**Can You Taco Tongue and Evil Eyebrow? Day 2**

Are the events “Yes Taco Tongue” and “Yes Evil Eyebrow” independent?

1. Find class data from the previous lesson and fill in the following two-way table.

|  |  |  |  |
| --- | --- | --- | --- |
|  | YesEvil Eyebrow | No Evil Eyebrow | Total |
| Yes Taco Tongue |  |  |  |
| No Taco Tongue |  |  |  |
| Total |  |  |  |

Suppose we randomly choose a student from class.

1. Find P(Yes Taco Tongue OR Yes Evil Eyebrow)

1. Given that the person selected is a Yes Evil Eyebrow, what is the probability that they are a Yes Taco Tongue? Write as a fraction, a decimal, and a percent.
2. Given that the person selected is a No Evil Eyebrow, what is the probability that they are a Yes Taco Tongue? Write as a fraction, a decimal, and a percent.

Definition: Two events are **independent** if knowing whether or not one event has occurred does not change the probability that the other event will occur.

1. Are the events “Yes Taco Tongue” and “Yes Evil Eyebrow” independent? Explain.

Consider the data for all Seniors at EKHS.

|  |  |  |  |
| --- | --- | --- | --- |
|  | YesEvil Eyebrow | No Evil Eyebrow | Total |
| Yes Taco Tongue | 180 | 300 | 480 |
| No Taco Tongue | 20 | 100 | 120 |
| Total | 200 | 400 | 600 |

1. Find each of the following using the data in the table. Write as a fraction, a decimal, and a percent.
2. P(Yes Taco Tongue) =
3. P(Yes Taco Tongue | Yes Evil Eyebrow) =

1. P(Yes Taco Tongue | No Evil Eyebrow) =
2. Are “Yes Taco Tongue” and “Yes Evil Eyebrow” independent?
3. Fill in the table as if the events were INDEPENDENT.

|  |  |  |  |
| --- | --- | --- | --- |
|  | YesEvil Eyebrow | No Evil Eyebrow | Total |
| Yes Taco Tongue |  |  | 480 |
| No Taco Tongue |  |  | 120 |
| Total | 200 | 400 | 600 |

1. Find each of the following using the INDEPENDENT table. Write as a fraction, a decimal, and a percent.
2. P(Yes Taco Tongue) =
3. P(Yes Taco Tongue | Yes Evil Eyebrow) =

c. P(Yes Taco Tongue | No Evil Eyebrow) =

1. What do you notice about your answers in #6 and #8?
2. Generalize: Complete the following statement using a formula.

Let A 🡪 Yes Taco Tongue and B 🡪 Yes Evil Eyebrow

If events A and B are INDEPENDENT then…

Conditional Probability and Independence

Important Ideas:

Check Your Understanding:

The Pew Research center randomly selected 100 mothers age 40 to 44 in 1976, 1994, and 2014 and asked each mother how many children they have. The two-way table summarizes the responses.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Year** |  |
|  |  | 1976 | 1994 | 2014 | Total |
| **Number of children** | 1 child | 11 | 21 | 22 | 54 |
| 2 children | 24 | 43 | 41 | 108 |
| 3 children | 25 | 23 | 24 | 72 |
| 4+ children | 40 | 13 | 13 | 66 |
|  | Total | 100 | 100 | 100 | 300 |

Suppose we randomly select one of the survey respondents. Define events C: have 4 or more children, S: 1976, N: 1994, and F: 2014.

1. Find *P*(C | S). Interpret this value in context.
2. Given that the chosen mother was not surveyed in 1976, what’s the probability that she has 4 or more children? Write your answer as a probability statement using correct symbols for the events.
3. Are the events “Surveyed in 1976” and “4 or more children” independent? Explain.