

Never to Always**DIRECTIONS:**

What is the chance that a pig will fly?

Below is a scale. On one end is Never (0), which would relate to something that is impossible. On the other end is Always (1), which would relate to something that is certain.



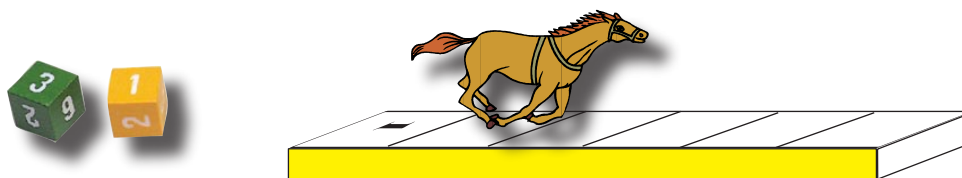
Decide on the probability of each of the events below. Write the letter that corresponds to the event on the scale.

- A. Flipping a coin and getting heads.
- B. You will win the lottery.
- C. Going to a store and finding that they don't have your size in the T-shirt you like best.
- D. The sun will come up in the East tomorrow.
- E. It will rain today.
- F. That you will draw a red marble out of a mystery bag that contains 3 red marbles and 1 blue one.
- G. Rolling a number cube and getting a 6.

Never to Always Scale



The Horse Race Directions

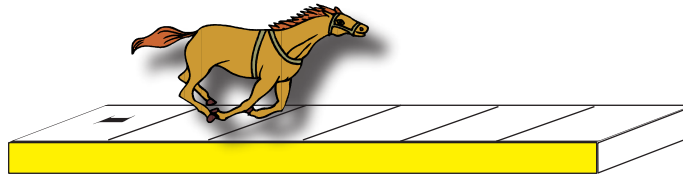


Directions:

1. Each player chooses a number on the gameboard.
2. Two number cubes are rolled and the sum is called out.
3. Place an X on the gameboard in the **START** area above the sum that is called.
4. The winner is the first to place an X in the **FINISH** area (it takes 5 Xs above the number chosen to win with this gameboard).

				FINISH						
				START						
2	3	4	5	6	7	8	9	10	11	12
<div style="border-top: 1px solid black; width: 100%; position: relative;"> Sums </div>										

The Horse Race Gameboards



				FINISH							
					START						
2	3	4	5	6	7	8	9	10	11	12	
Sums											

				FINISH						
				START						
2	3	4	5	6	7	8	9	10	11	12
Sums										

			FINISH									
			START									
2	3	4	5	6	7	8	9	10	11	12		
Sums												

Outcome Matrix

Complete the chart to show
all possible outcomes of rolling 2 number cubes.

+	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

How many spaces are in the outcome grid?

How many of the spaces have sums of:

1?	_____
2?	_____
3?	_____
4?	_____
5?	_____
6?	_____
7?	_____
8?	_____
9?	_____
10?	_____
11?	_____
12?	_____

Probability

Description: Probability will help you decide how often something is likely to happen. The probability of an event is the ratio of the number of desired outcomes to the total number of possible outcomes.

$$P(\text{event}) = \frac{\text{desired outcomes}}{\text{total possible outcomes}}$$

For example: $P(\text{rolling a sum of 3}) = \frac{\text{number of 3s}}{\text{total number of squares}}$

Directions: What are the following theoretical probabilities?

P (rolling a sum of 1)? _____

P (rolling a sum of 2)? _____

P (rolling a sum of 3)? _____

P (rolling a sum of 4)? _____

P (rolling a sum of 5)? _____

P (rolling a sum of 6)? _____

P (rolling a sum of 7)? _____

P (rolling a sum of 8)? _____

P (rolling a sum of 9)? _____

P (rolling a sum of 10)? _____

P (rolling a sum of 11)? _____

P (rolling a sum of 12)? _____



Description:

Probability will help you decide how often something is likely to happen.

$$P(\text{event}) = \frac{\text{desired outcomes}}{\text{total possible outcomes}}$$

For example:

$$P(\text{rolling a sum of 3}) = \frac{\text{number of 3s}}{\text{total number of squares}}$$

Directions:

What are the following probabilities?

