Introduction to Probability

Introduction to probability: Mistakes and missing information

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

For equally likely outcomes, probability = favorable outcomes/total outcomes. A bag with 3 red and 5 blue has $P(\text{red}) = 3/8$, while $P(\text{not red}) = 5/8 = 1 - 3/8$. Impossible events have probability 0; certain events have probability 1. Random does not mean every color is equally likely when color counts differ.

Worked example

Find the probability of one red draw. A bag contains 3 red, 5 blue, and 0 green counters; draw one at random. Find $P(\text{red})$.

1. Total equally likely counters $= 3 + 5 + 0 = 8$.
2. The event has 3 favorable counters, so probability $= 3/8 = \frac{3}{8}$.
3. Complement probability $= 1 - \frac{3}{8} = \frac{5}{8}$; together they total 1.
Answer: $\frac{3}{8}$.

Practice Problems

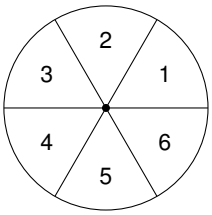
Show your thinking.

1. A student reports $1/3$ because there are three colors. Correct the probability. A bag contains 6 red, 2 blue, and 2 green counters; draw one at random. Find $P(\text{red})$.

2. Recover the required number of red counters. Use 20 counters in all and make $P(\text{red}) = \frac{3}{5}$.

3. A student uses only the green count for not green. Repair it. A bag contains 2 red, 3 blue, and 5 green counters; draw one at random. Find $P(\text{not green})$.

4. A fair six-sector spinner is numbered 1 to 6. A student counts 1 as prime. Correct the probability of a prime.



5. Reconstruct a bag with the stated red probability. Use 16 counters in all and make $P(\text{red}) = \frac{3}{4}$.

6. Explain a certain event using counts. A bag contains 1 red, 4 blue, and 3 green counters; draw one at random. Find $P(\text{any listed color})$.

Answer Key

1. $\frac{3}{5}$.
2. 12 red and 8 non-red counters.
3. $\frac{1}{2}$.
4. $\frac{1}{2}$.
5. 12 red and 4 non-red counters.
6. 1.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Total equally likely counters $= 6 + 2 + 2 = 10$.
2. The event has 6 favorable counters, so probability $= 6/10 = \frac{3}{5}$.
3. Complement probability $= 1 - \frac{3}{5} = \frac{2}{5}$; together they total 1.

Problem 2

1. Red count $= 20 \times \frac{3}{5} = 12$.
2. Non-red $= 20 - 12 = 8$; check $12/20 = \frac{3}{5}$.

Problem 3

1. Total equally likely counters $= 2 + 3 + 5 = 10$.
2. Not green includes the 2 red and 3 blue counters, not the 5 green counters. Favorable count is $2 + 3 = 5$, so $P = 5/10 = \frac{1}{2}$.
3. Complement probability $= 1 - \frac{1}{2} = \frac{1}{2}$; together they total 1.

Problem 4

1. The prime labels are $2, 3, 5$, so there are 3 favorable outcomes; 1 is not prime.
2. $P(\text{prime}) = 3/6 = 1/2$.

Problem 5

1. Red count $= 16 \times \frac{3}{4} = 12$.
2. Non-red $= 16 - 12 = 4$; check $12/16 = \frac{3}{4}$.

Problem 6

1. Total equally likely counters $= 1 + 4 + 3 = 8$.
2. The event has 8 favorable counters, so probability $= 8/8 = 1$.
3. Complement probability $= 1 - 1 = 0$; together they total 1.

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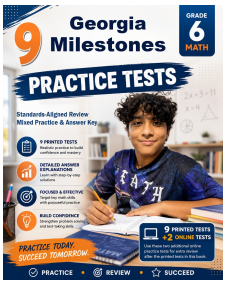

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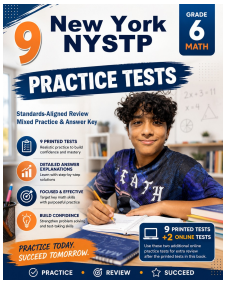

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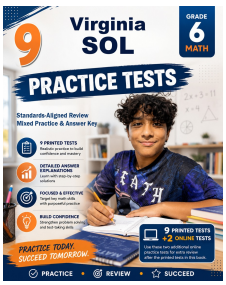

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