



Math Virtual Learning

Math 7/Pre-Algebra

Theoretical and Experimental Probability

April 22, 2020



Grade 7/Theoretical and Experimental Probability

Lesson: April 22, 2020

Objective/Learning Target:

Students will solve problems involving theoretical and experimental probabilities.

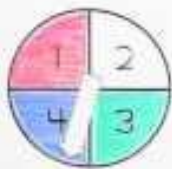
Let's Get Started:

Click on the Link: [Experimental Probability](#)

Let's Get Started:

Click to watch the video.

Using the following spinner, find the experimental probability of spinning a 3.



$$P(\text{event}) = \frac{\text{no. of favorable outcomes}}{\text{total no. of outcomes}}$$

$$P(3) = \frac{1}{4} \rightarrow \text{theoretical}$$

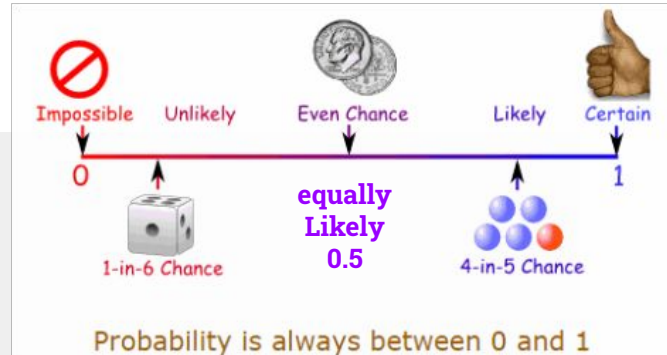
Outcome	Tallies	No. of Times	Fraction of Total
1			
2			
3			
4			



Warm-Up

Read each question. Select all answers that apply.

- Which event would have a probability of 0?
 - Reaching into a bag of all yellow marbles and pulling out a yellow marble
 - Reaching into a bag of all yellow marbles and pulling out a red marble
 - Reaching into a bag of all yellow marbles and pulling out a marble
- Which event would have a probability of 1?
 - Reaching into a bag of all yellow marbles and pulling out a yellow marble
 - Reaching into a bag of all yellow marbles and pulling out a red marble
 - Reaching into a bag of all yellow marbles and pulling out a marble
- Which event would have a probability of 0.5?
 - Flipping a coin and getting heads every time
 - Flipping a coin and getting heads half the time and tails half the time
 - Flipping a coin and never getting tails



Warm-Up - Answer Key

Read each question. Select all answers that apply.

1. Which event would have a probability of 0?
 - a. Reaching into a bag of all yellow marbles and pulling out a yellow marble
 - b. Reaching into a bag of all yellow marbles and pulling out a red marble**
 - c. Reaching into a bag of all yellow marbles and pulling out a marble
2. Which event would have a probability of 1?
 - a. Reaching into a bag of all yellow marbles and pulling out a yellow marble**
 - b. Reaching into a bag of all yellow marbles and pulling out a red marble
 - c. Reaching into a bag of all yellow marbles and pulling out a marble**
3. Which event would have a probability of 0.5?
 - a. Flipping a coin and getting heads every time
 - b. Flipping a coin and getting heads half the time and tails half the time**
 - c. Flipping a coin and never getting tails

Reminder

Probability

- How likely something is to occur
- **Theoretical probability** - what should happen
- **Experimental probability** - what happens when a situation is actually tested
- Probabilities are written as fractions:

<u>Probable outcomes</u>	what we are looking for
Possible outcomes	everything that could happen

Practice

Rolling a die experiment (aka a “random number cube”)

Use a piece of paper to record your responses.

1.) What is the theoretical probability of rolling a ...

P(1) =

P(2) =

P(3) =

P(odd #) =

4) =

P(5) =

P(6) =

P(less than 5) =

2.) Next, use the dice link to roll the die 30 times. Record your results using tally marks on the chart below.

1	2	3	4	5	6

3.) What was the experimental probability of rolling a ...

P(1) =

P(2) =

P(3) =

P(odd #) =

P(4) =

P(5) =

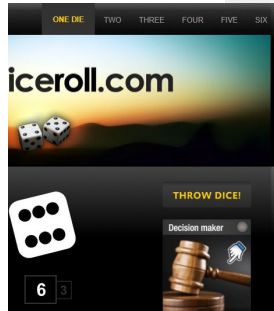
P(6) =

P(less than 5) =

[Online Dice](#)



For the online dice, make sure “ONE” is selected at the top. Click “THROW DICE” to roll the die.