P (rolling a sum of 1)? _____

P (rolling a sum of 2)? _____

P (rolling a sum of 3)? _____

P (rolling a sum of 4)? _____

Now finish the rest on your own.



Is It Fair?

Materials: 2 number cubes (or dice)
Gameboard



Number of Players: 4



The game:

1. Each player chooses a column on the gameboard.
2. Two number cubes are rolled and the sum is called out.
3. The player with that sum places an X on the gameboard in the *START* area's column that contains the number called.
4. The winner is the first to reach the *FINISH* area.

FINISH			
START			
4 or 5	2 or 7	8 or 11	9 or 10

* For sums of:
3, 6, 12
no one advances

NCTM Expectations

How did we address the following probability expectations for grades 6-8 from the NCTM Standards for school mathematics in this session?

- Understand and use appropriate terminology to describe complementary and mutually exclusive events.

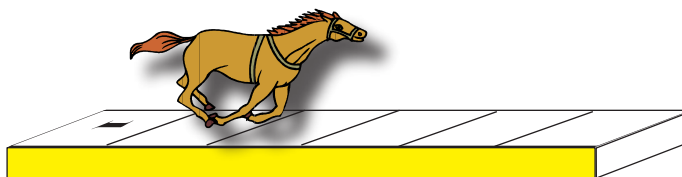
- Use proportionality and a basic understanding of probability to make and test conjectures about the results of experiments and simulations.

- Compute probabilities for simple compound events, using such methods as organized lists, tree diagrams, and area models.

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A Different Race

Materials: 2 number cubes
(or dice)
Gameboard



Number of Players: 2 or more

The Game:

1. Each player chooses a number on the gameboard.
2. Two number cubes are rolled and the difference is called out ($6-4=2$).
3. Place an X on the gameboard in the START area above the difference called.
4. The winner is the first to move into the FINISH area.

	FINISH				
	START				
0	1	2	3	4	5
Differences					

Adapted from "They're Off!" by Alfinio Flores and "Mathematical Activities from Poland" by Jerzy Gwirko-Goadycki

Game Variations for Home

Materials: 2 number cubes (or dice)



Game 1: Roll Odd, Roll Even

Gameboard: The Horse Race gameboards

The Game:

1. One player chooses the odd numbers and one player chooses the even numbers.
2. Two number cubes are rolled and the sum is called out.
3. Place an X on the gameboard above the sum that was called.
4. The winner is the first to place an X in the finish area.
5. Is this a fair game?

Game 2: Roll Odd, Roll Even Variation

Gameboard: A Different Race gameboard

The Game:

1. One player chooses the odd numbers and one player chooses the even numbers.
2. The number cubes are rolled and the difference is called out.
3. Place an X on the gameboard above the difference that was called.
4. The winner is the first to place an X in the finish area.
5. Is this a fair game?

Game 3: Over-the-Hill

Gameboard: Create a new gameboard with places for two horses, one for the numbers 1-15, and one for the numbers 16-36.

The Game:

1. One player chooses the first horse: numbers 1-15, and the second player chooses the other horse: numbers 16-36.
2. The number cubes are rolled and the product is called out. (ex: if 2 and 5 were rolled, call out $2 \times 5 = 10$)
3. Place an X on the gameboard above the horse that has that number, in the example it would be horse one with the numbers 1-15.
4. The winner is the first to place an X in the finish area.
5. Is this a fair game?

Double Trouble

Materials: 2 number cubes (or dice)
Paper and pencil for scoring



Number of Players: 2 or more

The game:

1. Each turn of the game consists of one or more rolls of the number cubes.
2. Keep rolling until you decide to stop, or roll a double.
3. You may choose to stop anytime.

Scoring:

1. You receive one point for each time that you roll without getting doubles.
2. If you stop before you roll a double, you keep all your points. If you roll a double, you receive no points for that turn, no matter how many rolls you had before the double.
3. Each turn is scored separately.
4. Add the score from 5 turns together to determine your final score for the game.
5. The winner is the one with the highest score.

Noncompetitive version:

Try to get your highest score together, making decisions as a team. This game could also be played by one person who tries to beat his own record score.

Player One	
Round Number	Round Total
1	
2	
3	
4	
5	
Grand Total	

Player Two	
Round Number	Round Total
1	
2	
3	
4	
5	
Grand Total	