

Probability Models and Chance Experiments

Grade 7 math · Worksheet Answer Key · Standards: 7.SP.C.5, 7.SP.C.6, 7.SP.C.7

Each solution counts outcomes, writes the probability and checks that a model adds to 1. For prediction problems, compare the expected count with the observed count and say whether the gap is small enough to be chance.

Standards: 7.SP.C.5, 7.SP.C.6, 7.SP.C.7 · **Level:** Grade 7

Problem 1 Certain event

Every face is less than 7, so the event always happens.

certain; probability 1

Problem 2 Describe the probability

0.92 is close to 1; 0 never happens; 1 always happens; 0.08 is close to 0; 0.5 is halfway.

0.92 likely; 0 impossible; 1 certain; 0.08 unlikely; 0.5 equally likely as not

Problem 3 Marble bag

Total: $4 + 6 + 5 = 15$. $P(\text{yellow}) = 6/15 = 2/5 = 0.4$.

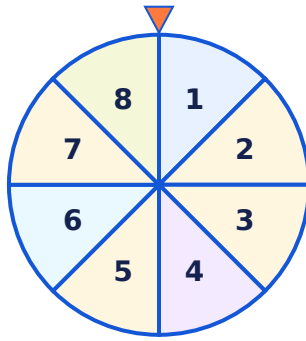
$2/5 = 0.4$

Problem 4 Spinner with 8 sections

The primes from 1 to 8 are 2, 3, 5 and 7, which is 4 outcomes out of 8.

$P(\text{prime}) = 4/8 = 1/2$.

$1/2$



Shaded sections: 2, 3, 5, 7.

Problem 5 Experimental probability

$$14 \div 40 = 0.35.$$

0.35

Problem 6 Complement

$$1 - 0.18 = 0.82.$$

0.82

Problem 7 Which is more likely

$$3/8 = 0.375, \text{ and } 0.4 \text{ is greater than } 0.375.$$

Event B

Problem 8 Predict a count

$$\text{Expected} = 3/10 \times 250 = 75.$$

about 75 red tiles

Problem 9 Coin flips

Expected: $1/2 \times 60 = 30$. Observed 36 is 6 more, which is 10% of the flips.

A difference this size can happen by chance, so the result is reasonable.

30 heads expected; 36 is reasonable

Problem 10 Missing probability

The probabilities add to 1: $P(\text{green}) = 1 - 0.40 - 0.35 = 0.25$.

$P(\text{not red}) = 1 - 0.40 = 0.60$.

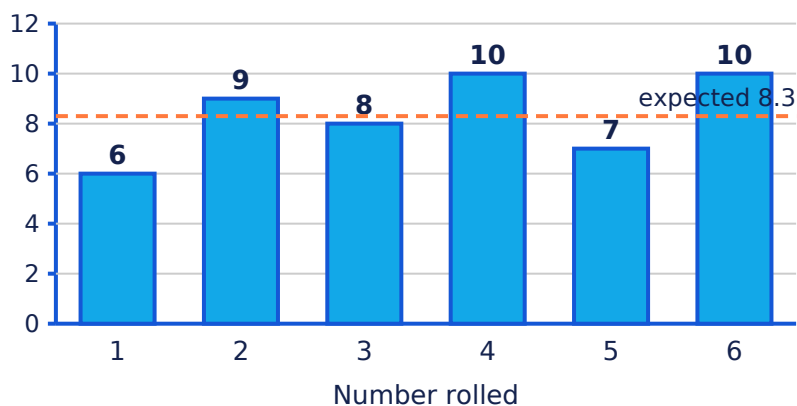
$P(\text{green}) = 0.25$; $P(\text{not red}) = 0.60$

Problem 11 Die results

Experimental: $10 \div 50 = 0.2$. Theoretical: $1/6 \approx 0.167$.

Expected number of 4s: $1/6 \times 50 \approx 8.3$.

0.2 compared with about 0.167; about 8 fours expected



Problem 12 Probability model

Outcome 1 covers 2 of 5 sections, 2 covers 1 of 5, and 3 covers 2 of 5.

Model: $P(1) = 2/5$, $P(2) = 1/5$, $P(3) = 2/5$. $P(2 \text{ or } 3) = 1/5 + 2/5 = 3/5$.

$P(2 \text{ or } 3) = 3/5$

Problem 13 Free throws

Estimate: $140 \div 200 = 0.7$.

Prediction: $0.7 \times 30 = 21$.

0.7; about 21 free throws

Problem 14 Mystery bag

Experimental $P(\text{red}) = 22 \div 80 = 0.275$.

Estimate: $0.275 \times 40 = 11$.

about 11 red chips

Problem 15 Is it uniform

If the outcomes were equally likely, each would be expected about $100 \div 3 \approx 33$ times.

A was 15 above that and C was 11 below, which is large for 100 spins.

Experimental probabilities: 0.48, 0.30, 0.22. A better model is about $P(A) = 0.5$, $P(B) = 0.3$, $P(C) = 0.2$.

The claim is not supported; the model is non-uniform.

Problem 16 Prize boxes

Experimental: $14/40 = 0.35$, $9/40 = 0.225$, $8/40 = 0.2$, $9/40 = 0.225$.

Equally likely would predict $1/4 \times 40 = 10$ of each. The counts differ from 10 by at most 4, which can happen by chance in 40 boxes.

The claim is reasonable.

Problem 17 Weather model

$P(\text{rain}) = 1 - 0.45 - 0.30 = 0.25$.

Sunny: $0.45 \times 30 = 13.5$. Cloudy: $0.30 \times 30 = 9$. Rain: $0.25 \times 30 = 7.5$.

$P(\text{rain}) = 0.25$; about 13.5 sunny, 9 cloudy and 7.5 rainy days

Problem 18 Defective bulbs

$P(\text{defective}) = 5 \div 250 = 0.02$. $P(\text{not defective}) = 1 - 0.02 = 0.98$.

Defective bulbs: $0.02 \times 12,000 = 240$.

0.98; about 240 defective bulbs

Problem 19 Weighted number cube

The other five faces share $1 - 0.25 = 0.75$, so each has $0.75 \div 5 = 0.15$.

$P(\text{even}) = P(2) + P(4) + P(6) = 0.15 + 0.15 + 0.25 = 0.55$.

Expected 6s: $0.25 \times 80 = 20$.

0.15 each; $P(\text{even}) = 0.55$; 20 sixes

Problem 20 Carnival game

$P(\text{prize}) = 4/10 = 0.4$. Predicted prizes: $0.4 \times 150 = 60$.

Predicted grand prizes: $1/10 \times 150 = 15$.

52 is 8 fewer than 60, which is plausible for 150 plays.

0.4; 60 prizes; 15 grand prizes; 52 is reasonably close