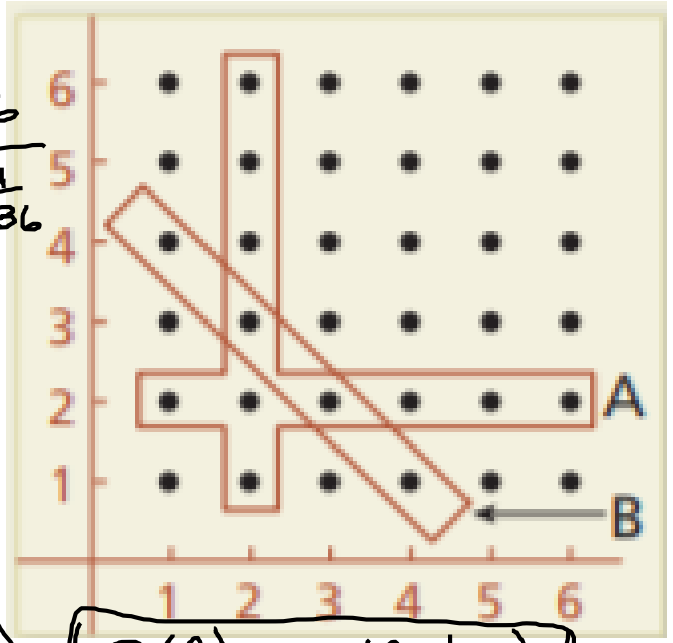
Wednesday, April 24, 2019

- Warm-up
  - Two six-sided dice are rolled once. Events A and B are represented by the diagram.
    - **Describe each event.**
    - **Are the two events independent? How do you know?**
    - **Are the two events mutually exclusive? How do you know?**
- Review Yesterday
- Calculating probabilities with Independence or Mutually Exclusive
- Sorting events
- Writing Problems

$P(A \mid B) = \frac{P(A \text{ AND } B)}{P(B)} = \frac{\frac{2}{36}}{\frac{4}{36}}$

A -> at least one die = 2

B -> Sum of 5



no -> (3,2) & (2,3) fit both criteria *

$P(A) = P(A \mid B)$

$\frac{11}{36} \stackrel{?}{=} \frac{1}{2}$

$\frac{2}{36} \div \frac{4}{36} = \frac{2}{36} \cdot \frac{36}{4} = \frac{2}{4} = \frac{1}{2}$

Objectives

Content: I will apply the concepts of **independence** and/or **mutually exclusive** to calculating probability.

Social: I will participate with my group in solving problems.

Language: I will use the terms **independence** and **mutually exclusive** correctly in small group discussion.

A survey of 505 teens by the American Academy of Dermatology included 254 boys and 251 girls. Thirty-three percent of the boys said they wear sunscreen, and 53% of the girls said they wear sunscreen.

254 * 0.33

a. Fill in a copy of the following table, showing the number of teenagers who fell into each category.

	Boy	Girl	Total
Wear Sunscreen	84	133	217
Don't Wear Sunscreen	170	118	288
Total	254	251	505

Source: www.aad.org/public/News/NewsReleases/Press+Release+Archives/Skin+Cancer+and+Sun+Safety/Teen+Survey+Results.htm

1. P(sunscreen) = $\frac{217}{505}$
2. P(boy) = $\frac{254}{505}$
3. P(sunscreen AND boy) = $\frac{84}{505}$
4. P(sunscreen OR boy) = $\frac{387}{505}$
5. P(sunscreen | boy) = $\frac{84}{254}$
6. Are wearing sunscreen & being a boy mutually exclusive? no -> there are overlap
7. Are wearing sunscreen & being a boy independent? no

$\frac{254}{505} \neq \frac{84}{254}$

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Review

		Dominant Hand		
		Left	Right	Total
Gender	Female	11	104	115
	Male	24	92	116
	Total	35	196	231

- According to this data, are the events left handed and female mutually exclusive? Prove it…

No - there are 11 people that are both

$P(A) \stackrel{?}{=} P(A|B)$

- According to this data, are the events left handed and female independent? Prove it…

$P(LH) \stackrel{?}{=} P(LH|F)$

Not Independent

$P(F) \stackrel{?}{=} P(F|LH)$

$\frac{35}{231} \stackrel{?}{=} \frac{11}{115}$

$0.15 \stackrel{?}{=} 0.09$

not equal

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More with Mutually Exclusive & Independent

Dice P(5, 5) $\frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$ AND = overlap → independent

Cards with replacement:

One draw

- P(Queen OR King) = $\frac{8}{52} = \frac{2}{13}$
- P(Queen AND King) = 0 → Mutually Exclusive

