$\qquad$
$\qquad$

## Notes - Two-way frequency tables

1) The marginal frequencies are the sums of each row and column in a two-way table.
2) The points of intersection between the two categories are called $\qquad$ joint frequencies.
3) The relative frequencies should total $\qquad$ ـ.
4) The joint and marginal relative frequencies are calculated as decimatistead of percentages.

## Try these

1) A public opinion survey explored the relationship between age and support for increasing the minimum wage. The results are found in the following two-way frequency table.

|  | For | Against | No <br> Opinion | TOTAL |
| :---: | :---: | :---: | :---: | :---: |
| Ages 21- <br> 40 | 25 | 20 | 5 | 50 |
| Ages 41- <br> 60 | 30 | 30 | 15 | 75 |
| Over 60 | 50 | 20 | 5 | 75 |
| TOTAL | 105 | 70 | 25 | 200 |

1. Fill in the missing data to the table.
2. Out of the people that have no opinion, what is the frequency of people over 60 years old? What percent is that?

$$
\frac{5}{25}=.2=200 \%
$$

3. What percentage of people is for increasing minimum wage? $\frac{105}{200}=.525=52.5 \%$
4. How many people over 60 are against increasing the minimum wage? 20
5. For ages 21-60, how many were not against increasing the minimum wage? 75 (for in opinion)
6. What is the joint frequency of people for increasing the minimum wage and are in the age group 21-40

$$
\frac{\text { individual }}{\text { total }}=\frac{25}{200}=.13=13 \%
$$

Practice

1. Using the table below, construct a table displaying the joint and marginal probabilities.

|  | Dance | Sports | Movies | TOTAL |
| :---: | :---: | :---: | :---: | :---: |
| Women | 16 | 6 | 8 | 30 |
| Men | 2 | 10 | 8 | 20 |
| TOTAL | 18 | 16 | 16 | 50 |

2. Based on the above tables, which is more likely to occur: a woman who enjoys sports or a Male who enjoys movies?, '
3. Given that a person likes dancing, what is the probability that the person is a male?

$$
\frac{2}{18}=.11=11010
$$

4. If we only look at the men, what is the probability that they enjoy sports?

$$
\frac{10}{20}=.50=50 \%
$$

The following table comes from a survey of 100 hikers on the areas of hiking preferred. Complete the table.

Hiking Area Preference

| Gender | The Coastline | Near Lakes \& Streams | On Mountain Peaks | Total |
| :---: | :---: | :---: | :---: | :---: |
| Female | 18 | 16 | 11 | 45 |
| Male | 16 | 25 | 14 | 55 |
| Total | 34 | 41 | 25 | 100 |

5. What percent of people surveyed prefer to hike on mountain peaks? $\frac{25}{100}=.25=25 \%$
6. What percent of females surveyed prefer to hike the coastline?

$$
\frac{18}{45}=.40=40 \%
$$

7. What is the probability that a male prefers to hike near lakes and streams? $\begin{aligned} \frac{25}{55}=45 \\ =45\end{aligned}$
8. What is the marginal probability of people who prefer to hike the coastline? $\frac{34}{100}=.34=34 \%$
9. What percent of people who prefer to hike the coastline are female?

$$
\frac{18}{34}=.53=53 \%
$$

Abigail surveys students in different grades, and asks each student which pet they prefer. The responses are in the table below.

| Grade | Preferred Pet |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Bird | Cat | Dog | Fish | Totals |  |
| 9 | 3 | 49 | 53 | 22 | 127 |  |
| 10 | 7 | 36 | 64 | 10 | 117 |  |
| Totals | 10 | 85 | 117 | 32 | 244 |  |

11. How many 9 graders prefer cats as a pet? 49
12. How many 10 graders prefer fish as a pet? 10
13. What is the probability that a randomly chosen student prefers cats and is a $10^{\text {th }}$ grader?

$$
\frac{36}{244}=. .148=14.8 \%
$$

14. What is the probability that a randomly chosen student prefers cats and is a $9^{\text {th }}$ grader?

$$
\frac{49}{244}=.20 .=20 \%
$$

15. What is the probability that a randomly chosen student prefers birds and is a $10^{\text {th }}$ grader?

$$
\frac{7}{244}=.029=2.9010
$$

16. What is the probability that any randomly chosen student prefers dogs?

$$
\frac{117}{244}=.48=48 \%
$$

17. What is the probability that any randomly chosen student prefers birds?

$$
\frac{10}{244}=.041=4.10
$$

18. What is the probability that any randomly chosen student is a $9^{\text {th }}$ grader?

$$
\frac{127}{244}=.52=52 \%
$$

## 2 Way Frequency Table Practice

## Table \#1:

Elizabeth surveys 9 th graders, 10 th graders, and 11 th graders in her school. She asks each student how many hot they spend doing homework each night. She records the responses in the table below.

