THE MATHEMATICAL
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MATHS TREATS
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GAMES OF CHANCE AND SKILL

Games based around unbiased dice or playing cards are heavily influenced by chance because of the random outcome of rolling dice or selecting a card. Whilst players can't control the hand they get dealt, they can use knowledge of probability to introduce an element of skill into the game.

DICE GAMES

With unbiased die there is an equal chance of any particular side falling face up so the outcome of each throw is independent of past throws. A well-known dice game is Yahtzee, where the player cannot influence what numbers the five dice land on, but can decide how to record them on their playing sheet to maximise their score. Similarly, understanding probability can help players decide which pieces to move in backgammon. Combining a knowledge of chance and financial return on investment gives players an advantage in board games such as Monopoly.

ACTIVITY

Look at some dice and board games – or their digital equivalent – and think about how chance and skill impact the game. What is the probability of various dice roll outcomes for multiple dice? How could you use this to increase your chance of winning the game?

CARD AND NUMBERED BALL GAMES

When an item is selected from a finite pool of objects which have defined characteristics and the item is not replaced, then the outcome of a subsequent selection will be influenced by the prior outcome. These are known as dependent events. A game like bingo is based purely on chance. However, an advantage can be gained in some card games by keeping track of cards already drawn, and developing a strategy which links the parameters of the game with the likelihood of certain cards being drawn next.

ACTIVITY

Consider a standard pack of 52 cards with four suits (typically hearts, diamonds, spades and clubs), numbered cards from 1 (Ace) to 10, and face cards (Jack, Queen, King). What is the probability of drawing a heart? A face card? The queen of hearts? How would these change if the 2 of hearts had already been removed? How can a knowledge of probability be used to advantage in common card games?

REFERENCES AND FURTHER READING

CHANCE AND PROBABILITY
Probability games: www.math.cornell.edu/~mec/2006-2007/Probability/ProbGames.htm

Bad Bets!: http://mav.vic.edu.au/files/mathsnacks/mathsnacks-pdfs/mathsnacks19-probability.pdf

DICE GAMES
Throwing dice: http://gwydir.demon.co.uk/jo/probability/calcdice.htm
Yahtzee: https://en.wikipedia.org/wiki/Yahtzee
Backgammon: www.paulspages.co.uk/bgvaults/tips/dicerolls.php

Monopoly: http://statistics.about.com/od/ProbHelpandTutorials/a/Probability-And-Monopoly.htm

CARD AND BALL GAMES
Bingo probability: www.durangobill.com/BingoHowTo.html
Probability and playing cards: www.sciencebuddies.org/blog/2013/09/probability-and-playing-cards-hands-on-family-math.php Poker: https://en.wikipedia.org/wiki/Poker_probability

IMAGES
Leadbeater possum - Steve Kuiter
Other images - Pixabay and iStockphoto