**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

The Quincunx Game

|  |  |
| --- | --- |
| We will drop a ball into a Quincunx machine like the one at the right (also known as a Galton Board). The ball will drop through a series of 10 rows of pegs. At each peg, the ball bounces to the left or the right (with equal probability), and lands in one of 11 bins at the bottom.  | C:\Users\dmoore\Dropbox\OPR\BDE (Carter)\BDE3\Stimuli\Quincunx.png |

How likely is it that the ball will land in each of the eleven bins at the bottom of the Quincunx?

(The numbers below should add to 100%.)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

We will now play 20 rounds of this game, and each round has its own page in the packet that follows.

Round 1

In this and all the following rounds, there are points at stake.

You must choose one of the eleven bins below **by marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 2

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 3

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 4

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 5

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 6

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 7

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 8

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 9

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 10

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 11

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 12

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 13

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 14

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 15

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 16

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 17

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 18

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 19

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 20

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

The Quincunx Game

|  |  |
| --- | --- |
| We will drop a ball into a Quincunx machine like the one at the right (also known as a Galton Board). The ball will drop through a series of 10 rows of pegs. At each peg, the ball bounces to the left or the right (with equal probability), and lands in one of 11 bins at the bottom.  | C:\Users\dmoore\Dropbox\OPR\BDE (Carter)\BDE3\Stimuli\Quincunx.png |

How likely is it that the ball will land in each of the eleven bins at the bottom of the Quincunx?

(The numbers below should add to 100%.)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

We will now play 20 rounds of this game, and each round has its own page in the packet that follows.

Round 1

In this and all the following rounds, there are points at stake.

You must choose one of the eleven bins below **by marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 2

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 3

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 4

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 5

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 6

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 7

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 8

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 9

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 10

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the right**, you will get 2 points.

If the ball lands **two or more bins to the right** of the one you mark, you will get 1 point.

If the ball lands **to the left** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 11

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 12

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 13

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 14

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 15

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 16

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 17

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 18

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 19

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |

Round 20

Choose one of the eleven bins below by **marking it with an X**.

If the ball lands **in the bin you mark or one to the left**, you will get 2 points.

If the ball lands **two or more bins to the left** of the one you mark, you will get 1 point.

If the ball lands **to the right** of the bin you mark, you will get 0 points for this round.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k |
|  |  |  |  |  |  |  |  |  |  |  |