

Two-Way Frequency Tables

Hw Section P.4

Complete the two-way frequency tables.

1. Students were asked in Middle and High School which they liked more, Math or English. Complete the two-way table from the given information.

	Math	English	Total
Middle	25	18	43
High	19	12	31
Total	44	30	74

2. Complete the two-way tables and determine the requested probability.

In the class of 24 boys and 10 girls a survey was given about whether they liked Justin Bieber or Katie Perry. 20 boys liked Katie Perry and 9 of the girls liked Justin Bieber. Complete the two-way table

	JB	KP	Total
Boys	4	20	24
Girls	9	1	10
Total	13	21	44

3. A class of 35 students were asked if they were members of the chess club or math club. 16 were in the chess club, 10 were in both, 9 students weren't in either club.

	MATH Yes	Math NO	Total
Chess Yes	10	6	16
Chess NO	10	9	19
Total	20	15	35

$$P(\text{math club}) = \frac{20}{35}$$

4. 15 boys and 20 girls were surveyed about music preference between Top 40 and 80's music. 25 students picked Top 40, and 2 girls picked 80's music.

	Boys	Girls	Total
TOP 40	7	18	25
80's	8	2	10
Total	15	20	35

$$P(\text{Boy and Top 40's}) = \frac{7}{35}$$

Create the two-way tables.

5. High School freshman were surveyed about their use of Facebook and Twitter. Of the 80 freshman surveyed, 65 use Twitter, 69 use Facebook, and 62 use both. Create a two-way frequency table and then determine:

$$P(\text{Not Twitter and Not Facebook}) = \frac{5}{80}$$

	USE T	NOT T	Total
USE FB	62	7	69
NO FB	3	8	11
Total	65	15	80

The boys and girls of a class were surveyed about whether the class had been surveyed about who had been to Canada, Europe or both. The two way table shows the results of the survey.

	Europe	Not Europe	Total
Canada	3	22	25
Not Been to Canada	2	7	9
Total	5	29	34

6. What is the probability that a student had been to Canada and Europe? $\frac{3}{34}$

7. What is the probability that a student had been to Europe but not Canada? $\frac{2}{34}$

8. What is the probability that a student had been to Canada? $\frac{25}{34}$

9. Given that they had not travelled to Europe, what is the probability that they had been to Canada? $\frac{22}{29}$

The boys and girls of a class had been surveyed about whether they had received a speeding ticket or not. The two way table shows the results of the survey.

	Speeding Ticket	No Speeding Ticket	Total
Boy	9	31	40
Girl	1	25	26
Total	10	56	66

10. What is the probability of getting a speeding ticket? $\frac{10}{66}$

11. What is the probability of being a girl with a speeding ticket? $\frac{1}{66}$

12. What is the probability that being a boy with no speeding ticket? $\frac{31}{66}$

13. Who is more likely to getting a speeding ticket, boys or girls? Boys or Girls Explain your choice.

A boy has a $\frac{9}{40} = .225$ chance.
A girl has a $\frac{1}{26} = .038$ chance.

14. Are boys and speeding tickets independent or not? Yes or No

Use mathematics to explain your choice.

$P(B \cap S) \neq P(B) \cdot P(S)$
 $\frac{9}{66} \neq \frac{40}{66} \cdot \frac{10}{66}$
 $0.14 \neq 0.092$

Dependent because $P(B \cap S) \neq P(B) \cdot P(S)$

15. The town of Centerville is divided by a railroad track that splits the population of the town into two groups, the North side and South side of town. Centerville is having an election for the mayor; Tim Jenson is running against Joe Smith. If the side of town that you live on is independent of the candidate that you will choose, how many people do we expect on the North Side to vote for Joe Smith?

	Jenson	Smith	Total
North	half 30	half 30	60
South	half 20	half 20	40
Total	50	50	100

We expect 30 Northerners to vote for Smith.

The following relative frequency table was created from the data gathered from a survey about favorite colors.

