


Concept: Dice Probabilities

Name:

NOTE: You will need two dice for this section

COMPUTER COMPONENT

Instructions: In  follow the **Content Menu** path:

Probability > Dice Probabilities



Work through all Sub Lessons of the following Lessons **in order**:

- *Roll One Die*
- *Roll Two Dice*

Additional Required Materials: *Dice*



As you work through the computer exercises, you will be prompted to make notes in your notebook/math journal.

SUMMARY

1. *Roll One Die*

Record your findings in the tables below.

(a)

Your Experiment

	1	2	3	4	5	6
# of times face appears	* Answers will vary					
Experimental Probability	$\frac{1}{60}$	$\frac{1}{60}$	$\frac{1}{60}$	$\frac{1}{60}$	$\frac{1}{60}$	$\frac{1}{60}$

The Computer's Experiment

	1	2	3	4	5	6
# of times face appears	214	204	213	185	183	201
	<i>(Your random answers will vary.)</i>					
Experimental Probability	$\frac{214}{1200}$	$\frac{204}{1200}$	$\frac{213}{1200}$	$\frac{185}{1200}$	$\frac{183}{1200}$	$\frac{201}{1200}$
	<i>(Your random answers will vary.)</i>					

(b) The Theoretical Probabilities:

$$P(1) = \frac{1}{6}$$

$$P(2) = \frac{1}{6}$$

$$P(3) = \frac{1}{6}$$

$$P(4) = \frac{1}{6}$$

$$P(5) = \frac{1}{6}$$

$$P(6) = \frac{1}{6}$$

(c) The probability of something occurring + probability of something **not** occurring = **1**

The experimental probabilities are *not* the same as the *theoretical* probabilities.

The experimental probabilities get closer and closer to the theoretical probabilities as the number of dice throws *increases*.

2. Roll Two Dice

Theoretical Probabilities

Complete the table by filling in the possible sums of the two faces

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

Notice that $P(2) = P(12)$ AND all the probabilities add to **1**.

$$P(3) = P(11)$$

$$P(4) = P(10)$$

$$P(5) = P(9)$$

$$P(6) = P(8)$$

OFF COMPUTER EXERCISES

1. Julie threw two dice and when they landed she subtracted one number from the other wrote down the answer 2. What might the numbers on each have been?

* **Answers will vary**

Some possibilities include: $5 - 3 = 2$, $3 - 1 = 2$, $6 - 4 = 2$, $4 - 2 = 2$

2. A toy manufacturer wants to design a die where the chance of throwing a “blue” is $\frac{1}{2}$. What might this new die look like?

Draw some of your ideas/prototypes below.

* **Answers will vary**

3. *When rolling a single die*

- (a) What is the probability of rolling a number greater or equal to 5? $\frac{2}{6}$ or $\frac{1}{3}$
- (b) What is the probability of rolling a number that is divisible by 2 **or** 3? $\frac{4}{6}$ or $\frac{2}{3}$
- (c) What is the probability of rolling a composite number? $\frac{2}{6}$ or $\frac{1}{3}$
- (d) What is the probability of rolling a number that is divisible by 2 **and** 3? $\frac{1}{6}$

4. The following is a variation of a game called 'Tic Tac Toe Dice'.

Each player works with their own identical grid (See grid below) and a pair of regular dice.

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

RULES: The object of the game is to be the first player to cross out one vertical and one horizontal line. Numbers may be crossed out as they are rolled or they may be crossed out in any sum combination of the dice. For Example, if a dice total of four was rolled, a player may cross out either the 4 **or** a 3 and a 1.

Play the game a few times and then answer the following questions:

a) Is this a fair game or are some rows and columns easier to cross out than others?

b) Which rows and columns were most frequently used by the winner?

c) Why is this the case?

d) Is there a game winning strategy in choosing which sum combination to cross out?
(Example: If you rolled a total of twelve, should you cross out the 12 or the 5 and 7?)

e) Design your own variation of 'Tic Tac Toe Dice' so that it is more fair.

[**HINT:** You must account for the higher probability of rolling some dice totals than others!]

Suggestions:

- Use a circular grid
- Have players cross out a varying number of lines
- Have players use the same grid and work in opposition to one another (like real Tic Tac Toe)