| | | |
|---|---|---|
| hazel | male | |
| green | male | |
| brown | male | |
| blue | male | |
| hazel | male | |
| green | male | |
| brown | male | |
| blue | male | |
| hazel | male | |
| green | male | |

| | |
|---|---|
| green | female |
| brown | female |
| blue | female |
| hazel | female |
| green | female |
| brown | female |
| blue | female |
| hazel | female |
| green | female |

Date: _____

is **wn eyed female?**

To answer today's question we will randomly select 1̶0̶ 20 students to come up front. Use those students' information to answer the following questions.

1. In any given class, there are males and females who have blue, brown or green eyes. Create a table that shows all possible combinations of these gender and eye colors.

*Br Bl G*
*Male*
*Female*

|  | Br | Bl | G | |
|---|---|---|---|---|
| Male | 4 | 3 | 3 | 10 |
| Fem | 4 | 3 | 3 | 10 |
| 20 | 8 | 6 | 6 | |

2. Using the 1̶0̶ 20 students chosen, find each of the following probabilities:

P(Male) = $10/20 = 0.5$   P(Blue Eyes) = $6/20 = 0.3$

P(Female) = $10/20 = 0.5$   P(Brown Eyes) = $8/20 = 0.4$

P(Green Eyes) = $6/20 = 0.3$

*Mutually Exclusive*

3. Find each of the following probabilities and explain why your answer makes sense.

P(Male or Female) = $10+10$   P(Blue or Brown Eyes) = *No overlap*

$20/20 = 1$   $6+8 = 14/20 = 0.7$

4. Find each of the following probabilities and explain why your answer makes sense. $P(A \text{ or } B) = P(A) + P(B) - P(A \cap B)$

P(Male or Blue Eyes) =   P(Female or Brown Eyes) =

$\frac{10}{20} + \frac{6}{20} - \frac{3}{20} = \frac{13}{20}$   $\frac{10}{20} + \frac{8}{20} - \frac{4}{20} = \frac{14}{20} = \boxed{0.7}$

$\boxed{0.65}$

5. Find each of the following probabilities and explain why your answer makes sense.

P(Not Green Eyes) =   0.7   P(Not Male) =   $\frac{10}{20} = 0.5$

$P(G^c) = 1 - \frac{6}{20} = \frac{14}{20}$   $P(M^c) = 1 - \frac{10}{20}$

*Complement Rule*

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# Lesson 5.2: Day 2: Probability and the General Addition Rule

Big Ideas:

**Two Way Tables and Venn Diagrams** [handwritten]

|     | B | B$^c$ |
|-----|---|-------|
| A   | 1 | 2     |
| A$^c$ | 3 | 4   |

[Venn diagram with A and B: 2, 0, 3, and 4 outside]

**ADD. Rule** [handwritten]
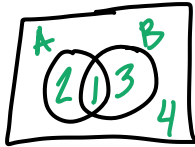
$P(A \text{ or } B) = P(A) + P(B) - P(A \cap B)$

Cannot occur together ↑ **Mutually Exclusive** — overlap

$P(A \text{ or } B) = P(A) + P(B)$

## Check Your Understanding: $P(A \text{ and } B) = 0$ [handwritten]

What is the relationship between educational achievement and home ownership? A random sample of 500 U.S. adults was selected. Each member of the sample was identified as a high school graduate (or not) and as a homeowner (or not). The two-way table displays the data. Suppose we choose a member of the sample at random. Define events

G: person is a high school graduate

H: person is a homeowner.

|                  | High school graduate | Not a high school graduate |       |
|------------------|----------------------|----------------------------|-------|
| Homeowner        | 221                  | 119                        | 340   |
| Not a homeowner  | 89                   | 71                         | 160   |
|                  | 310                  | 190                        | 500   |

1. Explain in plain language what $P(G^c)$ means and find the probability.
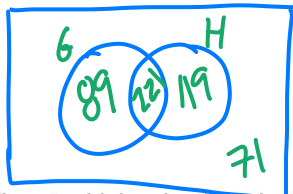
The prob. that a person did not graduate high school.

$P(G^c) = 190/500 = 0.38$

2. Explain why $P(G \text{ or } H) \neq P(G) + P(H)$. Then find $P(G \text{ or } H)$.

There r people who graduated and own a home who r counted twice.

$P(G \text{ or } H) = 310 + 340 - 221 = \dfrac{429}{500} = 0.858$

3. Make a Venn diagram to the right to display the sample space of this chance process.

[Venn diagram G and H: G region 89, overlap 221, H region 119; 6 label near G, 71 outside]

4. Write the event "is not a high school graduate but is a homeowner" in symbolic form and find the probability.

$P(H \cap G^c) = 119/500 =$

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