

Grade 5 Mathematics

PROBABILITY & CHANCE

Explore chance, predict outcomes and reason about events



Name: _____

Chance • Likely • Unlikely • Fair & Unfair • Outcomes • Probability

Teacher-friendly • Printable • Answer Key Included

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From Impossible to Certain

Place each event on: impossible, unlikely, even chance, likely or certain.

1. Rolling a 7 on a standard die.
2. Rolling a number from 1 to 6.
3. Rolling an even number.
4. Picking red from a bag with 8 red and 2 blue.
5. Picking blue from a bag with 2 blue and 8 red.
6. Tossing a fair coin and getting heads.
7. Write your own event with an even chance.
8. Write an event that is unlikely but possible.

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Probability as a Fraction

Probability = favourable outcomes $\div$ total possible outcomes.

1. A die is rolled. Find $P(4)$.
2. A die is rolled. Find $P(\text{odd number})$.
3. A die is rolled. Find $P(\text{number greater than } 4)$.
4. A bag has 5 red, 3 blue and 2 green. Find $P(\text{red})$.
5. Using the same bag, find $P(\text{green})$.
6. Using the same bag, find $P(\text{not red})$.
7. A spinner has 8 equal sections: 3 yellow, 2 green, 3 blue. Find $P(\text{blue})$.
8. Why is probability always between 0 and 1?

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Equivalent Probabilities

Simplify and compare the probabilities.

1. Simplify $\frac{3}{6}$.
2. Simplify $\frac{4}{8}$.
3. Simplify $\frac{5}{10}$.
4. Which is greater: $\frac{2}{5}$ or $\frac{1}{5}$?
5. Which is greater: $\frac{3}{8}$ or $\frac{1}{2}$?
6. Which is more likely: red from 6 red/4 blue, or green from 2 green/8 yellow?
7. Order least to most likely: $\frac{1}{10}$, $\frac{1}{2}$, $\frac{3}{4}$, 1.
8. Which probability represents an impossible event: 0, $\frac{1}{2}$ or 1?

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Design a Fair Game

A fair game gives players equal chances.

1. A die is rolled. A wins on 1,2,3 and B wins on 4,5,6. Is it fair?
2. A wins on 1,2,3,4 and B wins on 5,6. Is it fair?
3. A spinner has 6 equal sections: 2 red, 2 blue, 2 green. Are colours equally likely?
4. Change it so red is twice as likely as blue.
5. Design a fair game for two players using 10 cards.
6. Design an unfair game and explain why it is unfair.
7. Why should the rules be stated before playing a probability game?

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Theoretical vs Experimental

Theoretical probability is based on what should happen; experimental probability is based on what actually happened.

1. Toss a coin 30 times. Record heads and tails. Find experimental $P(\text{heads})$.
2. Roll a die 30 times. Record the number of 6s. Find experimental $P(6)$.
3. Compare your $P(\text{heads})$ with theoretical $1/2$.
4. Compare your $P(6)$ with theoretical $1/6$.
5. Why can experimental probability differ from theoretical probability?
6. What usually happens when the number of trials becomes much larger?

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Two Coins & Two Dice

List outcomes carefully when an experiment has two steps.

1. List all outcomes when two coins are tossed.
2. Find $P(\text{two heads})$.
3. Find $P(\text{exactly one head})$.
4. Two dice are rolled. Smallest total? Largest total?
5. Is total 7 possible? Give two rolls that make 7.
6. Is total 1 possible? Explain.
7. Why are there 36 equally likely ordered outcomes for two dice?

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Probability from a Table

Use the data to calculate probabilities.

1. Favourite fruit: apples 8, bananas 6, oranges 4, grapes 2. What is the total?
2. Find $P(\text{apples})$.
3. Find $P(\text{grapes})$.
4. Find $P(\text{bananas or oranges})$.
5. Which fruit is most likely?
6. Find $P(\text{not apples})$.
7. If 4 more students choose oranges, what happens to the data?

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Chance in Everyday Decisions

Use probability to reason about real situations.