Reflection Time

Let's Think...

- In this situation, did any of the **theoretical** probabilities match the **experimental** probabilities?
- What do you think we would see if we rolled 100 times? 500 times? 1 million times?
- What does **theoretical** probability help us do?
- What does **experimental** probability show us?

Practice Answers

Rolling a die experiment (aka a "random number cube")

Use a piece of paper to record your responses.

1.) What is the theoretical probability of rolling a ...

$$P(1) =$$

$$\frac{1}{6}$$

$$P(2) =$$

$$\frac{1}{6}$$

$$P(3) =$$

$$\frac{1}{6}$$

$$P(\text{odd \#}) =$$

$$\frac{1}{2}$$

$$P(4) =$$

$$\frac{1}{6}$$

$$P(5) =$$

$$\frac{1}{6}$$

$$P(6) =$$

$$\frac{1}{6}$$

$$P(\text{less than 5}) =$$

$$\frac{4}{6} = \frac{2}{3}$$

1	2	3	4	5	6
Answers will Vary depending on experiment					

3.) What was the experimental probability of rolling a ...

$$P(1) =$$

$$P(2) =$$

$$P(3) =$$

$$P(\text{odd \#}) =$$

$$P(4) =$$

$$P(5) =$$

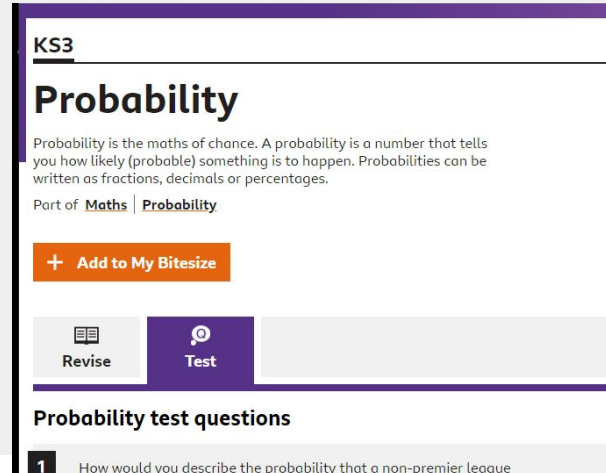
$$P(6) =$$

$$P(\text{less than 5}) =$$

Answers will Vary depending on experiment

Additional Practice

- ❑ Click on the link to test your probability skills!
[Probability Quiz](#)
- ❑ Work through each question on a separate piece of paper. Then, select the correct answer!
- ❑ After you have finished, push submit and check your answers.



The screenshot shows a webpage for a KS3 Probability quiz. At the top, it says 'KS3' and 'Probability'. Below the title, there is a short definition of probability: 'Probability is the maths of chance. A probability is a number that tells you how likely (probable) something is to happen. Probabilities can be written as fractions, decimals or percentages.' It also indicates it is part of 'Maths | Probability'. There is an orange button that says '+ Add to My Bitesize'. Below this, there are two buttons: 'Revise' and 'Test', with 'Test' being the active button. At the bottom, the section is titled 'Probability test questions' and the first question is visible: '1 How would you describe the probability that a non-premier league'.

Practice:

Answer the questions on a piece of paper.

Amanda used a standard deck of 52 cards and selected a card at random. She recorded the suit of the card she picked, and then replaced the card. The results are in the table below.

Diamonds	
Hearts	
Spades	
Clubs	

1. Based on her results, what is the experimental probability of selecting a heart?
2. What is the theoretical probability of selecting a heart?
3. Based on her results, what is the experimental probability of selecting a diamond or a spade?
4. What is the theoretical probability of selecting a diamond or a spade?
5. Compare these results, and describe your findings.

$$\text{Theoretical Probability} = \frac{\text{Number of favorable (desired) outcomes}}{\text{Total number of possible outcomes}}$$

$$\text{Experimental Probability} = \frac{\text{Number of Event Occurrences}}{\text{Total Number of Trials}}$$

Practice Answers

Amanda used a standard deck of 52 cards and selected a card at random. She recorded the suit of the card she picked, and then replaced the card. The results are in the table below.

