

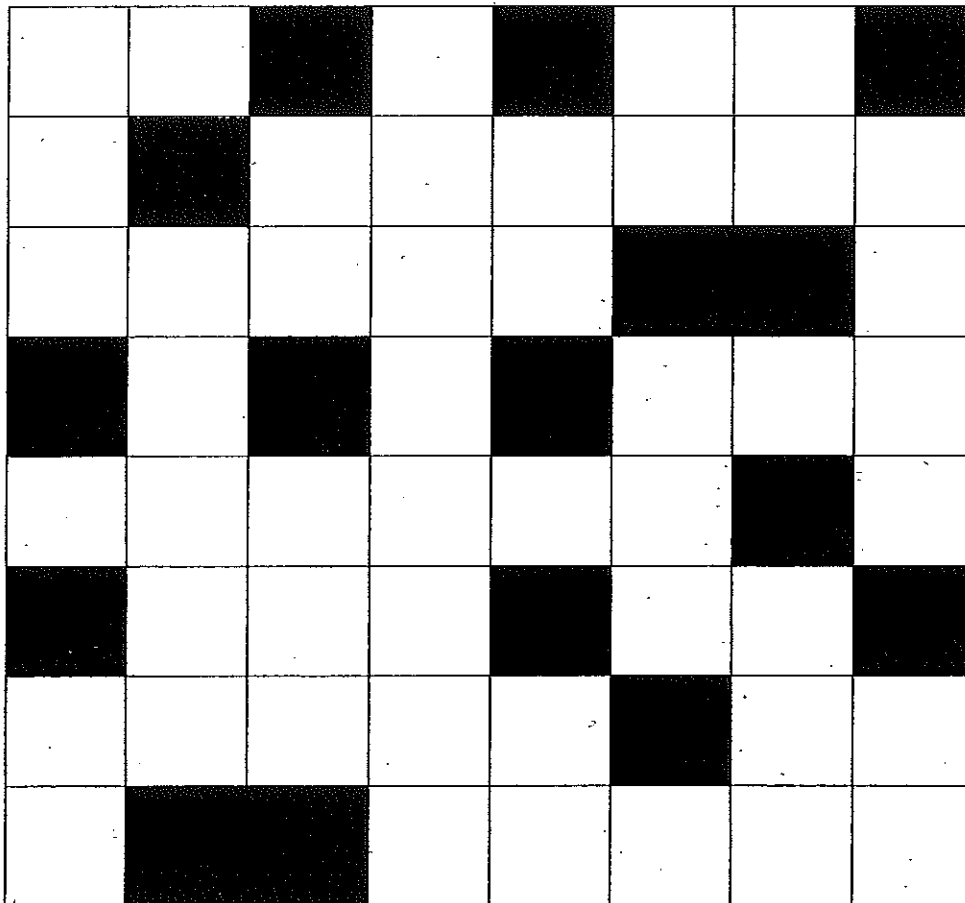
Name _____ Period _____

Practicing a Simulation

Below is a dartboard made up of an 8 x 8 grid of squares. When a dart is thrown, it is equally likely to land on any of the 64 squares.

Playing the Game:

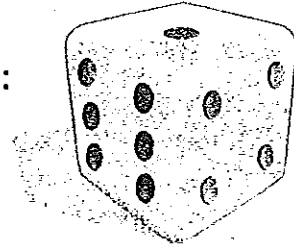
- A) A point is won if the dart lands on one of the 16 black squares.
- B) Zero points are earned if the dart lands in a white square.



- 1) If you throw the dart one time, what is the probability of winning a point? _____

1) Rather than throwing darts, we will use a die to simulate the dart throws.

Example of a simulation using a number cube:



- a) Rolling a one would represent landing on a black square.
- b) Rolling a 2,3,or 4 would represent landing on a white square.
- c) Rolling a 5 or 6 would not count; ignore it.

2) Suppose the game consists of throwing the dart 3 times for 50 trials. Here are the random rolls of the die that simulate the dart throws. Remember, rolling a 5 and 6 do not count so they do not show in the simulation below.

Here is the experimental simulation of the 3 dice rolls x 50 games:

3,2,4	3,3,2	4,1,1	3,2,2	1,2,4
2,2,4	2,2,1	2,4,1	1,1,1	2,2,3
3,2,1	3,3,2	1,1,2	4,3,3	4,1,2
4,4,3	3,2,2	4,2,4	4,1,2	4,3,3
1,4,4	3,2,2	4,2,1	4,1,4	1,1,1
2,4,2	2,4,4	2,2,2	3,3,1	2,2,4
1,1,3	2,2,3	3,3,3	4,1,4	2,1,2
4,3,1	2,3,3	3,1,4	2,1,2	2,4,1
4,2,1	2,2,2	2,2,2	1,1,2	1,1,3
2,1,2	4,1,3	3,4,1	4,4,2	3,2,4

The theoretical probabilities for this simulation are given below:

- Winning 0 points = 0.42 (42%) 0 black squares (.75 x .75 x .75)
- Winning 1 point = 0.42 (42%) 1 black square (.75 x .75 x .75)
- Winning 2 points = 0.14 (14%) 2 black squares (.75 x .75 x .25)
- Winning 3 points = 0.02 (2%) 3 black squares (.25 x .25 x .25)

3) a) Use the simulated die rolls from the experiment in section 2 to tally the number of times you get 0 points, 1 point, 2 points, and 3 points.

b) Turn the tally marks into a number out of 50 (the number of trials) and then change the fraction to a percent. Finally, compare your experimental results to the theoretical probability.

Number of Black Square Outcomes	Experimental	Theoretical
0	tally marks: _____ fraction = _____ % = _____	42%
1	tally marks: _____ fraction = _____ % = _____	42%
2	tally marks: _____ fraction = _____ % = _____	14%
3	tally marks: _____ fraction = _____ % = _____	2%

4) How did the experiment compare with the expected (theoretical) ?

