

Algebra 2 · Probability: Sample Spaces, Independence and Conditional Probability · Test Answer Key

Common Core S-CP.A.1, S-CP.A.2, S-CP.A.3, S-CP.A.4, S-CP.A.5, S-CP.B.6, S-CP.B.7 · mathovore.fr

Use this key to score the test out of 20 points. Every solution gives the full reasoning and a scoring guide. Award points per part as described, and require a justification wherever the question asks students to justify.

Algebra 2 Common Core: S-CP.A.1 · S-CP.A.2 · S-CP.A.3 · S-CP.A.4 · S-CP.A.5 · S-CP.B.6 · S-CP.B.7

Question 1: Sample space of coin flips (2 points)

- a. $\{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$: 8 outcomes.
- b. $A = \{HHT, HTH, THH\}$, so $P(A) = \frac{3}{8}$.

Scoring: 1 point for all 8 outcomes (no repeats or omissions); 1 point for the set A and the probability.

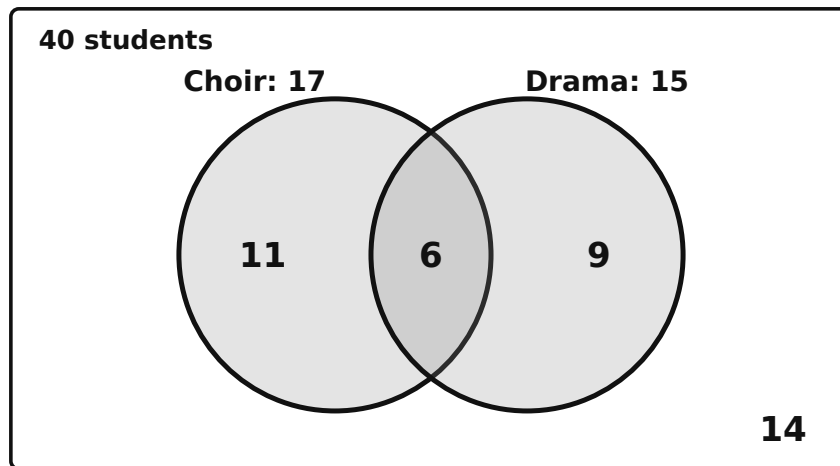
Question 2: Events from a set of numbers (2 points)

- a. A and B : $\{6, 12\}$. A or B : $\{2, 3, 4, 6, 8, 9, 10, 12\}$.
- b. $P(A \text{ or } B) = \frac{8}{12} = \frac{2}{3}$. $P(\text{not } A) = \frac{6}{12} = \frac{1}{2}$.

Scoring: 1 point for both lists; 1 point for both probabilities.

Question 3: Addition rule with a Venn diagram (2 points)

- a. Choir $11+6=17$, drama $9+6=15$: $P(\text{choir}) = \frac{17}{40}$, $P(\text{drama}) = \frac{15}{40} = \frac{3}{8}$, $P(\text{both}) = \frac{6}{40} = \frac{3}{20}$.
- b. $\frac{17}{40} + \frac{15}{40} - \frac{6}{40} = \frac{26}{40} = \frac{13}{20}$. Neither: $\frac{14}{40} = \frac{7}{20}$.



Totals for each circle.

Scoring: 1 point for the three probabilities; 1 point for the union (with the subtraction shown) and the probability of neither.

Question 4: Independent or not (2 points)

- a. $P(A)P(B) = 0.3 \cdot 0.6 = 0.18 = P(A \text{ and } B)$, so the events are **independent**.
 b. $P(A|B) = \frac{0.2}{0.6} = \frac{1}{3}$.

Scoring: 1 point for the product comparison and conclusion; 1 point for the correct conditional probability.

Question 5: Two-way table of lunches (3 points)

- a. $\frac{64}{120} = \frac{8}{15}$.
 b. The packed lunch row has 56 students, 32 in 10th: $\frac{32}{56} = \frac{4}{7}$.
 c. $P(\text{school} | 9\text{th}) = \frac{36}{60} = \frac{3}{5} = 0.6$, but $P(\text{school}) = \frac{8}{15} \approx 0.533$. The values differ, so the events are **not independent**.

	9th	10th	Total
School lunch	36	28	64
Packed lunch	24	32	56
Total	60	60	120

The counts used in parts b and c.

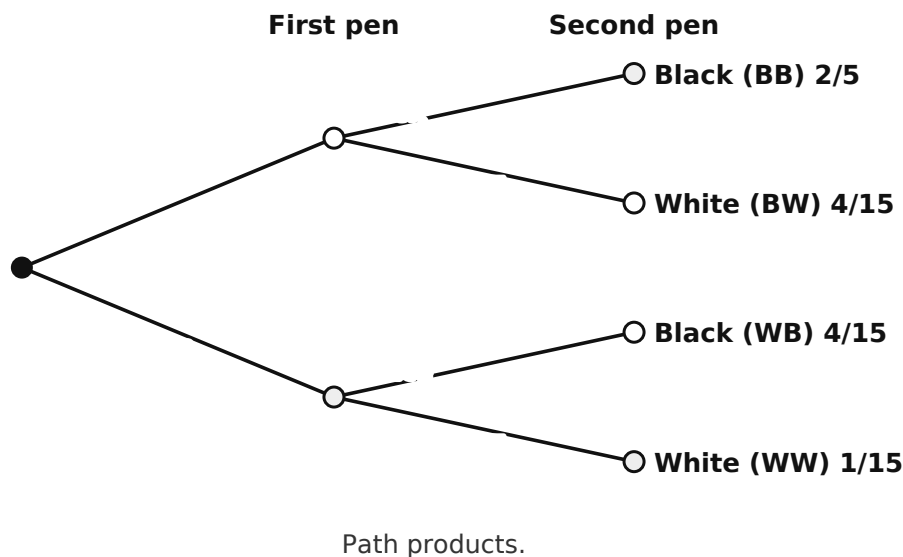
Scoring: 1 point per part.

Question 6: Pens without replacement (3 points)

a. $\frac{4}{6} \cdot \frac{3}{5} = \frac{12}{30} = \frac{2}{5}$.

b. Black-white $\frac{4}{6} \cdot \frac{2}{5} = \frac{8}{30}$ and white-black $\frac{2}{6} \cdot \frac{4}{5} = \frac{8}{30} : \frac{16}{30} = \frac{8}{15}$.

c. Second white: $\frac{8}{30} + \frac{2}{30} = \frac{10}{30} = \frac{1}{3}$. Then $\frac{8/30}{10/30} = \frac{4}{5}$.



Scoring: 1 point per part; in part c, award the point for $\frac{4}{5}$ with the correct denominator $\frac{1}{3}$ shown.

Question 7: Free throws in a row (3 points)

a. $0.8 \cdot 0.8 = \mathbf{0.64}$.

b. $0.2 \cdot 0.2 = \mathbf{0.04}$.

c. $1 - 0.04 = \mathbf{0.96}$ (the complement of missing both).

Scoring: 1 point per part.

Question 8: Conditional probability formula (2 points)

a. $P(C|D) = \frac{0.25}{0.60} = \frac{5}{12}$.

b. $P(D|C) = \frac{0.25}{0.40} = \mathbf{0.625}$.

Scoring: 1 point per part; the denominator must be the probability of the given event.

Question 9: At least one six (1 point)

$P(\text{no six on one roll}) = \frac{5}{6}$, so $P(\text{no six in two rolls}) = \frac{25}{36}$. Then $1 - \frac{25}{36} = \frac{11}{36}$.

Scoring: 1 point for $\frac{11}{36}$ with the complement idea shown.

Total

20 points