

Lesson Title: Is It a Fair Game?		Pre Prob 3.2b
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 collect data, organize it, and make conjectures based on our findings. Using theoretical probability, we can determine the fairness of games.	How can we determine fairness of games?	
Skill Focus	Vocabulary Focus	
<ul style="list-style-type: none"> • Basic probability • Use of fractions, ratio, and percentage to represent probability 		
Assessment ideas:		
See the Dozen or Nothing Game below or have students make up fair and unfair games.		
Materials: A pair of standard dice or use a calculator and roll random pairs of numbers.		
Launch		
Explore		
<ul style="list-style-type: none"> • How large a sampling do we need before we can say something is probably true? 		
Summarize		
Apply		

Directions:

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:

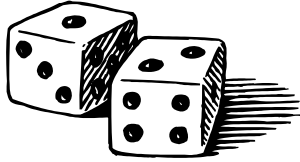
- Play in groups of two.
- Player A will be odd numbers, and Player B will be even.
- If the sum or product of the numbers is odd, Player A receives 1 point
- If the sum or product of the numbers is even, Player B receives 1 point.
- The player with the most points after 36 rolls wins.

See the Tally Sheets and student worksheets below.

Pre Prob 3.2b

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.



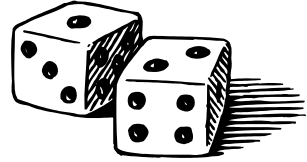
Game 1: The Addition Game

Roll two Dice.

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

Roll two dice.

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: A Dozen or Nothing Game

Roll one dice

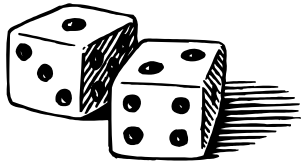
If the number on top is 1, player #1 gets 12 points.

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

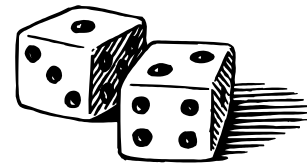
If the number on top is a 3 or a 5, neither player receives a score.

Roll the dice 36 times.

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

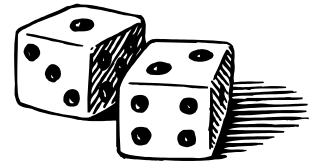
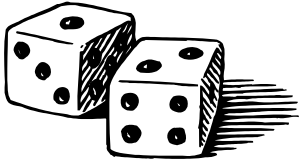


The Multiplication Game

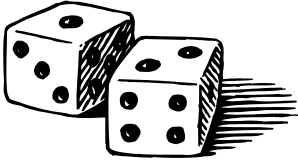


Roll Number	Product	Odd or even?		Roll Number	Product	Odd or even?
1				19		
2				20		
3				21		
4				22		
5				23		
6				24		
7				25		
8				26		
9				27		
10				28		
11				29		
12				30		
13				31		
14				32		
15				33		
16				34		
17				35		
18				36		

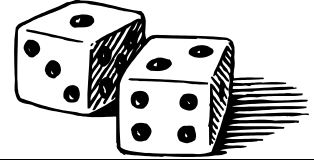
The Addition Game



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		