Draw twice

- P(Queen, King) = $\frac{1}{13} \cdot \frac{1}{13} = \frac{1}{169}$

$P(K) = P(K \mid Q)$ Independent

Cards without replacement:

- P(Queen OR King) = $\frac{2}{13}$
- P(Queen AND King) = 0
- P(Queen, King) = $\frac{1}{13} \cdot \frac{4}{51}$

$P(K) \neq P(K \mid Q)$ not independent

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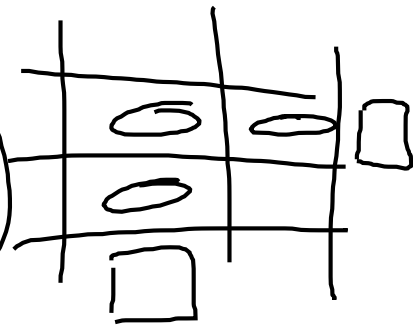
More with Mutually Exclusive & Independent

A couple more formulas…

$$P(A \text{ OR } B) = P(A) + P(B) - P(A \text{ AND } B)$$



$P(A \text{ AND } B) = 0$ Mutually Exclusive

$$P(A \mid B) = \frac{P(A \text{ AND } B)}{P(B)}$$

$P(A \mid B) = P(A)$ independent

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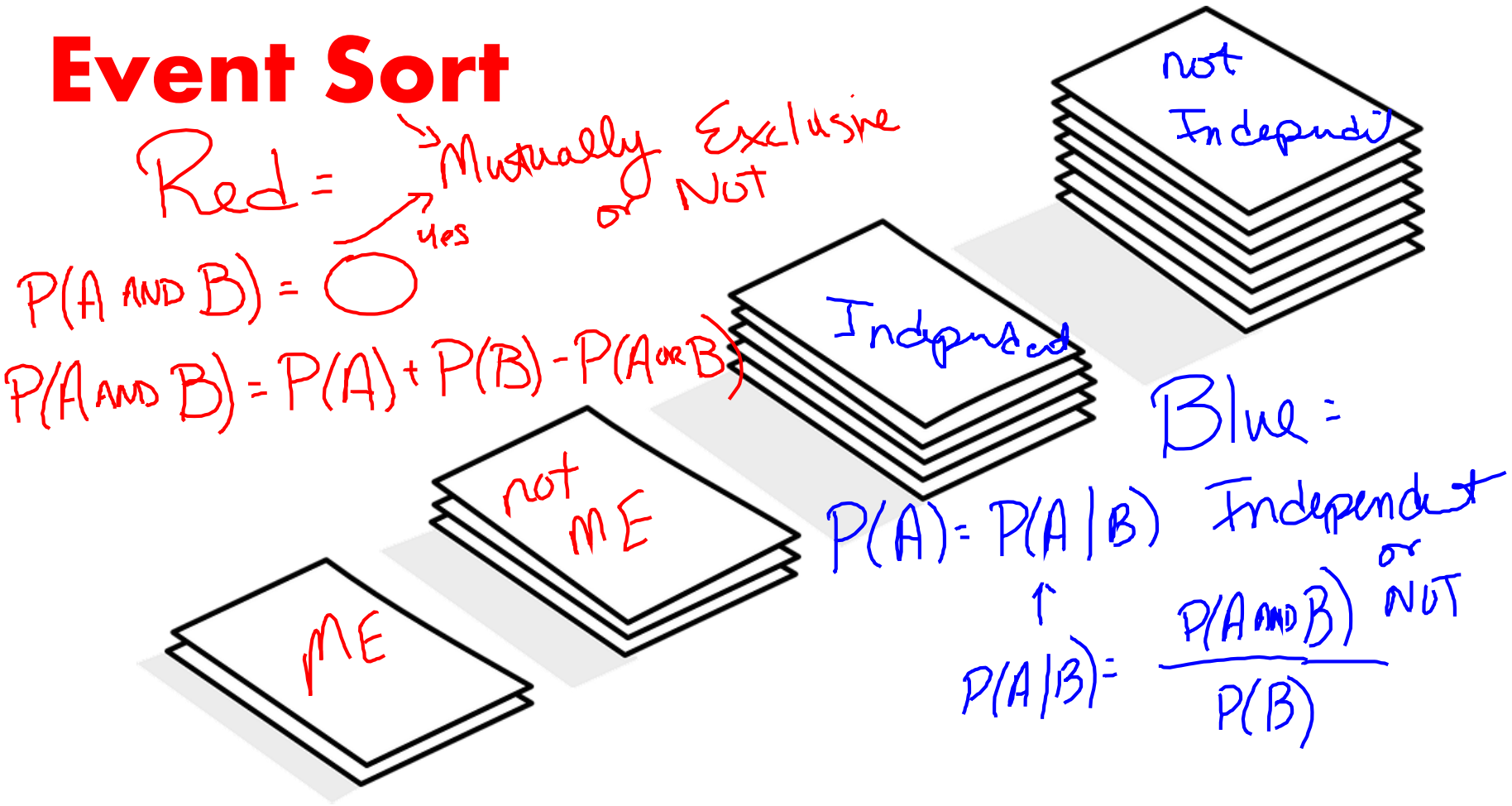
Event Sort



