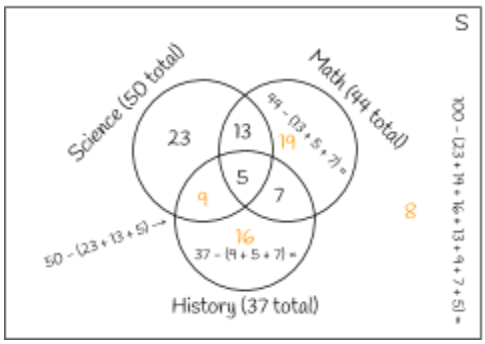
# -- Probability --

## Sets + Venn Diagrams

| Problem | Picture | Questions |
|---|---|---|
| A school surveyed 100 students to find out what their favorite class was. 50 students liked Science, 44 kids liked Math, and 37 kids liked History. 7 kids liked Math and History, 13 kids like Math and Sciences, and 23 kids exclusively liked science. 5 kids claimed that they liked all 3.<br><br>Black = Given  Orange = Solved → |  | A ∩ B = A and B<br>A ∪ B = A or B<br>~ A = complement of A, aka what's not A<br><br>Math ∩ Science = 13 students<br>Math ∪ Science = 50 + 44 − 13 − 5 = 76<br><br>~ Math ∩ Science = 23 + 9 = 32<br>~ Math ∪ Science = 23 + 9 + 13 + 5 = 50<br><br>~ (Math ∩ Science) = 100 − 13 = 87<br>~ (Math ∪ Science) = 100 − 76 = 24 |

## Vocab

| Independent Events | vs. | Dependent Events |
|---|---|---|
| when the two actions you are doing don't affect each other<br>ex. drawing with replacing, flipping a coin and rolling a die | | when the two actions you are doing affect each other<br>ex. drawing/picking more than one item w/o replacing |

| Empirical Probability | Theoretical Probability |
|---|---|
| the probability you really get when conducting the study<br>ex. if i get 7 heads after flipping a coin 10 times, $\frac{7}{10}$ | the probability you would expect to occur of the thing<br>ex. chance of getting heads when flipping a coin is $\frac{1}{2}$ |

## Probability + Two-Way Frequency Tables

| Problem | Table | Questions |
|---|---|---|
| A school surveyed 100 students to find out whether or not they like Math or Science. The table is shown in the right, the black numbers are given by the question and you should be able to solve for the orange numbers by + and − | | $P(A) = \frac{\#\ of\ times\ event\ happened}{total\ \#\ of\ times}$<br>$P(A \cap B) = P(A) \cdot P(B)$<br>$P(A \cup B) = P(A) + P(B) - P(A \cap B)$<br>$P(A \mid B) = \frac{P(A \cap B)}{P(B)}$<br><br>P(Liking Math) = $\frac{38}{100}$ = .38<br>$P(Math \cap 11^{th}) = \frac{6}{100}$ = .06<br>$P(Math \cup 11^{th}) = \frac{38}{100} + \frac{20}{100} - \frac{6}{100}$ = .53<br>$P(Math \mid 11^{th}) = \frac{6/100}{20/100}$ = .3 |

| | 9th | 10th | 11th | 12th | Total |
|---|---|---|---|---|---|
| Math | 9 | 11 | 6 | 12 | 38 |
| Science | 16 | 17 | 14 | 15 | 62 |
| Total | 25 | 28 | 20 | 27 | 100 |