

LessonTitle: Is It a Fair Game?		Alg Prob 2.0b
Utah State Core Standard and Indicators Algebra Standards 5.2 Process Standards 1-5		
Summary		
In this activity, students play games by rolling dice. They arrive at their scores using different parameters and then determine the fairness of the game. They create their own games		
Enduring Understanding	Essential Questions	
Probability is a part of our lives. We must collect data, organize it, and make conjectures based on our findings. Using theoretical probability, we can determine the fairness of games.	What is probability and how do we use it in our lives? How does probability help us understand fairness?	
Skill Focus	Vocabulary Focus	
<ul style="list-style-type: none"> • Basic probability • Use of fractions, ratio, and percentage to represent probability 		
Assessment		
Materials: Pairs of standard dice or use a calculator and roll random pairs of numbers.		
Launch		
Explore		
Summarize		
Apply		

Directions: Remember to post the essential questions. Remind students to keep log books handy to write about group findings and to note important things to remember. Let them “show” what they “know.”

To use a calculator instead of dice (on the TI 73) go to Math, PRB, dice, enter, type in 2) for 2 dice, then hit enter to roll the dice.

Game Rules:

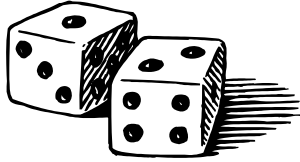
- Play in groups of two.
- Player A will be odd numbers, and Player B will be even.
- If the sum or product of the numbers is odd, Player A receives 1 point
- If the sum or product of the numbers is even, Player B receives 1 point.
- The player with the most points after 36 rolls wins.

See the Tally Sheets and student worksheets below.

Alg Prob 2.0b

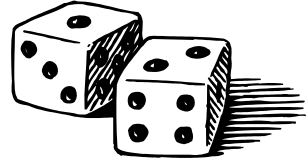
Is It a Fair Game?

The concept of a fair game implies that each player has an equal chance of winning the game. Tossing a coin is considered a fair game, since there is an equal chance that a head or a tail will come up. This doesn't guarantee that in tossing a coin 10 times, 5 times a head will appear and 5 times a tail.



Game 1: The Addition Game

If the answer is odd, player #1 gets a point.
If the answer is even, player #2 gets a point.
Roll the dice 36 times.



- 1) Predict whether or not you think this game is fair. Explain your prediction.
- 2) Play the game. Based on your data, what is the experimental probability of rolling an odd sum? An even sum?

$$P(\text{odd}) = \underline{\hspace{2cm}} \quad P(\text{even}) = \underline{\hspace{2cm}}$$

- 3) Find all the possible sums you can get when rolling two number cubes. Organize your data.

- 4) What is the theoretical probability of rolling an odd sum? An even sum?

$$P(\text{odd}) = \underline{\hspace{2cm}} \quad P(\text{even}) = \underline{\hspace{2cm}}$$

- 5) Do you think the addition game is a fair game? Explain why or why not.

Game 2: The Multiplication Game

If the answer is odd, player #1 gets a point.

If the answer is even, player #2 gets a point.

Roll the dice 36 times.

- 6) Predict whether or not you think this game is fair. Explain your prediction.
- 7) Play the game. Based on your data, what is the experimental probability of rolling an odd product? An even product?

$$P(\text{odd}) = \underline{\hspace{2cm}} \quad P(\text{even}) = \underline{\hspace{2cm}}$$

- 8) Find all the possible products you can get when rolling two number cubes. Organize your data.

- 9) What is the theoretical probability of rolling an odd product? An even product?

$$P(\text{odd}) = \underline{\hspace{2cm}} \quad P(\text{even}) = \underline{\hspace{2cm}}$$

- 10) Do you think the multiplication game is a fair game? Explain why or why not.

Game 3: The Dozen or Nothing Game

Roll one dice

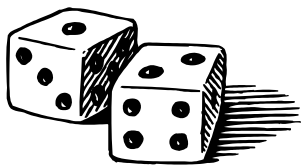
If the number on top is 1, player #1 gets 12 points.

If the number on top is even, player #2 gets that number of points

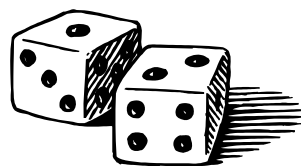
If the number on top is a 3 or a 5, neither player receives a score.

Roll the dice 36 times.

- 11) Is this a fair game? Why or why not? Prove your answer.

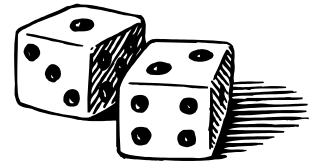
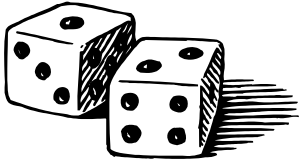


The Multiplication Game

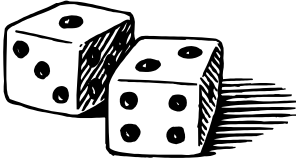


Roll Number	Product	Odd or even?		Roll Number	Product	Odd or even?
1				19		
2				20		
3				21		
4				22		
5				23		
6				24		
7				25		
8				26		
9				27		
10				28		
11				29		
12				30		
13				31		
14				32		
15				33		
16				34		
17				35		
18				36		

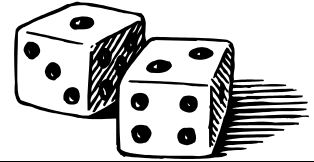
The Addition Game



Roll Number	Product	Odd or even?		Roll Number	Product	Odd or even?
1				19		
2				20		
3				21		
4				22		
5				23		
6				24		
7				25		
8				26		
9				27		
10				28		
11				29		
12				30		
13				31		
14				32		
15				33		
16				34		
17				35		
18				36		



A "Dozen or Nothing" Game



Roll Number	Product	Odd or even?		Roll Number	Product	Odd or even?
1				19		
2				20		
3				21		
4				22		
5				23		
6				24		
7				25		
8				26		
9				27		
10				28		
11				29		
12				30		
13				31		
14				32		
15				33		
16				34		
17				35		
18				36		