Experimental Probability

Spot mistakes, reason, and work backward

Name _____ **Date** _____ **Score** _____ / 8

QUICK REVIEW

Experimental probability is the observed event count divided by the total trials. For 11 hits in 25 trials, the observed rate is $11/25$. Multiply the rate by the new trial count to predict under similar conditions. The result is not guaranteed.

Worked example

A spinner lands red 12 times in 30 trials. Estimate red results in 160 similar trials.

1. Observed rate $12/30 = 2/5$.
2. The projected red count is $160(2/5) = 64$.
3. It is an estimate from past trials; a new run need not produce exactly 64.
Answer: About 64 red results.

Practice Problems

Show your thinking.

1. A student divides 40 by 19 after 19 wins. Correct the experimental probability and complement.

result	count
wins	19
total	40
losses	?

2. The experiment had 28 successes in 60 trials. A report predicts $28 + (200 - 60)$ successes in 200 similar trials. Repair that forecast using the observed fraction.

3. A student says 17 heads in 50 tosses proves the next toss cannot be heads. Compute the observed rate and explain why it does not determine the next toss.

4. Total 70 includes 36 wins. A student counts losses as 106. Correct loss count and fraction.

result	count
wins	36
total	70
losses	?

5. A report ranks B (27 of 100) above A (23 of 80) by raw wins. Find both rates, choose the larger, and give the exact gap.

6. A table has rate $\frac{37}{90}$ and 90 trials but a missing success count. Reconstruct it rather than guessing.

7. A student averages $7/20$ and $9/30$ to pool unequal trial batches. Use combined counts to find the correct probability.

8. A rate of $3/8$ came from 64 trials. A student says there were only 3 successes because of the numerator. Correct both outcome counts.

Answer Key

1. Success $\frac{19}{40}$; failures 21, rate $\frac{21}{40}$.
2. About 93 successes.
3. Observed heads rate $\frac{17}{50}$; it does not rule out heads next.
4. Success $\frac{18}{35}$; failures 34, rate $\frac{17}{35}$.
5. A $\frac{23}{80}$, B $\frac{27}{100}$; A is higher, gap $\frac{7}{400}$.
6. 37 successes.
7. Pooled rate $8/25$.
8. 24 successes and 40 failures.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Observed success rate $= 19/40 = \frac{19}{40}$.
2. Failures $= 40 - 19 = 21$, fraction $\frac{21}{40}$.
3. Check: $\frac{19}{40} + \frac{21}{40} = 1$, since all observed outcomes are successes or failures.

Problem 2

1. The extra $200 - 60 = 140$ are trials, not guaranteed successes. The observed success rate is $28/60 = \frac{7}{15}$.
2. The model for 200 future trials gives $200(\frac{7}{15}) = \frac{280}{3}$.
3. To the nearest whole trial, plan for about 93 successes. This is an estimate, not a promise.

Problem 3

1. Heads occurred 17 times in 50 tosses, so the observed rate is $17/50 = \frac{17}{50}$.
2. The denominator counts 50 completed tosses; it does not include the next toss.
3. A rate from past tosses does not force the next one to be tails. Heads is not ruled out.

Problem 4

1. Observed success rate $= 36/70 = \frac{18}{35}$.
2. Failures $= 70 - 36 = 34$, fraction $\frac{17}{35}$.
3. Check: $\frac{18}{35} + \frac{17}{35} = 1$, since all observed outcomes are successes or failures.

Problem 5

1. Observed win rates: A $23/80 = \frac{23}{80}$; B $27/100 = \frac{27}{100}$.
2. With denominator 400, A is $115/400$ and B is $108/400$, so A is higher.
3. Subtract the smaller rate from the larger: $115/400 - 108/400 = 7/400$.

Problem 6

1. The unknown count s satisfies $s/90 = \frac{37}{90}$.
2. Multiply by the total: $s = 90(\frac{37}{90}) = 37$.
3. Check: $37/90 = \frac{37}{90}$.

Problem 7

1. Wins $7 + 9 = 16$, plays $20 + 30 = 50$.
2. Pooled probability $16/50 = 8/25$.
3. The 30-play trial supplies more observations than the 20-play trial. An equal average of the two rates would give the trials equal weight.

Problem 8

1. The 64 trials form $64/8 = 8$ groups of 8 in the ratio model.
2. Successes are $8(3) = 24$; the other $64 - 24 = 40$ trials were failures.
3. Check $24/64 = 3/8$. The numerator 3 is per group of 8, not the total success count.

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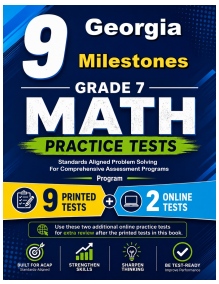

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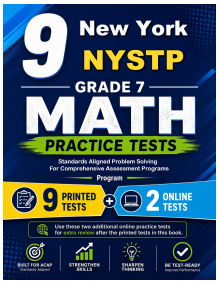

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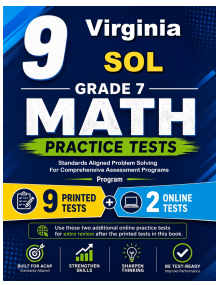

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