



Probability

7

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Focus: A set of questions and solutions for Year 7 students on Probability, tailored to the Australian Curriculum under the strand 'Statistics and Probability':

1. Basic Concepts of Probability

a) Define probability and explain what a probability of 0.5 means.

b) What is the probability of an event that is certain to happen?



2. Probability of Simple Events

a) If you roll a die, what is the probability of rolling a 4?

b) A bag contains 5 red marbles, 3 blue marbles, and 2 green marbles. What is the probability of picking a blue marble?

3. Complementary Events

a) If the probability of rain tomorrow is 0.7, what is the probability it will not rain?



b) In a deck of 52 cards, if the probability of drawing a heart is $\frac{1}{4}$, what is the probability of not drawing a heart?

4. Probability of Multiple Events

a) If you flip two coins, what is the probability of getting two heads?

b) What is the probability of drawing a red card or a king from a standard deck of cards?



5. Real-World Applications

a) A spinner has sections labelled 1, 2, 3, 4, 5, and 6, each with an equal area. What's the probability of landing on a prime number?

b) In a class where 60 % of students play soccer and 40 % play basketball, what can you say about the probability of a student playing both sports if these are independent events?

6. Conditional Probability

a) In a group of 10 students, 7 like math and 3 like both math and science. If a student likes math, what is the probability they also like science?



b) Suppose 20 % of a school's students are in the choir, and 50 % of choir members are also in the band. What percentage of the school's students are in both the choir and the band?



Solutions

1a.

Probability is the measure of the likelihood that an event will occur. A probability of 0.5 means there's an equal chance of the event happening or not happening; it's like flipping a fair coin where heads or tails each have a 50 % chance.

b.

An event certain to happen has a probability of 1 (or 100 %).

2a.

A die has 6 faces, each with an equal chance.

The probability of rolling a 4 is $\frac{1}{6}$.

b.

Total marbles = $5 + 3 + 2 = 10$.

Probability of picking a blue marble

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

3a.

The probabilities of complementary events sum to 1.

Therefore, the probability it will not rain is:

$$1 - 0.7 = 0.3.$$

b.

Probability of not drawing a heart: (Remember: $P(\text{Heart}) = \frac{13 \div 13}{52 \div 13} = \frac{1}{4}$ (= 0.25))

$$= 1 - \frac{1}{4}$$

$$= \frac{1}{1} \times 4 - \frac{1}{4} \text{ *turn 1 into a fraction, with a denominator of 4}$$

$$= \frac{1 \times 4}{1 \times 4} - \frac{1}{4}$$

$$= \frac{4}{4} - \frac{1}{4}$$

$$= \frac{4 - 1}{4}$$

$$= \frac{3}{4}.$$



4a.

Each coin flip is independent with a probability of heads being $\frac{1}{2}$.

For two heads, you multiply the probabilities:

$$\begin{aligned} & \frac{1}{2} \times \frac{1}{2} \\ &= \frac{1 \times 1}{2 \times 2} \\ &= \frac{1}{4}. \end{aligned}$$

b.

There are 26 red cards (13 hearts + 13 diamonds), and 4 kings, but the red kings are counted twice in this sum, so:

Probability of red card or king

$$\begin{aligned} &= \frac{26}{52} + \frac{4}{52} - \frac{2}{52} \\ &= \frac{26 + 4 - 2}{52} \\ &= \frac{28}{52} \\ &= \frac{7}{13}. \end{aligned}$$

5a.

Prime numbers from 1 to 6 are 2, 3, and 5.

Probability

$$\begin{aligned} &= \frac{3}{6} \\ &= \frac{1}{2}. \end{aligned}$$

b.

If playing soccer and basketball are independent, the probability of playing both would be the product of their individual probabilities:

Probability of playing both

$$\begin{aligned} &= 0.6 \times 0.4 \\ &= 0.24. \end{aligned}$$



6a.

Given that a student likes math, the probability they like science is:

$$\frac{\text{Number who like both}}{\text{Number who like math}}$$

$$= \frac{3}{7}.$$

b.

Probability of being in both = Probability of being in choir \times Probability of being in band given in choir:

$$0.20 \times 0.50$$

$$= 0.10 \text{ or } 10\%.$$



Additional Notes for Teachers

Learning Outcomes:

Students should understand the concept of probability, how to calculate probabilities for simple and compound events, and start to grasp conditional probability.

Teaching Strategies:

Use dice, coins, cards, or spinners for hands-on probability experiments. Discuss real-life scenarios where probability is relevant, like weather forecasting or games.

Assessment:

Assess through problems that require students to calculate probabilities, interpret results, and solve for conditional probabilities in context.

Resources:

Probability games or apps can make learning engaging. Use physical models for probability experiments, and encourage discussions on how probability affects decision-making.

This set of questions aligns with the Australian Curriculum for Year 7, aiming to develop students' understanding of probability in both theoretical and practical contexts.

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