Fill in the totals for each row and column, and find the total number of responses for the table.

| Grade | Hours Spent on Homework |  |  |
| :---: | :---: | :---: | :---: |
|  | $0-2$ | $2-4$ | Totals |
| 9 | 38 | 12 | 50 |
| 10 | 21 | 25 | 46 |
| 11 | 14 | 18 | 32 |
| Totals | 73 | 55 | 128 |

1. How many 9 th graders study $0-2$ hours per night? 38
2. How many 11 th graders study $2-4$ hours per night? 18
3. What is the probability that a randomly chosen student is a 10th grader who spends $2-4$ hours a night on homework? $\frac{25}{128}=.195 \sim 19.50$
4. What is the probability that a randomly chosen 9th grader spends $0-2$ hours a night on homework?

$$
\frac{38}{50}=.76=76 \%
$$

5. What is the probability that any student will spend 2-4 hours a night on homengrk?

$$
=.43=43 \mathrm{~V}
$$

## Table \#2:

Cameron surveys students in his school who play sports, and asks them which sport they prefer. He records the responses in the table below.

| Gender | Preferred Sport |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Baseball | Soccer | Basketball | Totals |  |
| Male | 49 | 52 | 16 | 117 |  |
| Female | 23 | 64 | 33 | 120 |  |
| Totals | 72 | 116 | 49 | 237 |  |

6. How many males prefer baseball? 49
7. How many females prefer basketball?
8. What is the probability that a randomly chosen student is female and prefers soccer $44=.27=27 \%$
9. What is the probability that a randomly chosen student is male and prefers soccer?
10. What is the probability that any randomly chosen student prefers soccer?

$\frac{116}{237}=.489=48.9 \%$

## Table \# 3

The two-way frequency tables below shows the number of students who joined the "I Love Harry "otter" Club in Mrs. Warren's class and Mrs. Ledford's class. Complete the two-way frequency table below.

|  | Joined the Club | Did Not Join the Club | Total |
| :---: | :---: | :---: | :---: |
| Mrs. Warren's class | 28 | 5 | 33 |
| Mrs. Ledford's Class | 33 | 7 | 40 |
| Total | 6 | 12 | 73 |

19. How many total students are there in Mrs. Warren's and Mrs. Ledford's classes combined?

73
20. How many total students joined the "I Love Harry Potter" Club? $\qquad$

## Table \# 4

The two-way frequency table below shows the number of students who play a sport at North Paulding High School in Mrs. Warren's class and Mrs. Jones's class.

|  | Play a Sport | Do Not Play a Sport | Total |
| :---: | :---: | :---: | :---: |
| Mrs. Warren's Class | 14 | 14 | 28 |
| Mrs. Jones's Class | 16 | 12 | 28 |
| Total | 30 | 26 | 56 |

21. How many total students are there in Mrs. Warren's and Mrs. Jones classes combined? $\qquad$ 56
22. What percent of students do not play a sport?

$$
\frac{26}{56}=.464=46.4010
$$

23. Of all students that play a sport, what percent of students are in Mrs. Warren's class?
24. Of all students that play a sport, what percent of students are in Mrs. Jones's class?

25. What teacher had a higher percentage of students that play a sport? By how much?

$$
\text { mrs. Jones about } 6.6 \%
$$

26. Of all students in Mrs. Jones class, what is the relative frequency that they do not play a sport?

$$
28=.428
$$

27. Of all students that do not play a sport, what percent are in Mrs. Jones' class?

## Table \#5

The two-way frequency table below shows the number of students who like the Chicago Blackhawks in Mrs. Warren's class and Ms. Graham's class.

|  | Like the Chicago <br> Blackhawks | Do Not Like the Chicago <br> Blackhawks | Total |
| :---: | :---: | :---: | :---: |
| Mrs. Warren's Class | 23 | 8 | 31 |
| Ms. Graham's Class | 24 | 7 | 31 |
| Total | 47 | 15 | 62 |

28. How many total students are there in Mrs. Warren's and Ms. Graham's classes combined?
29. What percent of students do not like the Chicago Blackhawks?

$$
\frac{15}{62}=.242
$$

$24.2 \%$
30. Of all students in Mrs. Warren's class, what percent like the Blackhawks?


$$
31=.742
$$

32. What teacher had a higher percentage of students that like the Chicago Blackhawks? By how much? Show your work and explain how you know. Ms. Graham, by 3.2\%.

$$
77.4-74.2=3.2 \%
$$

33. What is the relative frequency that students are in Mrs. Warren's class, given that they like the Blackhawks? $48.9 \%$

$$
\frac{23}{47}=.489
$$

34. Of all students, what is the relative frequency that students are in Mrs. Warren's class?
