**ACTIVITY: Is yawning contagious?**

**MATERIALS: Deck of cards for each team of three to four students**

In **Chapter 4**, we examined data from an experiment involving 50 subjects on the TV show *MythBusters* that investigated this question. Here’s a brief recap. Each subject was placed in a booth for an extended period of time and monitored by hidden camera. Thirty-four subjects were given a “yawn seed” by one of the experimenters; that is, the experimenter yawned in the subject’s presence before leaving the room. The remaining 16 subjects were given no yawn seed. What happened? The table below shows the results:**3**



Adam Savage and Jamie Hyneman, the cohosts of *MythBusters,* used these data to conclude that yawning is contagious. In this Activity, your class will investigate whether the results of the experiment were really statistically significant. Let’s see what would happen just by chance if we randomly reassign the 50 people in this experiment to the two groups (yawn seed and no yawn seed) many times, *assuming the treatment received doesn’t affect whether or not a person yawns.*

1. We need 50 cards from the deck to represent the original subjects. In the *MythBusters* experiment, 14 people yawned and 36 didn’t. Because we’re assuming that the treatment received won’t change whether each subject yawns, we use 14 cards to represent people who yawn and 36 cards to represent those who don’t. Remove the ace of spades and ace of clubs from the deck.

Yawn: All the jacks, queens, kings, and aces (16 − 2 removed aces = 14)

Don’t yawn: All cards with denominations 2 through 10 (9 denominations × 4 suits = 36)

1. Shuffle and deal two piles of cards—one with 16 cards and one with 34 cards. The first pile represents the no yawn seed group and the second pile represents the yawn seed group. The shuffling reflects our assumption that the outcome for each subject is not affected by the treatment. Record the number of people who yawned in each group.
2. Calculate the difference in the proportions who yawned for the two groups(yawn seed – no yawn seed). For example, if you get 9 yawners in the yawn seed group and 5 yawners in the no yawn seed group, the resulting difference in proportions is (9/34) –(5/16) = –0.048 A negative difference would mean that a smaller proportion of people in the yawn seed group yawned during the experiment than in the no yawn seed group.
3. Repeat Steps 2 and 3 four more times so that you have a total of 5 trials. Record your results in this table:

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| --- | --- | --- | --- |
| **Trial** | **Number who yawned in yawn seed group** | **Number who yawned in no yawn seed group** | **Difference in proportions** **(yawn seed – no yawn seed)** |
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1. Make a class dotplot of the difference in proportions. In what percent of the class’s trials did the difference in proportions equal or exceed (10/34) – (4/16) = 0.0441 (what the MythBusters got in their experiment)?
2. Based on the class’s simulation results, how surprising would it be to get a result this large or larger simply due to the chance involved in the random assignment? Is the result statistically significant?
3. What conclusion would you draw about whether yawning is contagious? Explain.
4. Based on your conclusion in Step 7, could you have made a Type I error or a Type II error? Discuss this as a class.