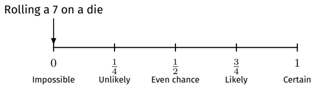
Basic Probability

Mana Maths

Start Tasks

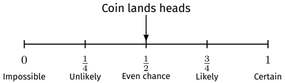
Use the probability scale to describe how likely an event is.

1.



Which word describes this?

2.



Which word describes this?

3. What probability value (from 0 to 1) means an event is certain?

4. A fair coin is flipped. What is the probability of landing on heads?

Start Tasks Answers

1. Impossible

2. Even chance

3. 1

4. $\frac{1}{2}$

5. $\frac{1}{6}$

6. $\frac{1}{4}$

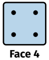
7. 52

8. $\frac{3}{10}$

Start Tasks

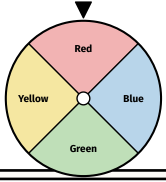
Use a sample space to find a basic probability.

5.



A fair 6-sided die is rolled. What is the probability of rolling this number?

6.



7. A standard deck has 52 playing cards. How many cards are in the sample space?

8. A bag has 3 red counters and 7 blue counters. What is the probability of picking a red counter at random?

Build Tasks

Find probabilities from a sample space, and express them as fraction, decimal, and percentage.

1. A fair die is rolled once. Find $P(\text{rolling a number greater than } 4)$.

2. A spinner has 8 equal sections numbered 1 to 8. Find $P(\text{spinning a multiple of } 3)$.

3. A bag has 4 red, 5 blue, and 3 green counters. Find $P(\text{green})$ as a fraction, decimal, and percentage.

4. Explain the difference between theoretical and experimental probability.

Build Tasks Answers

1. $5, 6$: $\frac{2}{6} = \frac{1}{3}$

2. $3, 6$: $\frac{2}{8} = \frac{1}{4}$

3. $\frac{3}{12} = 0.25 = 25\%$

4. Theoretical is calculated from the sample space; experimental is based on actual trial results.

5. $\frac{4}{52} = \frac{1}{13}$

6. $60 \times \frac{1}{6} = 10$

7. No – small samples naturally vary; 3 flips is too few to judge fairness.

8. $200 \times 0.4 = 80$

Build Tasks

Use theoretical probability to predict long-run counts.

5. A card is drawn from a standard 52-card deck. Find $P(\text{drawing a King})$.

6. A die is rolled 60 times. Theoretically, how many times would you expect to roll a 6?

7. A coin is flipped 3 times and lands heads all 3 times. Does this mean the coin isn't fair? Explain.

8. A spinner is coloured so that $P(\text{red}) = 0.4$. If spun 200 times, how many times would you theoretically expect red?

Build Tasks Answers

9. E.g. rolling a 2 and rolling a 5 on the same roll – can't get both.

10. $1 - 0.3 = 0.7$

11. 12 outcomes (H1–H6, T1–T6).

12. Probabilities can't exceed 1 (certain) – 1.2 is too high.

Build Tasks

Use complementary events, sample spaces, and the valid range of a probability.

9. Two events are mutually exclusive if they cannot happen at the same time. Give an example using a single die roll.

10. A bag has only red and blue counters. $P(\text{red}) = 0.3$. What is $P(\text{blue})$?

11. List the sample space for flipping a coin and rolling a die together. How many total outcomes are there?

12. A probability is calculated as 1.2. Explain why this cannot be correct.

Push Tasks

Every question requires reasoning or justification. Combine sample-space counting with careful reasoning.

1. A standard deck has 52 cards. Find P(a heart OR a King), explaining why you must not double-count the King of Hearts.

2. A die is rolled twice. Find the total number of possible outcomes, and P(both rolls show the same number).

3. A bag has 20 counters, some red and some blue. $P(\text{red}) = 0.35$. How many red counters are there?

4. Explain why rolling a die 6 times does not guarantee you will see each face exactly once.

Push Tasks Answers

1. $13 + 4 - 1 = 16$ (King of Hearts counted once). $\frac{16}{52} = \frac{4}{13}$

3. $0.35 \times 20 = 7$

2. 36 outcomes. 6 matching pairs: $\frac{6}{36} = \frac{1}{6}$

4. Theoretical probability is a long-run expectation, not a guarantee for a few trials.

Push Tasks

Every question requires reasoning or justification. Reason about dependent events and unexpected results.

5. A spinner has 5 sections: $P(\text{red}) = 0.2$, $P(\text{blue}) = 0.3$, $P(\text{green}) = x$, $P(\text{yellow}) = 0.1$, $P(\text{purple}) = 0.15$. Find x.

6. A card is drawn from a deck and not replaced, then a second card is drawn. Explain why $P(\text{King on the second draw})$ depends on the first draw.

7. An experiment rolling a die 600 times records only 60 sixes (expected 100). Suggest one reason for this, other than bad luck.

8. Explain the difference between an independent event and a dependent event, giving one example of each.

Push Tasks Answers

5. $1 - (0.2 + 0.3 + 0.1 + 0.15) = 0.25$

7. The die may be biased/unfair.

6. Cards aren't replaced, so how many Kings remain (3 or 4) depends on the first card.

8. Independent: e.g. coin flips. Dependent: e.g. cards with no replacement.

Push Tasks

Every question requires reasoning or justification. Combine events, and justify why a probability is valid.

9. A game claims: "You have a 100% chance of winning if you play twice." Each play has an independent $P(\text{win}) = 0.5$. Is this claim correct? Explain using $P(\text{win at least once in two plays})$.

10. Explain why a probability can never be negative, using the definition of probability as a proportion of a sample space.

11. Two mutually exclusive events A and B have $P(A) = 0.3$ and $P(B) = 0.45$. Find $P(A \text{ or } B)$.

12. A die is rolled and a coin is flipped. Find $P(\text{rolling a } 6 \text{ AND flipping heads})$.

Push Tasks Answers

9. Not correct: $P(\text{win at least once}) = 1 - 0.5^2 = 75\%$, not 100%.

11. $0.3 + 0.45 = 0.75$

10. $P =$ favourable $\div$ total; both counts are ≥ 0, so P can't be negative.

12. $\frac{1}{6} \times \frac{1}{2} = \frac{1}{12}$