Applied Statistics

Domain	Probability and Informed Decisions	
Cluster	Use probability to evaluate outcomes and make decisions.	
Standard(s)	M.ASHS.25	Use probability rules to make fair decisions. Instructional Note: Extend and apply probability rules introduced in prior courses to more complex probability models that involve decisions. Include examples that yield both false positive and false negative results.

Content Examples

Law of Large Numbers and Probability
https://www.youtube.com/watch?v=yZbBbMWUQUM

Relevant Content

» Complement of an event: $P(A^c) = 1 - P(A)$

» Mutually exclusive: P(A or B) = P(A) + P(B) – P(A and B)

» P(A ∪ B) = P(A) + P(B) – P(A ∩ B)

» Conditional Probability: P(A and B) = P(A)*P(B|A) or

» Multiplication Rule for Independent Events: P(A∩B) = P(A) · P(B)

» General Multiplication Rule: P(∩ B) = P(A) · P(B|A)

» Factorial: $n! = n(n - 1)(n - 2) \cdots 3 \cdot 2 \cdot 1$

» Permutations Formula: $_nP_r = \frac{n!}{(n-r)!}$

» Combinations Formula: $_nC_r = \frac{n!}{r!(n-r)!}$

Vocabulary

probability of an event, Law of Large Numbers, sample space, complement of an event, mutually exclusive, conditional probability, independence, tree diagram, factorial, permutations, combinations

Introduction to Probability: How-to Articles and Videos
https://www.statisticshowto.datasciencecentral.com/probability-and-statistics/probability-main-index/

Basic Probability Khan Academy Videos, Articles, Exercises:
https://www.khanacademy.org/math/statistics-probability/probability-library

Stats Medic Chapter 4: Probability (this standard directly relates to 4.1, 4.2, 4.6-4.8):
https://www.statsmedic.com/introstats-chapter-4

Probability Big Ideas Review/FRAME (Graphic organizer): *https://www.statsmedic.com/intro-day58*

Assessment Links or Tasks

Roll Until Doubles *http://noblestatman.com/uploads/6/6/7/3/66731677/roll_till_doubles__2015_.pdf*

Roll until "Doubles"

Name: _____

A game of chance is played in which two dice are rolled until "doubles" are rolled. A trial consists of a sequence of rolls terminating with a roll of "doubles". This can be simulated on the TI 83 or TI 84 calculator using the randInt(1,6,2) command. This will select two numbers at random from 1 to 6 inclusively.

We want to construct a histogram of the number of rolls until "doubles" are rolled. Use the calculator to simulate 20 plays of the game.

Trial	Rolls		Trial	Rolls
1			16	
2			17	
3			18	
4			19	
5			20	
6			21	
7			22	
8			23	
9			24	
10			25	
11			26	
12			27	
13			28	
14			29	
15			30	

Construct the histogram on the grid below.

1   5   10   15   20   25   30
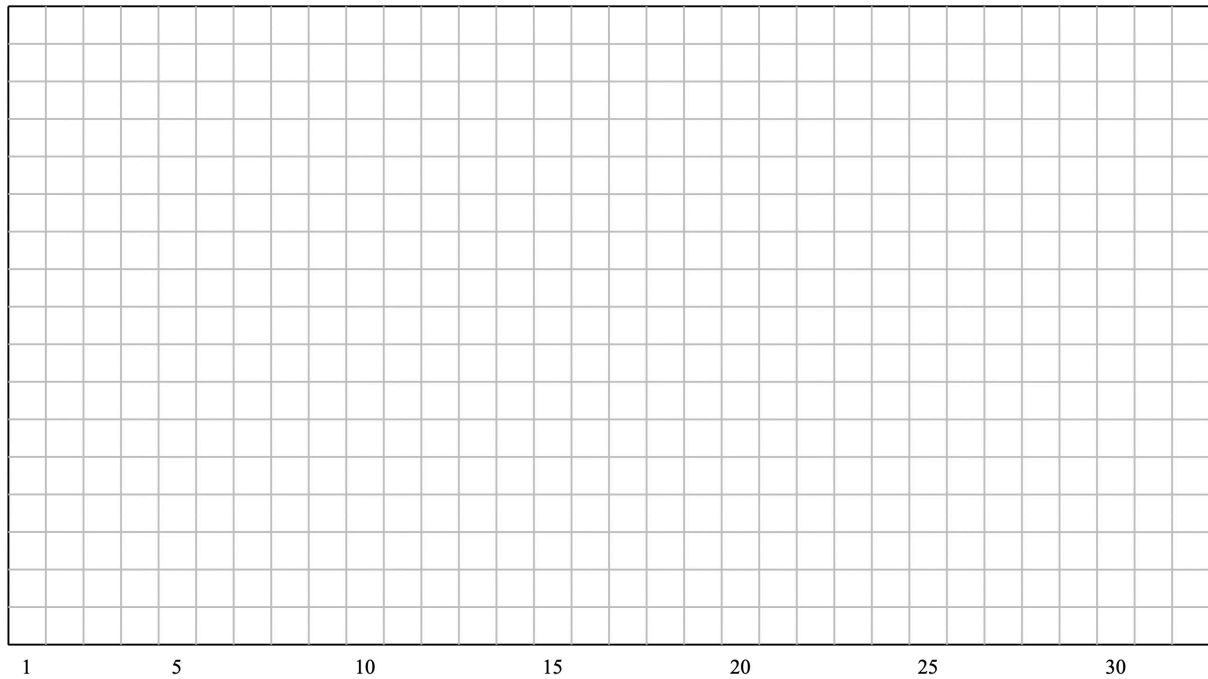
Describe the shape, center and spread for this distribution.

Locate the mean and the median for this distribution. Which is larger? Why?

Let's play a game…

If you can roll the dice 6 times *without* rolling "doubles", I will give you $1. However, if "doubles" are rolled on the first through sixth roll, you pay me $1…. Who wants to play?