

AP Statistics · Probability and Random Variables · Worksheet Answer Key

Common Core AP Statistics Unit 2 (2026-27) · mathovore.fr

This ap statistics probability worksheet answer key solves all 24 problems of the probability and random variables worksheet step by step.

Complete worked solutions for all 24 problems follow, with the formula, the substitution and the final answer in bold. Keep unrounded values until the last step, then round to the accuracy asked. For interpretation problems, write the answer in the context of the situation.

AP StatisticsCommon Core: AP Statistics Unit 2 (2026-27)

AP Statistics Probability Worksheet Answer Key: problems 1-5

Problem 1: Complete the table

Add across each row and down each column. Rows: $20+70+60=150$ and $30+55+15=100$. Columns: $20+30=50$, $70+55=125$, $60+15=75$. Grand total: $150+100=250$ (also $50+125+75=250$).

Age group	Cash	Card	Mobile	Total
Under 40	20	70	60	150
40 and over	30	55	15	100
Total	50	125	75	250

Totals: 150, 100, 50, 125, 75 and 250.

Problem 2: Joint relative frequency

$\frac{55}{250} = 0.22$. **22% of all shoppers are 40 and over and pay by card.**

Problem 3: Marginal relative frequency

$\frac{75}{250} = 0.30$. **30% of all shoppers pay by mobile payment.**

Problem 4: Conditional relative frequency

The given group is the 150 shoppers under 40: $\frac{70}{150} \approx 0.467$. **About 46.7% of shoppers under**

40 pay by card.

Problem 5: Reverse condition

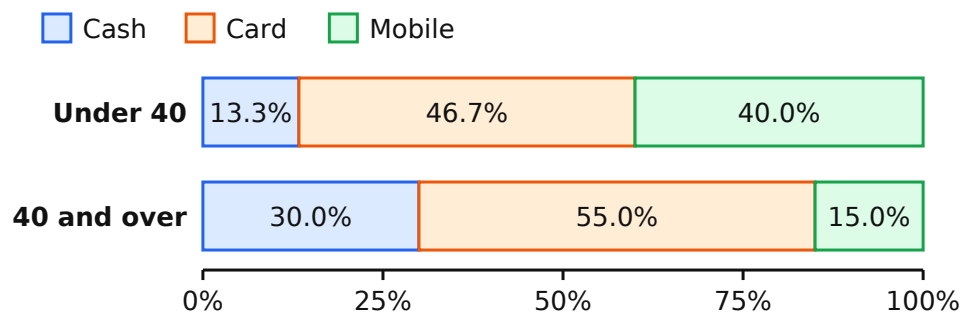
The given group is the 50 cash shoppers: $\frac{30}{50} = 0.60$. **60% of cash shoppers are 40 and over.**

The condition changes the denominator (50 instead of 150), so the two conditional proportions answer different questions.

AP Statistics Probability Worksheet Answer Key: problems 6-10

Problem 6: Compare conditional distributions

Under 40: cash $\frac{20}{150} \approx 13.3\%$, card $\frac{70}{150} \approx 46.7\%$, mobile $\frac{60}{150} = 40.0\%$. 40 and over: cash $\frac{30}{100} = 30\%$, card $\frac{55}{100} = 55\%$, mobile $\frac{15}{100} = 15\%$.



The bars have clearly different splits.

The distributions differ a lot (mobile is 40% versus 15%), so **payment method is associated with age group**.

Problem 7: Complement rule

$P(\text{not defective}) = 1 - 0.04 = 0.96$. **0.96**

Problem 8: Spinner

Red and blue cannot happen on the same spin, so they are mutually exclusive:

