

Example Context Elaboration: Binomial Dice

Focus: Applying distributions

Achievement objective S8-4

In a range of meaningful contexts, students will be engaged in thinking mathematically and statistically. They will solve problems and model situations that require them to:

Investigate situations that involve elements of chance:

A calculating probabilities of independent, combined, and conditional events

B calculating and interpreting expected values and standard deviations of discrete random variables

C applying distributions such as the Poisson, binomial, and normal

Dice Game

Alice and Zoe play a game (which may be a simulation) tossing three dice, and counting how many sixes appear. A player wins 10 points for tossing three sixes, 5 points for tossing 2 sixes and 2 points for tossing one six. The first player to twenty points wins. They record their results carefully in a table.

	3 sixes	2 sixes	1 six	zero sixes
tally				
frequency				

Alice and Zoe are aware that the number of sixes on their throw is a random variable, X , which can take a range of values and depends on chance.

They discuss the conditions for their game with their teacher, who identifies the conditions for the Binomial distribution in the context of this game. Alice and Zoe then compare their empirical (experimental) results with the theoretical results from tables, graphs, calculator or computer.

The general formula for $P(X = x)$ can be confirmed using a probability tree.