.3% of the freshman, well it is 50% of the sophomore surveyed.

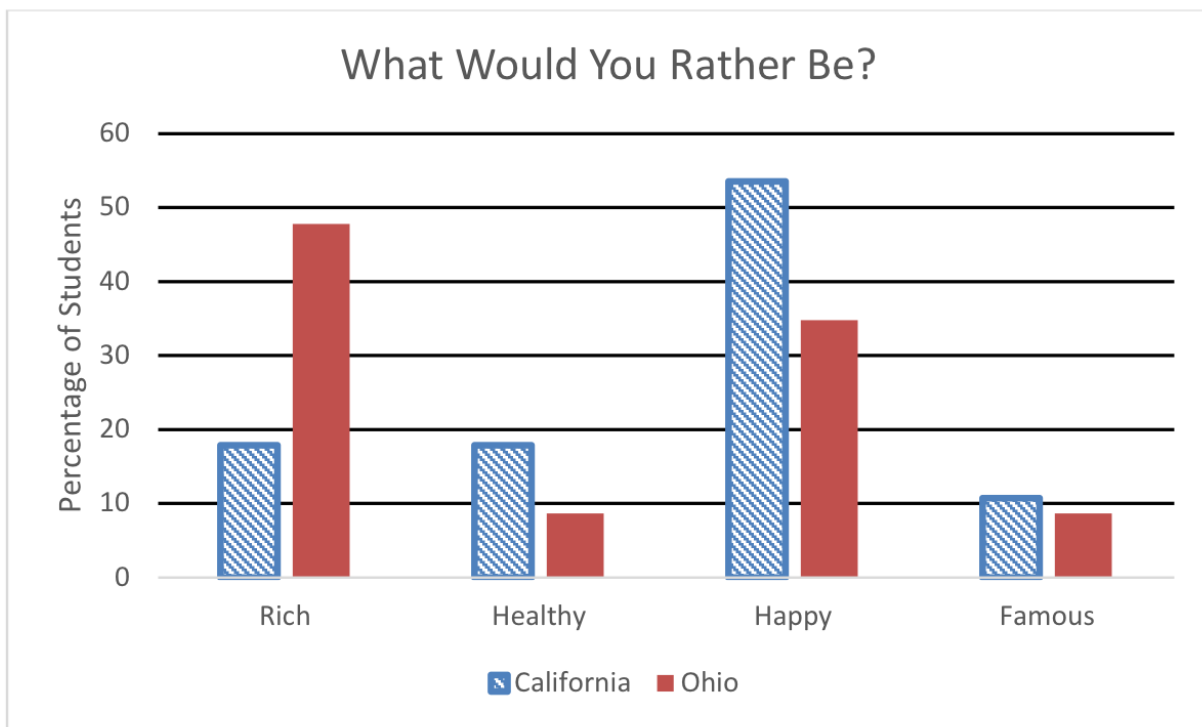
16. The opinions of 9th grade students in California were compared to the opinions of 9th grade students in Ohio on the same topic of if they'd rather be rich, healthy, happy or famous. Those results are shown in the table below.

	Rich	Healthy	Happy	Famous	Total
California	15	15	45	9	84
Ohio	33	6	24	6	69
Total	48	21	69	15	153

Create a row conditional relative frequency table of this data.

	Rich	Healthy	Happy	Famous	Total
California	$\frac{15}{84} \approx 17.9\%$	$\frac{15}{84} \approx 17.9\%$	$\frac{45}{84} \approx 53.6\%$	$\frac{9}{84} \approx 10.7\%$	$\frac{84}{84} = 100\%$
Ohio	$\frac{33}{69} \approx 47.8\%$	$\frac{6}{69} \approx 8.7\%$	$\frac{24}{69} \approx 34.8\%$	$\frac{6}{69} \approx 8.7\%$	$\frac{69}{69} = 100\%$

17. Create a bar graph to determine if there is an association between any of these relationships. Be sure to create a legend for the graph. State any associations.



Answers will vary. There seems to be an association between the state and what students would most like to be. There is a difference in the percentages in the categories of Rich, Healthy and Happy.