Diamonds	/
Hearts	/
Spades	/ /
Clubs	

1. Based on her results, what is the experimental probability of selecting a heart?

9 out of 30 OR 30%

2. What is the theoretical probability of selecting a heart?

13 out of 52 OR 1 out of 4 OR 25%

3. Based on her results, what is the experimental probability of selecting a diamond or a spade?

18 out of 30 OR 9 out of 15 OR 60%

4. What is the theoretical probability of selecting a diamond or a spade?

26 out of 52 OR 1 out of 2 OR 50%

5. Compare these results, and describe your findings.

Answers will vary

Additional Links

[Experimental Probability Practice - Math Games](#)

- Click on the link above.
- Type your answer in the box in ***fraction form*** using the / as the fraction bar.
- Click answer to see if you were correct.
- Remember to simplify your fraction.** If you don't simplify, your answer will be counted wrong.

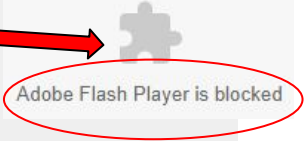
The screenshot shows the Math Games website interface. At the top, there is a navigation bar with links for Grades, Skills, Games, Standards, Worksheets, and a Subscribe button. The main content area displays a problem: "Elizabeth has worn a red shirt on 2 of 10 days. What is the experimental probability that Elizabeth will wear a red shirt tomorrow? Simplify your answer and write it as fraction or whole number." Below the problem is a text input field for the answer, labeled "P(red)", with a fraction bar. A blue "Answer" button is positioned below the input field. At the bottom of the page, there is a progress indicator showing "Level 1 of 3", a star rating system with five stars, and a row of empty boxes for additional input or feedback.

Additional Links

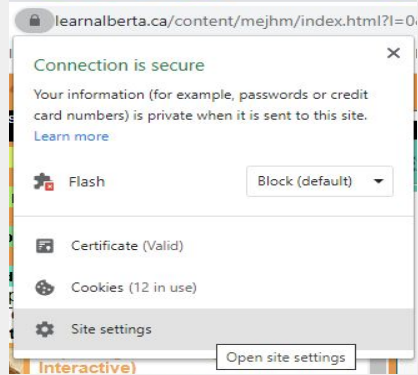
[Toads and Vines Probability Board Game](#)

- ❑ Click the link above.
- ❑ This game is a probability version of “**Chutes and Ladders**”
- ❑ If needed, fix the “Adobe Flash Player” using the directions below.

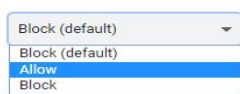
To fix the “Adobe Flash Player”, click on the  to the left of the web address bar.



Click on “Site Settings.”



Scroll down to find  Flash, then click on “Block (default)” and change it to “Allow.”



Refresh your game screen by pressing , and then you can play.

See next slide for “How to Play.”

How to Play "Toads and Vines"

1. Click "Start Level 1"

Exploring Probability - Use It

TOADS AND VINES

READ INSTRUCTIONS Level 1

Level 1: single event probability

In this 'Toads and Vines' game you will identify the number of possible outcomes and determine the probability for a variety of events using a 3, 4, 5 sector spinner. The sectors for each spinner will be the same size.

Earn spins by answering the questions. Move up if your marker lands on the base of a vine. Move down if you land on the tip of the toad's tongue. Win the game by landing on square 100. Click "Hints" for additional support. Free Spin can be used once to select your own number.

START LEVEL 1

100	99	98	97	96	95	94	93	92
81	82	83	84	85	86	87	88	89
80	79	78	77	76	75	74	73	72
61	62	63	64	65	66	67	68	69
60	59	58	57	56	55	54	53	52
41	42	43	44	45	46	47	48	49
40	39	38	37	36	35	34	33	32
21	22	23	24	25	26	27	28	29
20	19	18	17	16	15	14	13	12
2	3	4	5	6	7	8	9	10

USE IT EXPLORE IT PRINT ACTIVITIES PDF WORD LEARNING STRATEGIES PDF

2. Answer the question to earn spins

QUESTIONS No. 1 of 3 SCORE: ? | ? | ? LEVEL: 1

HISTORY

Q How many possible outcomes are shown on the spinner?

1 2 3 4 5

SPIN BANK 0

THE SPINNER

1	2
3	

100	99	98
81	82	83
80	79	78
61	62	63
41	42	43
40	39	38
21	23	
20	19	18
2	3	

3. To spin, click and hold on the spinner to increase the power. Release the mouse to spin. Move your marker the correct number of places on the game board.

SPIN POWER

FREE SPIN

20	19	18	17	16
2	3	4	5	