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Numbers and/or Context

Write your own

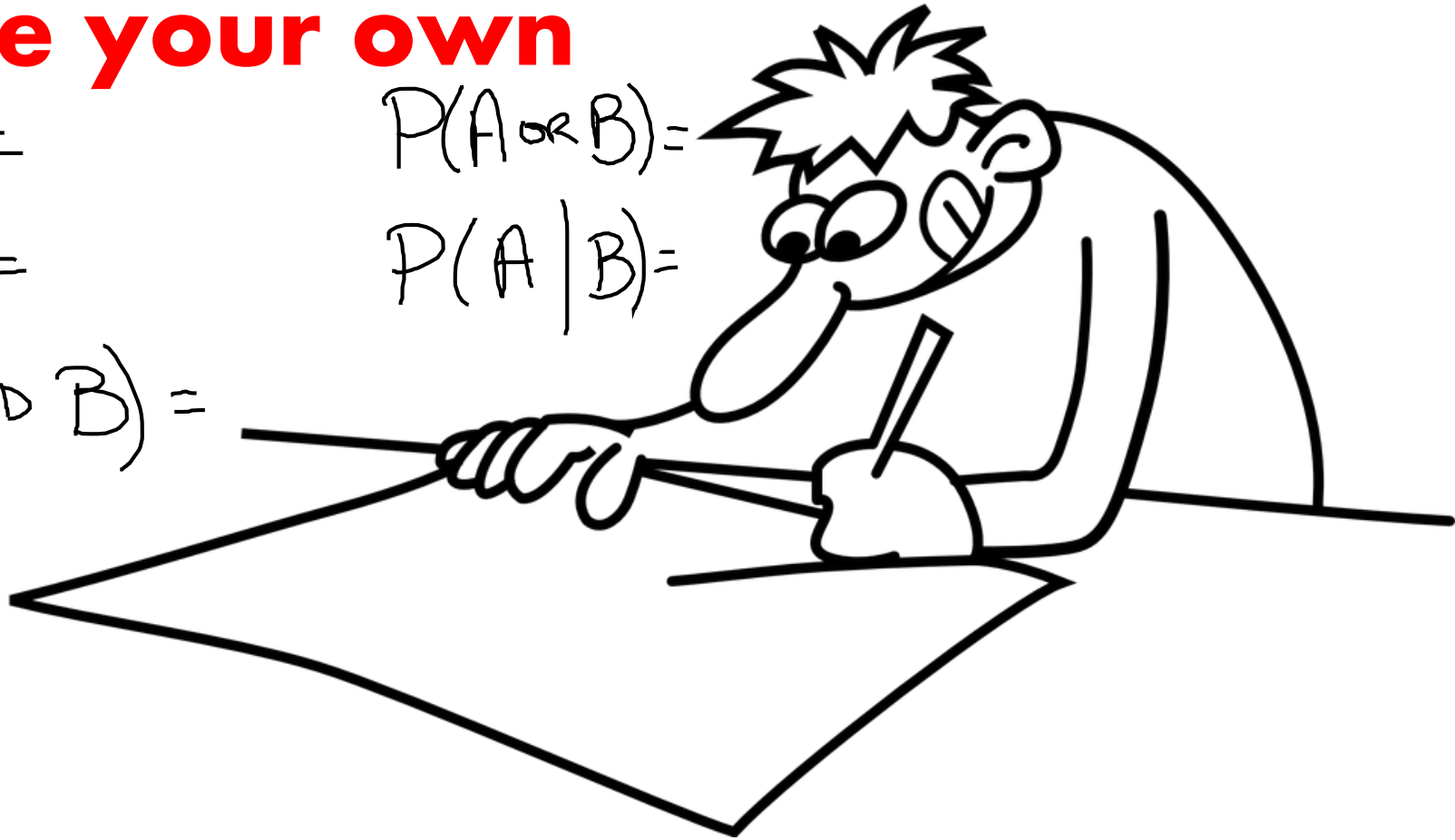
$P(A) =$

$P(B) =$

$P(A \text{ AND } B) =$

$P(A \text{ OR } B) =$

$P(A \mid B) =$



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