

Experiments, Simulation and Smart Decisions

Grade 11 – Algebra 2 math · Test Answer Key · Standards: S-IC.A.2, S-IC.B.5, S-IC.B.6, S-MD.B.6, S-MD.B.7

Each answer shows the counted runs, the percent and the conclusion. Give partial credit for correct counts with a weak conclusion, and add the points for a total out of 20.

Standards: S-IC.A.2, S-IC.B.5, S-IC.B.6, S-MD.B.6, S-MD.B.7 · **Level:** Grade 11 Algebra 2

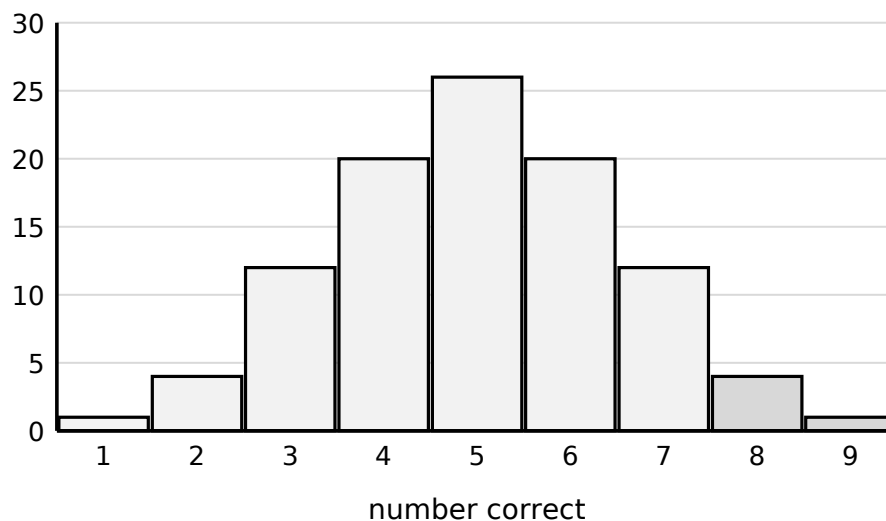
Question 1 Design a simulation (2 points)

Let 00–34 (35 numbers) represent blue and 35–99 not blue. Simulate three spins as three two-digit numbers, repeat many times, and divide the number of runs with at least two blues by the number of runs. **00–34 = blue; estimate = (runs with ≥ 2 blues) $\div$ (total runs).**

Scoring: 1 point for the assignment of digits, 1 point for the estimate method.

Question 2 Guessing on a quiz (3 points)

- The bars for 8 and 9 show $4 + 1 = 5$ runs.
- $5/100 = 0.05$.
- 5% is not below the 5% cutoff, so **the result is not convincing**; guessing could plausibly produce it.

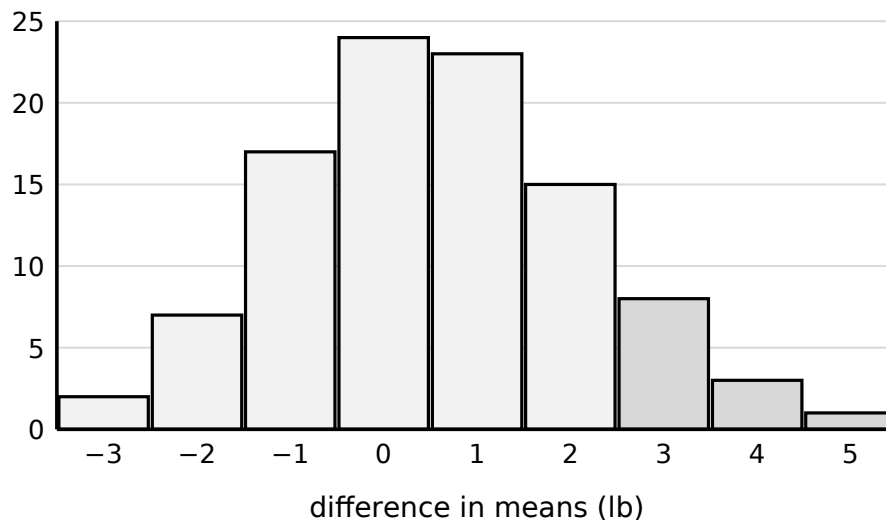


The shaded bars are runs with 8 or more correct.

Scoring: 1 point per part.

Question 3 Two diets (3 points)

- a. The bars for 3, 4 and 5 show $8 + 3 + 1 = 12$ runs.
- b. 12% is not below 5%, so a 3-pound difference happens often by chance. **Not significant: no convincing evidence that diet A works better.**



The shaded bars are differences of 3 pounds or more.

Scoring: 1 point for (a), 1 point for comparing 12% with 5%, 1 point for the conclusion.

Question 4 Evaluate a report (2 points)

The readers chose to write in, so happy users are over-represented (voluntary response). Also, 60 e-mails is a small sample and there is no information about the question or about non-responders. **Self-selected sample; small sample.**

Scoring: 1 point for each valid criticism.

Question 5 Is the game fair? (2 points)

Expected winnings = $10(1/5) = \$2$. Net = $2 - 3 = -\$1$. **Expected net $-\$1$ per play, so the game is not fair.**

Scoring: 1 point for the expected winnings, 1 point for the net value and decision.

Question 6 Choose a plan (3 points)

- a. Plan A: **\$400**. Plan B: $1000(0.45) = \$450$.
- b. **Plan B.**
- c. Plan A has no risk; Plan B pays \$0 with probability 0.55.

Scoring: 1 point per part.

Question 7 Estimate from trials (2 points)

$35/250 = 0.14$. In 1000 trials about $0.14 \times 1000 = \mathbf{140 \text{ times}}$.

Scoring: 1 point for 0.14, 1 point for 140.

Question 8 Random assignment (2 points)

Write each plant's number on a card, shuffle, and deal ten cards to Group 1, with the remaining ten going to Group 2 (or use a random number generator and skip repeats). **Random draw without replacement splits the plants into two groups of 10.**

Scoring: 1 point for a random method, 1 point for equal group sizes.

Question 9 Cause and effect (1 point)

No. The study is observational, so people who already like walking may be likelier to own dogs. Only a randomized experiment would support cause and effect.

Scoring: 1 point for the conclusion with a reason.