LETBERS

"a game for two or more players"

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Numeracy (30) – Binary Numbers

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You need:

1 Letbers board, 2 dice, 3 counters for 3 players (more for more)

You may need:

pencil and paper, chalk and board, etc.

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How to Play

Setting Up For The Game

S1. The object of the game is to see who can score the most points.

S2. Before starting the game, players agree to how long the game is played; for example: 30 minutes.

S3. All players take a turn throwing the dice, and the player with the highest number starts the game. Turns are taken in a clockwise direction.

S4. The players place their counters to the left of the letber '1 t' on the Letbers board.

Playing The Game

P1. The first player takes their turn by throwing the dice. The number is noted.

P2. The player moves their counter by the same number of spaces.

P3. The player answers a question according to the game they are playing. If they get the question correct, they get points (number thrown on dice) which are added to their total score. If they do not get the question correct, they get no points – but their counter stays at the new position.

P4. The next player takes their turn (i.e. the player sitting next to them, in a clockwise direction)... And so on.

Game 1 – One-Zero-One

The player has to say (or write down) a binary number using these rules:

(1) The value of the higher die represents the 'ones'

(2) The value of the lower die represents the 'zeros'

(3) The highest value must be a 'one'

(4) The lowest value must be a 'one' (only valid if the player does not throw 1 and 1)

(5) The remaining places are filled by 'ones' and 'zeros'

So, if the player were to throw 6 and 4, one possible answer would be:

(i) Answer is: 1 1 1 1 1 0 0 0 0 1

Game 2 – B2D (Binary to Decimal)

The player obtains a number as per Game 1 (with players agreeing on mutually agreeable dispersion of numbers), and the number has to be converted to a decimal. For example, if the numbers thrown are 2 and 6, we could get:

(i) Answer is: 1 1 1 1 1 0 0 1 = 128+64+32+16+8+0+0+1 = 249

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	1	1	1	1	0	0	1
128	64	32	16	8	0	0	1

Game 3 – D2B (Decimal to Binary)

The spots on the face of the dice give the two digits of a decimal number which needs to be converted to a binary. If 1 and 3 are thrown, we can get:

(i) 13 => 1 1 0 1

(ii) 31 => 1 1 1 1 1, or using 4-bit word-lengths: 0 0 0 1 1 1 1 1

Game 4 – ATB (Add the Binaries)

The dice are thrown once to get the first binary number (ones and zeros as per Game 1). The dice are thrown again to get the second binary number. The two numbers are added. For example, if we throw 1 & 5 and 2 & 2, we can get:

(i) 1 1 1 1 0 1 + 1 0 0 1 = 1 0 0 0 1 1 0

Game 5 – STB (Subtract the Binaries)

The dice are thrown twice to get two binary numbers. The smaller number is subtracted from the larger using two's complement. For example, if 2 & 5 and 2 & 5 are thrown, we could get:

(i) 1 1 1 1 0 0 1 - 1 1 1 1 0 0 1 = 0