

Unit 6 Lesson 2 – Two Way Frequency Tables & Independent/Dependent Events

- Two-way frequency tables are used to examine the relationships between two _____ variables.

The table to the right is an example of a two-way frequency table that shows the number of students who prefer art, band, or chorus at Clayton High School.

	Band	Chorus	Art Club	Total
9th Grade	22	30	26	
10th Grade	25	22	24	
11th Grade	31	32	20	
12th Grade	28	17	25	
Total				

Joint Frequencies

- _____ frequency represents the intersection of one row variable and one column variable

The following questions are examples of joint frequency:

1. How many 11th graders prefer chorus? _____
2. How many 12th graders prefer art? _____
3. How many 9th graders prefer band? _____

Marginal Frequencies

- _____ frequency represents the total of a row or column
- If the table does not include a total row/column, it is often helpful to make one by _____ straight down and straight across
 - Remember the horizontal total and vertical total should be the same.
 - Complete the at the top of the page so that it included marginal frequencies

The following questions are examples of marginal frequencies:

1. What is the marginal frequency of 12th graders? _____
2. What is the marginal frequency of students who prefer art? _____
3. Which subject has the highest marginal frequency? _____
4. Which grade level has the lowest marginal frequency? _____

Conditional Frequency/Probabilities

- Conditional probability is the probability of an event occurring, given that another event has _____.
 - To find conditional probability, you divide the _____ probability where both conditions are met by the _____ probability of the event that has already occurred or must be true.
 - The larger number should always be on the bottom so that your answer is never $>$ than 1.
1. What is the probability that a student in band is in 11th grade? _____
 2. Given that a student is in 9th grade, what is the probability that they're in chorus? _____
 3. What is the conditional frequency that an art club student is in 11th or 12th grade? _____

Conditional Frequencies as Percentages

- Questions about two-way frequency tables will often ask you to express an answer as a _____
- Percentages can be found in the same way as _____
 - Percent = _____ \times 100
- Remember that two-way frequency tables don't always include _____ and it may be necessary to find these when finding percentages

The two way frequency table below shows the gender and preferred subject of 99 high school students. Use this table to answer the questions below. Round each answer to the nearest percent.

	Science	Language Arts	Math
Males	12	22	15
Females	24	11	15

1. What percentage of students who prefer a foreign language are female? _____
2. What percentage of male students prefer language arts? _____
3. What percentage of students who prefer science are male? _____
4. What percentage of female students prefer math? _____

Relative Frequency Tables

- _____ frequency tables display the data from frequency tables, relative to the total
- To find relative frequency, take the number in each box and divide it by the _____

Create a relative frequency to display the data in the table below. Since the total number of people surveyed here is _____,

divide each box by _____.

Gender	Preferred Program			
	Dance	Sports	Movies	Total
Women	16	6	8	30
Men	2	10	8	20
Total	18	16	16	50

Gender	Preferred Program			
	Dance	Sports	Movies	Total
Women				
Men				
Total				

- You can find conditional probabilities from a relative frequency table the same way you found them with your two way frequency table
 - Set up the proportions in the same way with _____ instead of the whole numbers
- If you're asked to find a total number of people when you are given the relative frequency table (with decimals), work backwards by _____ by the _____

The relative frequency table below shows the number of sports male and female students play.

Use this frequency table to answer each question below.

1. Given that a student is a female, what is the probability that she plays 2 sports? _____
2. What percentage of students who played three sports were male? _____
3. What is the probability that a female student plays no sports? _____
4. If 300 students were surveyed, how many males played 1 sport? _____
5. If 200 students were surveyed, how many females played 2 sports? _____

Independent and Dependent Events

- Two events are _____ if the result of the 2nd event _____ affected by the result of the first event.
 - Ex: A box contains 4 red, 3 green, and 2 blue marbles. One marble is removed and then replaced. Another marble is drawn. What is the probability that the first marble is blue and the second marble is green?
 - Because the marble is replaced the _____ does not change. It stays _____ marbles.
- Two events are _____ if the result of the first event _____ the outcome of the second event so that the probability is changed.
 - Ex: A box contains 4 red, 3 green, and 2 blue marbles. One marble is removed, but not replaced. Another marble is drawn. What is the probability that the first marble is blue and the second marble is green?
 - Because the marble is not replaced the _____ does change from _____ to _____ marbles.

Determine whether each set of events below represent independent or dependent events.

1. You flip a coin and then roll a fair six-sided die. The coin lands heads-up and the die shows a one.	Independent or Dependent
2. A box of chocolates contains five milk chocolates, five dark chocolates, and five white chocolates. You randomly select and eat three chocolates. The first piece is milk chocolate, the second is dark chocolate, and the third is white chocolate.	Independent or Dependent
3. A cooler contains ten bottles of sports drink: four lemon-lime flavored, three orange flavored, and three fruit-punch flavored. Three times, you randomly grab a bottle, return the bottle to the cooler, and then mix up the bottles. The first time, you get a lemon-lime drink. The second and third times, you get fruit-punch.	Independent or Dependent
4. A bag contains eight red marbles and four blue marbles. You randomly pick a marble and then pick a second marble without returning the marbles to the bag. The first marble is red and the second marble is blue.	Independent or Dependent
5. A bag contains four red marbles and six blue marbles. You randomly pick a marble and then return it to the bag before picking another marble.	Independent or Dependent
6. You roll a fair six-sided die three times. The die shows an even number every time.	Independent or Dependent
7. There are eight nickels and eight dimes in your pocket. You randomly pick a coin out of your pocket and place it on a counter. Then you randomly pick another coin. Both coins are nickels.	Independent or Dependent
8. You flip a coin twice. The first flip lands heads-up and the second flip lands tails-up	Independent or Dependent

7. The relative frequency table below shows the results of a survey of **150** high school seniors about their college plans.

	2-Year College	4-Year College
Males	0.24	0.26
Females	0.12	0.38

- a. How many males plan to attend a 4-year college? _____
- b. How many more males than females plan to attend a 2-year college? _____
- c. Given that a student is female, what is the probability that she will attend a 4-year college? _____
- d. What percent of 2-year college students are male? _____

Decide whether each series of events described below are independent or dependent.

8. A basket contains five apples and five peaches. You randomly select a piece of fruit and then return it to the basket. Then you randomly select another piece of fruit. The first piece of fruit is an apple and the second piece is a peach.

Independent or Dependent

9. You flip a coin twice. The first flip lands tails-up and the second flip also lands tails-up.

Independent or Dependent

10. Your sock drawer has two white socks, four brown socks, and six black socks. You randomly pick two socks and get matching pair of black socks.

Independent or Dependent

11. You select a card from a standard shuffled deck of 52 cards. You return the card, shuffle, and then select another card. Both times the card is a diamond. (Note that 13 of the 52 cards are diamonds.)

Independent or Dependent

12. You select two cards from a standard shuffled deck of 52 cards. Both selected cards are diamonds. (Note that 13 of the 52 cards are diamonds.)

Independent or Dependent