1. A weather app says 70% chance of rain. Is rain more or less likely than not rain?
2. A game has a 1 in 20 chance of a prize. Write the probability as a fraction and percentage.
3. A bag has 12 sweets: 9 strawberry and 3 lemon. Find both probabilities.
4. A raffle has 100 tickets and you own 5. Find your probability of winning.
5. Why does 70% chance of rain not mean rain is certain?
6. Give an example where probability helps someone make a decision.

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Probability Detective

Explain your reasoning, not just the answer.

1. Bag A has 4 red/6 blue. Bag B has 8 red/12 blue. Which has the greater probability of red?
2. A student says $\frac{2}{6}$ is greater than $\frac{1}{2}$ because 2 is greater than 1. Explain the mistake.
3. A fair die is rolled 60 times. Should you expect exactly ten 6s? Explain.
4. Two events each have probability $\frac{1}{2}$. Does that guarantee one will happen? Explain.
5. A spinner has 10 equal sections and 7 are green. Find $P(\text{not green})$.
6. Create two different experiments that both have probability $\frac{1}{2}$ for a chosen outcome.

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Super Probability Challenge

Bring together fractions, chance, experiments and reasoning.

1. A bag contains 4 red, 3 blue and 3 yellow. Find all three probabilities.
2. Which colour is most likely? Which two have equal probability?
3. How many red counters should be added to make $P(\text{red})=1/2$?
4. A spinner has 12 equal sections. How many blue sections give $P(\text{blue})=1/3$?
5. Create a six-sided die game where A has probability $2/3$ and B has $1/3$.
6. Write events with probability close to 0, close to $1/2$ and close to 1.
7. Explain the difference between 'possible' and 'likely'.

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Answer Key

Answers for the Grade 5 pack.

1. Page 2: 1 impossible, 2 certain, 3 even chance, 4 likely, 5 unlikely, 6 even chance, 7–8 answers vary.
2. Page 3: 1 $\frac{1}{6}$, 2 $\frac{1}{2}$, 3 $\frac{1}{3}$, 4 $\frac{1}{2}$, 5 $\frac{1}{5}$, 6 $\frac{1}{2}$, 7 $\frac{3}{8}$, 8 probability ranges from impossible (0) to certain (1).
3. Page 4: 1 $\frac{1}{2}$, 2 $\frac{1}{2}$, 3 $\frac{1}{2}$, 4 $\frac{2}{5}$, 5 $\frac{1}{2}$, 6 first event $\frac{3}{5}$ vs second $\frac{1}{5}$, 7 $\frac{1}{10}, \frac{1}{2}, \frac{3}{4}, 1$, 8 0.
4. Page 5: 1 fair, 2 unfair, 3 yes, 4 examples vary; e.g. 4 red, 2 blue, 2 green, 5–7 answers vary.
5. Page 6: experimental answers vary; theoretical heads = $\frac{1}{2}$ and six = $\frac{1}{6}$. More trials generally make experimental probability closer to theoretical probability.
6. Page 7: 1 HH, HT, TH, TT, 2 $\frac{1}{4}$, 3 $\frac{1}{2}$, 4 min 2/max 12, 5 yes e.g. 1+6 and 2+5, 6 impossible, 7 $6 \times 6 = 36$.
7. Page 8: 1 20, 2 $\frac{2}{5}$, 3 $\frac{1}{10}$, 4 $\frac{1}{2}$, 5 apples, 6 $\frac{3}{5}$, 7 oranges become 8 and total 24.
8. Page 9: 1 more likely, 2 $\frac{1}{20} = 5\%$, 3 strawberry = $\frac{3}{4}$ and lemon = $\frac{1}{4}$, 4 $\frac{5}{100} = \frac{1}{20} = 5\%$, 5 probability is likelihood not certainty, 6 answers vary.
9. Page 10: 1 equal probability $\frac{2}{5}$, 2 $\frac{2}{6} = \frac{1}{3}$ is less than $\frac{1}{2}$, 3 no, 4 no, 5 $\frac{3}{10}$, 6 answers vary.
10. Page 11: 1 red = $\frac{4}{10}$, blue = $\frac{3}{10}$, yellow = $\frac{3}{10}$, 2 red; blue/yellow equal, 3 add 2 red, 4 4 sections, 5 A wins 4 of 6, 6 answers vary, 7 possible means it can happen; likely means it has a relatively high chance.