Fair and Unfair Games: Worksheet

Probability and Chance · Worksheet for https://jugami.com/chance/fair-and-unfair-games/ · For instant feedback, try the self-guided quiz online.

Jugami Probability and Chance, Unit 1 · https://jugami.com/chance/fair-and-unfair-games/

Name: _____ Date: _____

Directions: Show your thinking. Write probabilities as fractions in simplest form unless a problem asks for a decimal. Assume every coin, die and spinner is fair unless the problem says otherwise. A "die" is a regular six-sided die numbered 1 to 6.

Likelihood words: impossible, unlikely, even chance, likely, certain.

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1. Write the likelihood word that best fits each probability.

a) 1 b) 0.02 c) $\frac{1}{2}$ d) 0.8 e) 0

Answers: a) _____ b) _____ c) _____ d) _____ e) _____

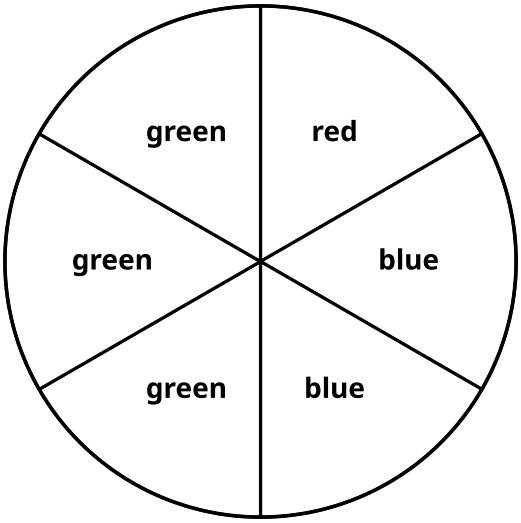
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2. Put these events in order from least likely to most likely. Write their letters.

- A. Roll a die and get a number from 1 to 6.
- B. Flip a coin and get tails.
- C. Roll a die and get a 2.
- D. Flip one coin once and get heads and tails at the same time.
- E. Roll a die and get a number greater than 1.

Order (least to most likely): _____ , _____ , _____ , _____ , _____

3. A spinner has 6 equal sections: 1 red, 2 blue and 3 green.



a) P(red) = _____ b) P(blue) = _____ c) P(green) = _____ d) P(not green) = _____

4. A bag holds 2 blue marbles, 5 white marbles and 3 black marbles. All the marbles are the same size. You pick one without looking.

a) P(white) = _____ b) P(blue or black) = _____ c) P(green) = _____

5. You roll one die. Find each probability.

a) P(a prime number) = _____ b) P(a number that is at least 5) = _____ c) P(a factor of 6) = _____

6. For each situation, say whether the outcomes listed are equally likely. Explain in one sentence.

a) A spinner with three sections that cover 180°, 90° and 90° of the circle. Outcomes: the three sections.

_____

b) Flipping a fair coin. Outcomes: heads, tails.

_____

c) Tomorrow's weather. Outcomes: "it rains" and "it does not rain."

_____

7. Dev tosses a thumbtack 40 times. It lands point up 14 times and point down 26 times.

a) What is the experimental probability that the thumbtack lands point up? Give a fraction in simplest form and a decimal. _____

b) Can Dev find a theoretical probability for "point up" by counting equally likely outcomes? Explain.

_____

8. A spinner with 4 equal sections (red, blue, green, yellow) was spun 80 times. Here are the results.

Color	Red	Blue	Green	Yellow
Times landed	18	25	17	20

a) What is the theoretical probability of landing on blue? _____

b) What is the experimental probability of landing on blue? Give a fraction in simplest form and a decimal. _____

c) Which color's experimental probability exactly matches its theoretical probability? _____

9. You plan to roll a die 300 times.

a) About how many times would you predict rolling a 5? _____

b) About how many times would you predict rolling an even number? _____

c) Will you get exactly that many even numbers? Explain.

_____

10. A spinner has 8 equal sections numbered 1 to 8. Player A wins if the number is greater than 5. Player B wins if the number is less than 4. On any other number, spin again. Is the game fair? Show the counts.

_____

11. Flip three coins. Player A wins if all three coins match. Player B wins otherwise.

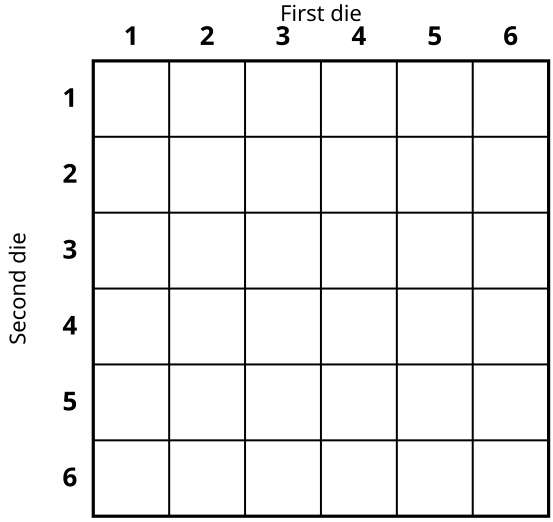
a) List all 8 equally likely outcomes (use H and T).

_____

b) Find P(Player A wins) and P(Player B wins). Is the game fair?

_____

12. Roll two dice. Find the difference (larger number minus smaller number; if they are equal, the difference is 0). Player A gets a point if the difference is 0, 1 or 2. Player B gets a point if the difference is 3, 4 or 5.



First die across the top, second die down the left. Fill in the differences.

a) How many of the 36 outcomes give Player A a point? How many give Player B a point?

_____

b) Is the game fair? If not, change which differences each player gets so that the game becomes fair. Show that your new game is fair.

_____

13. **Challenge (the problem of points).** Two players are equally likely to win each round. The first to win 3 rounds takes a pot of 16 coins. The game stops early when Player A has 2 wins and Player B has 0 wins.

    a) What is the most rounds that could still be needed to finish the game?

    b) List every equally likely way those rounds could go, and find the probability that Player A would have won.

    c) Split the 16 coins fairly according to each player's chance of winning.

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