

Home Learning Task 7 – 9 Chance – Likelihood of events

Dice Differences Task Worksheet

Mathematical language: equally likely, chance, event, trial, frequency, long range probability, sample space

Materials needed: two dice per pair. One 6-sided die per player.

Game: Player A and Player B both roll a die at the same time. Decide who is player A and who is Player B.

Player A wins if the difference between the two numbers rolled is 0, 1 or 2.

Player B wins if the difference between the two numbers is 3, 4, or 5.

Play this game 10 times using 2 dice and record your results in the table below:

| Player | Tally of wins | Total wins |
|---|---------------|------------|
| Player A- (Difference between the numbers rolled 0, 1, or 2) | | |
| Player B- (Difference between the numbers rolled 3, 4 or 5) | | |

Long range Probability:

Is this game fair? Do you have enough evidence to make a conclusion? Mathematicians prefer to have a lot of data to make more informed decisions. So we are going to look at data from 50 trials:

Data from 50 trials

OPTIONS:

- 1) Share the data from 4 other pairs in your class and create a new table for 50 trials
- 2) Conduct an Electronic simulation of 50 trials. For this you may use the random number generator on your CAS calculator TI Nspire, CASIO or an excel spreadsheet to simulate rolling the 2 dice, 50 times. To do this you would need to
 - (i) Define variables:
 - (ii) Complete the entry line: `randInt()` as ..

Record your results for 50 trials below:

| Player | Tally of wins | Total wins |
|--|---------------|------------|
| Player A (Difference between the numbers rolled 0, 1, or 2) | | |
| Player B (Difference between the numbers rolled 3, 4 or 5) | | |

Reflection:

1. Is this game fair?
2. Give detailed reasons to back up your answer.
3. Complete the sample space that shows all possible outcomes when 2 dice are rolled:

| | | FIRST DIE | | | | | |
|------------|---|-----------|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 |
| SECOND DIE | 1 | (1,1) | | | | | |
| | 2 | | | | | | |
| | 3 | | | | | | |
| | 4 | | | | | | |
| | 5 | | | | | | |
| | 6 | | | | | | |

4. Complete the sample space that shows the **differences** between the two numbers when the two dice are rolled.

| | | FIRST DIE | | | | | |
|------------|---|-----------|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 |
| SECOND DIE | 1 | 0 | | | | | |
| | 2 | | | | | | |
| | 3 | | | | | | |
| | 4 | | | | | | |
| | 5 | | | | | | |
| | 6 | | | | | | |

From the diagram, complete the table below:

| Difference | 0 | 1 | 2 | 3 | 4 | 5 |
|---------------------|---|---|---|---|---|---|
| Frequency | | | | | | |
| Who wins? A or B | | | | | | |

Questions:

5. How often do you expect A to win? (Show workings). State this as a probability.

6. How often do you expect B to win? (Show workings). State this as a probability.

7. Is this game fair? Why or Why not?

Extending Prompt: Creating a fair game

Redesign the above game so that it is fair to both players. You need to state the rules of the game clearly. You must supply detailed evidence to show your game is fair.