

Unit 8 Lesson 10: Using Probability to Determine Whether Events Are Independent

1 Which One Doesn't Belong: Events (Warm up)

Student Task Statement

A coin is flipped and a standard number cube is rolled. Which one doesn't belong?

Set 1

Event A1: the coin landing heads up

Event B1: rolling a 3 or 5

Set 3

Event A3: rolling a prime number

Event B3: rolling an even number

Set 2

Event A2: rolling a 3 or 5

Event B2: rolling an odd number

Set 4

Event A4: the coin landing heads up

Event B4: the coin landing tails up

2 Overtime Wins

Student Task Statement

Does a hockey team perform differently in games that go into overtime (or shootout) compared to games that don't? The table shows data about the team over 5 years.

year	games played	total wins	overtime or shootout games played	wins in overtime or shootout games
2018	82	46	19	6
2017	82	46	18	7
2016	82	51	23	16
2015	82	54	18	10
2014	82	34	17	5
total	410	231	95	44

Let A represent the event "the hockey team wins a game" and B represent "the game goes to overtime or shootout."

- Use the data to estimate the probabilities. Explain or show your reasoning.
 - $P(A)$
 - $P(B)$
 - $P(A \text{ and } B)$
 - $P(A | B)$
- We have seen two ways to check for independence using probability. Use your estimates to check whether each might be true.
 - $P(A | B) = P(A)$
 - $P(A \text{ and } B) = P(A) \cdot P(B)$
- Based on these results, do you think the events are independent?

3 Genetic Testing

Student Task Statement

A suspected cause of a disease is a variation in a certain gene. A study gathers at-risk people at random and tests them for the disease as well as for the genetic variation.

	has the disease	does not have the disease
has the genetic variation	80	12
does not have the genetic variation	1,055	1,160

A person from the study is selected at random. Let A represent the event "has the disease" and B represent "has the genetic variation."

- Use the table to find the probabilities. Show your reasoning.
 - $P(A)$
 - $P(B)$
 - $P(A \text{ and } B)$
 - $P(A | B)$
- Based on these probabilities, are the events independent? Explain your reasoning.
- A company that tests for this genetic variation has determined that someone has the variation and wants to inform the person that they may be at risk of developing this disease when they get older. Based on this study, what percentage chance of getting the disease should the company report as an estimate to the person? Explain your reasoning.