

S.ID.B.5: Frequency Tables

GRAPHS AND STATISTICS

S.ID.B.5: Frequency Tables

B. Summarize, represent, and interpret data on two categorical and quantitative variables.

5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. (Focus is on linear relationships and general principles).

Overview of Lesson

- activate prior knowledge and review learning objectives (see above)
- explain vocabulary and/or big ideas associated with the lesson
- connect assessment practices with curriculum
- model an assessment problem and solution strategy
- facilitate guided discussion of student activity
- facilitate guided practice of student activity
- [Selected problem set\(s\)](#)
- facilitate a summary and share out of student work
- Homework – Write the Math Assignment**

Vocabulary

frequency table A table that shows how often each item, number, or range of numbers occurs in a set of data.

BIG IDEAS

Building a Frequency Table: Example: The data {5 ,7, 6 , 8 , 9 , 5 , 13 , 2 , 1 , 6 , 5 , 14 , 10 , 5 , 9} can be displayed in a frequency table as follows.

Interval	Tally	Frequency
1-5	I	6
6-10	II	7
11-15	II	2

The frequency table can then be used to build a histogram, dot plot, or other graphical summary of the data.

NOTES: When building a frequency table involving continuous numbers, **each interval must be equal in size**. It is sometimes easier to arrange the data in ascending or descending order when making a frequency table. Here is the data set that is summarized in the preceding table in both original and ascending orders.

{5 ,7, 6 , 8 , 9 , 5 , 13 , 2 , 1 , 6 , 5 , 14 , 10 , 5 , 9}
 {1, 2, 5, 5, 5, 5, 7, 6 , 6, 8 , 9 , 9, 10, 13 , 14}

When rearranging data sets and/or building frequency tables, it is a good practice to count the data elements to make sure that all elements have been included.

Using a Frequency Table: Summarized data in a frequency table can be used to write ratios and proportions and calculate percentages.

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Answer Section

1. ANS: D

Step 1. Understand that the problem is only interested in the percent for the candidate in the 21-40 age group. The bottom two rows of the table are not relevant to the problem.

Step 2. Strategy. Determine the total number of poll responses in the 21-40 age group and what percentage of these responses were for the candidate.

Step 3. Execute the strategy.

$$\frac{\text{for}}{\text{total}} \left| \frac{30}{30 + 12 + 8} = \frac{30}{50} = \frac{60}{100} = 60\% \right.$$

Step 4. Does it make sense? Yes. We know that 30 responses were for the candidate. Choices a), b), and c) are wrong because: a) 15% of 50 is $.15 \times 50 = 7.5$; b) 25% of 50 is $.25 \times 50 = 12.5$; and c) 40% of 50 is $.40 \times 50 = 20$. Choice d) is the only correct answer because 60% of 50 is $.50 \times 60 = 30$.

PTS: 2

REF: 061615ai

NAT: S.ID.B.5

TOP: Frequency Tables

2. ANS:

234 of the school's 351 males prefer comedy based on the sample.

Step 1. Understand that the table is only a sample of the population, and the population of males is 351. Assume that the sample was not biased.

Step 2. Strategy. Determine the percent (or fraction) of the males in the sample that prefer comedy, then apply that percent to the total population.

Step 3. Execution of strategy.

$70 + 35 = 105$ males were surveyed.

Based on the sample, $\frac{70}{105} = \frac{2}{3} = 66.67\%$ of the males preferred comedy.

$$\frac{2}{3} (351) = \frac{2 \times 351}{3 \times 1} = \frac{702}{3} = 234.$$

Step 4. Does it make sense. Yes, if $\frac{2}{3}$ of the males in the sample prefer comedy, we can predict that $\frac{2}{3}$ of the males in the population will prefer comedy.

PTS: 2

REF: 011630ai

NAT: S.ID.B.5

TOP: Frequency Tables

Homework - Write the Math Assignment

START Write your name, date, topic of lesson, and class on your paper.
 NAME: Mohammed Chen
 DATE: December 18, 2015
 LESSON: Missing Number in the Average
 CLASS: Z

PART 1a. Copy **the problem** from the lesson and underline/highlight key words.

PART 1b. State your understanding of **what the problem is asking**.

PART 1c. **Answer** the problem.

PART 1d. Explanation of **strategy** with all work shown.

PART 2a. Create **a new problem** that addresses the same math idea.

PART 2b. State your understanding of **what the new problem is asking**.

PART 2c. **Answer** the new problem.

PART 2d. Explanation of **strategy** used in solving the new problem with all work shown.

Clearly label each of the eight parts.

Grading Rubric

Each homework writing assignment is graded using a four point rubric, as follows:

Part 1. The Original Problem	Up to 2 points will be awarded for: a) correctly restating the original problem; b) explicitly stating what the original problem is asking; c) answering the original problem correctly; and d) explaining the math.
Part 2. My New Problem	Up to 2 points will be awarded for: a) creating a new problem similar to the original problem; b) explicitly stating what the new problem is asking; c) answering the new problem correctly; and d) explaining the math.

This assignment/activity is designed to incorporate elements of [Polya's four step universal algorithm](#) for problem solving with the idea that writing is thinking. Polya's four steps for solving any problem are:

1. Read and understand the problem.
2. Develop a strategy for solving the problem.
3. Execute the strategy.
4. Check the answer for reasonableness.

EXEMPLAR OF A WRITING THE MATH ASSIGNMENT

Part 1a. The Problem

TOP Electronics is a small business with five employees. The mean (average) weekly salary for the five employees is \$360. If the weekly salaries of four of the employees are \$340, \$340, \$345, and \$425, what is the salary of the fifth employee?

Part 1b. What is the problem asking?

Find the salary of the fifth employee.

Part 1c. Answer

The salary of the fifth employee is \$350 per week.

Part 1d. Explanation of Strategy

The arithmetic mean or average can be represented algebraically as:

$$\bar{X} = \frac{x_1 + x_2 + \dots + x_n}{n}$$

I put information from the problem into the formula. The problem says there are 5 employees, so $n = 5$. The problem also gives the mean (average) salary and the salaries of 4 of the employees. These numbers can be substituted into the formula as follows:

$$360 = \frac{340 + 340 + 345 + 425 + x_5}{5}$$

$$1800 = 340 + 340 + 345 + 425 + x_5$$

$$1800 = 1450 + x_5$$

$$1800 - 1450 = x_5$$

$$350 = x_5$$

$$\text{Check: } 360 = \frac{340 + 340 + 345 + 425 + 350}{5} = \frac{1800}{5} = 360$$

Part 2a. A New Problem

Joseph took five math exams this grading period and his average score on all of the exams is 88. He remembers that he received test scores of 78, 87, 94, and 96 on four of the examinations, but he has lost one examination and cannot remember what he scored on it. What was Joseph's score on the missing exam?

Part 2b. What is the new problem asking?

Find Joseph's score on the missing exam.

Part 2c. Answer to New Problem

Joseph received a score of 85 on the missing examination.

Part 2d. Explanation of Strategy

I substitute information from the problem into the formula for the arithmetic mean, as follows:

$$88 = \frac{78 + 87 + 94 + 96 + x_5}{5}$$

$$440 = 355 + x_5$$

$$85 = x_5$$

$$88 = \frac{78 + 87 + 94 + 96 + 85}{5} = \frac{440}{5} = 88$$

The answer makes sense.