	Red	Green	Blue	Yellow	Total
Male	.24	.14	.18	0	.56
Female	.16	.16	.06	.06	.44
Total	.40	.30	.24	.06	1

16. What is the P(Red)? 0.40

17. What is the P(Female)? 0.44

18. What is the P(Green|Male)? $\frac{.14}{.56} = 0.25$

19. What is the P(Female and Blue)? 0.06

20. What is the P(Red or Green)?

$P(R) + P(G) - P(R \cap G) = 0.70$

21. What is the P(Male and Not Green)?

$0.24 + 0.18 = 0.42$

22. What is the P(Blue or Female)?

$P(B) + P(F) - P(B \cap F)$
 $= 0.24 + 0.44 - 0.06$
 $= 0.62$

High Schools were surveyed about whether they owned a PS4 or an XBOX ONE. Of the 100 surveyed 70 owned XBOX ONE, 23 didn't own a PS4, and 9 didn't own either system.

	XBOX	NO XBOX	Total
PS4	56	21	77
NO PS4	14	9	23
Total	70	30	100

23. What is the P(No XBOX ONE)? $\frac{30}{100}$
24. What is the P(PS4 | XBOX ONE)? $\frac{56}{70}$
25. What is the P(PS4 and XBOX ONE)? $\frac{56}{100}$
26. What is the P(PS4 or XBOX ONE)? $\frac{22}{100} + \frac{77}{100} - \frac{56}{100} = \frac{91}{100}$
27. What is the P(Neither System)? $\frac{9}{100}$

28. Are owning a PS4 and owning a XBOX ONE independent of each other? Yes or No Use mathematics to explain your choice.

$P(PS4 \cap X) \neq P(PS4) \cdot P(X)$

$\frac{56}{100} \neq \left(\frac{77}{100}\right)\left(\frac{70}{100}\right)$ Dependent because

$\neq \frac{5390}{10000}$

$0.56 \neq 0.539$

$P(PS4 \cap X) \neq P(PS4) \cdot P(X)$

29. Why do you think that they two are not independent of each other? Why would one possibility influence the other?

Owning a system likely means you like video games so you may purchase another one.

30. A total of 50 students play either soccer or lacrosse.

20 girls play lacrosse.

20 boys play either soccer or lacrosse

20 students play soccer.

	Boy	Girl	Total
Lacrosse	10	20	30
Soccer	10	10	20
Total	20	30	50

What is the probability that a student plays soccer or is a girl?

$P(S \cup G) = P(S) + P(G) - P(S \cap G)$

$= \frac{20}{50} + \frac{30}{50} - \frac{10}{50}$

$= \frac{40}{50}$

31. The two-way table shows the number of births, in thousands, in the United States for the years 2010 and 2011.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
2010	324	303	340	327	325	338	346	359	350	342	337	326	4017
2011	322	299	330	315	328	335	348	362	346	331	328	322	3966

A baby born in 2011 is randomly selected.

What is the probability that the baby was born in February?

$\frac{299}{3966}$

32. Rosa collects data on what students at her school like to eat at the movie theater. She asks a random sample of 120 students two questions:

Do you like to eat popcorn at the movie theater?

Do you like to eat candy at the movie theater?

Her data are partially shown in the table. Of the students she asks, 60% of those who like to eat popcorn also like to eat candy.

$$\text{Candy} = 60\% (70) = 42$$

Complete the table to show the number of students in each category.

	Like popcorn	Don't Like popcorn	Total
Like Candy	42	16	58
Don't Like Candy	28	34	62
Total	70	50	120

Once the table above is complete, answer each questions.

33. What is the probability that a student likes candy?

$$58/120$$

34. What is the probability that a "don't like popcorn" was selected?

$$50/120$$

35. What is the probability that you select a person who likes candy that also likes popcorn?

$$42/120$$

36. Given that the person doesn't like candy, what is the probability they don't like popcorn?

$$\frac{34}{62}$$