

B – Graphs and Statistics, Lesson 2, Frequency Tables (r. 2018)

GRAPHS AND STATISTICS

Frequency Tables

<p>Common Core Standard</p> <p>S-ID.B.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.</p>	<p>Next Generation Standard</p> <p>AI-S.ID.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.</p>
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Overview of Lesson

<p>Teacher Centered Introduction</p> <p>Overview of Lesson</p> <ul style="list-style-type: none"> - activate students’ prior knowledge - vocabulary - learning objective(s) - big ideas: direct instruction - modeling 	<p>Student Centered Activities</p> <p>guided practice ←Teacher: anticipates, monitors, selects, sequences, and connects student work</p> <ul style="list-style-type: none"> - developing essential skills - Regents exam questions - formative assessment assignment (exit slip, explain the math, or journal entry)
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LEARNING OBJECTIVES

Students will be able to:

- 1) Complete a two-way frequency table.
- 2) Calculate the percentage of data elements in a cell, row, or column of a two-way frequency table.

VOCABULARY

univariate
 bivariate
 frequency table

two-way frequency table
 percentage
 percent

BIG IDEAS

frequency table: A table that shows the observed number or frequency for a single number or range of numbers in a set of univariate data.

Example:

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

two-way frequency table: A table that shows the observed number or frequency for two variables in a set of bivariate data, the rows indicating one category and the columns indicating the other category.

Example:

What is your favorite sport to watch on television?			
	Football	Basketball	Baseball
Males	40	22	15
Females	12	16	45
Total	52	38	60

Calculating Percents

To calculate what **percent** A is of B, you simply divide A by B, then take that **number** and move the decimal place two spaces to the right.

Example: To find what percent 3 is of 4, simply divided 3 by 4, then take .75 and move the decimal two spaces to the right. The answer is 75%.

You can also use proportions. To find what percent 3 is of 4, set up the proportion

$$\frac{3}{4} = \frac{x\%}{100\%}$$

$$300 = 4x\%$$

$$75\% = x$$

DEVELOPING ESSENTIAL SKILLS

1) Organize Data

The senior spirit committee sold hot dogs, pizza, water, and soda at soccer games to raise money for the prom. 400 sales were made. They sold 200 sodas, 150 bottles of water, 158 hot dogs, and 182 pizzas. 50 students who bought hot dogs also bought sodas, and 58 students who bought pizzas also bought bottles of water. 30 students bought soda, but no food; and 46 students bought hot dogs, but no drink. Organize this data in a two-way frequency table.

Concession Stand Sales				
	Soda	Water	No Drink	Total
Hot Dog	50	62	46	158
Pizza	120	58	4	182
No Food	30	30	0	60
Total	200	150	50	400

2) Calculate Percentages

Calculate the percent of sales in each cell of your two-way frequency table *to the nearest tenth of a percent*.

Concession Stand Sales				
	Soda	Water	No Drink	Total
Hot Dog	12.5%	15.5%	11.5%	39.5%
Pizza	30%	14.5%	1%	45.5%
No Food	7.5%	7.5%	0%	15%
Total	50%	37.5%	12.5%	100%

REGENTS EXAM QUESTIONS

S.ID.B.5: Frequency Tables

- 12) The school newspaper surveyed the student body for an article about club membership. The table below shows the number of students in each grade level who belong to one or more clubs.

	1 Club	2 Clubs	3 or More Clubs
9th	90	33	12
10th	125	12	15
11th	87	22	18
12th	75	27	23

If there are 180 students in ninth grade, what percentage of the ninth grade students belong to more than one club?

- 13) A survey of 100 students was taken. It was found that 60 students watched sports, and 34 of these students did not like pop music. Of the students who did *not* watch sports, 70% liked pop music. Complete the two-way frequency table.

	Watch Sports	Don't Watch Sports	Total
Like Pop			
Don't Like Pop			
Total			

- 14) A statistics class surveyed some students during one lunch period to obtain opinions about television programming preferences. The results of the survey are summarized in the table below.

Programming Preferences

	Comedy	Drama
Male	70	35
Female	48	42

Based on the sample, predict how many of the school's 351 males would prefer comedy. Justify your answer.

$$\frac{33 + 12}{180} = \frac{45}{180} = .25$$

$$.25 = 25\%$$

PTS: 2 NAT: S.ID.B.5 TOP: Frequency Histograms, Bar Graphs and Tables

13) ANS:

Step 1. Fill in the known information from the problem.

	Watch Sports	Dont Watch Sports	Total
Like Pop			
Don't Like Pop	34		
Total	60		100

Step 2. Complete additional cells using given information.

	Watch Sports	Dont Watch Sports	Total
Like Pop	26		
Don't Like Pop	34		
Total	60	40	100

Step 3. Complete the “Don’t Watch Sports - Like Pop” cell using information from the problem that states “Of the students who did *not* watch sports, 70% liked pop music.” Compute $40 \times 70\% = 28$.

	Watch Sports	Dont Watch Sports	Total
Like Pop	26	28	
Don't Like Pop	34		
Total	60	40	100

Step 4. Complete the remaining cells.

	Watch Sports	Dont Watch Sports	Total
Like Pop	26	28	54
Don't Like Pop	34	12	46
Total	60	40	100

PTS: 2 NAT: S.ID.B.5 TOP: Frequency Tables

14) 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 NAT: S.ID.B.5 TOP: Frequency Tables

15) ANS: 4

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 NAT: S.ID.B.5 TOP: Frequency Tables

16) ANS: 2

Understand the Problem:

The questions asks what percentage of college students prefer classic rock. The information in the table about middle school and high school students is not important.

The total number of college students is $16 + 20 + 14 = 50$.

14 out of 50 college students prefer classic rock.

Strategy: Write and solve a proportion to convert 14 out of 50 to a percentage.

$$\frac{14}{50} = \frac{x}{100}$$

$$1400 = 50x$$

$$28 = x$$

PTS: 2 NAT: S.ID.B.5 TOP: Frequency Tables

17) ANS: 1

Strategy:

STEP 1. Find the total numbers of students who like each sport.

Basketball: A total of 126 boys and girls chose basketball.

Soccer: A total of 99 boys and girls chose soccer.

Tennis: A total of 25 boys and girls chose tennis.

STEP 2. Find the total number of students in the entire table.

Total basketball plus total soccer plus total tennis = 250

STEP 3. Write a proportion to find the percentage of students who chose soccer.

$$\frac{\text{chose soccer}}{\text{total students}} = \frac{\% \text{ of students who chose soccer}}{100} \Leftrightarrow \frac{99}{250} = \frac{x}{100}$$

STEP 4. Solve the proportion for x

$$\frac{99}{250} = \frac{x}{100}$$

$$99 \times 100 = 250x$$

$$9900 = 250x$$

$$\frac{9900}{250} = x$$

$$39.6 = x$$

PTS: 2 NAT: S.ID.B.5 TOP: Frequency Tables