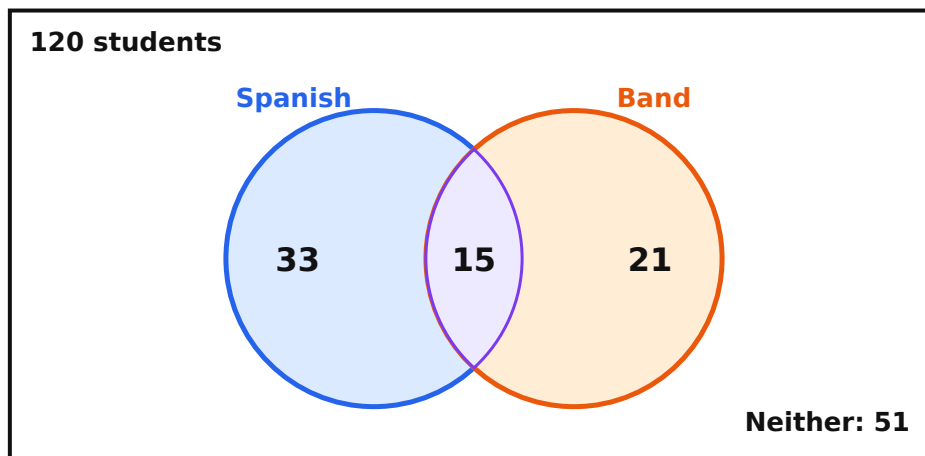
$$P(\text{red or blue}) = \frac{3}{8} + \frac{2}{8} = \frac{5}{8} = 0.625.$$

$$P(\text{not green}) = 1 - \frac{2}{8} = \frac{6}{8} = 0.75.$$

0.625 and 0.75; yes, mutually exclusive.

Problem 9: Venn diagram

Spanish only: $48 - 15 = 33$. Band only: $36 - 15 = 21$. Neither: $120 - (33 + 15 + 21) = 51$.



Regions sum to 120.

$$P(\text{neither}) = \frac{51}{120} = 0.425. \quad \mathbf{0.425}$$

Problem 10: General addition rule

$P(A \text{ or } B) = 0.5 + 0.4 - 0.2 = 0.7$. Because $P(A \text{ and } B) = 0.2 \neq 0$, the events can happen together and are **not mutually exclusive**.

AP Statistics Probability Worksheet Answer Key: problems 11-15

Problem 11: Conditional probability

$$P(\text{honor roll} | \text{job}) = \frac{0.18}{0.45} = 0.40. \quad \mathbf{0.40}$$

Problem 12: Without replacement

$$P(\text{both red}) = \frac{5}{8} \cdot \frac{4}{7} = \frac{20}{56} = \frac{5}{14} \approx 0.357.$$

$$P(\text{red, then blue}) = \frac{5}{8} \cdot \frac{3}{7} = \frac{15}{56} \approx 0.268.$$

Problem 13: Test independence

$$\text{Overall, } P(\text{card}) = \frac{36 + 84}{200} = 0.60. \text{ Given 9th grade, } P(\text{card} | 9\text{th}) = \frac{36}{60} = 0.60.$$

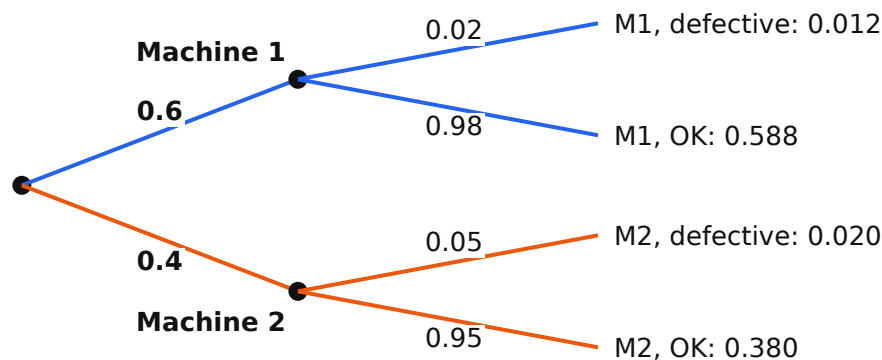
The two probabilities are equal (and $P(10\text{th} | \text{card}) = \frac{84}{120} = 0.70 = P(10\text{th})$), so **the events are independent**.

Problem 14: Independent events

$P(A \text{ and } B) = 0.3 \times 0.6 = 0.18$. $P(A \text{ or } B) = 0.3 + 0.6 - 0.18 = 0.72$. **0.18 and 0.72**

Problem 15: Tree diagram

Multiply along each branch: $0.6 \times 0.02 = 0.012$, $0.6 \times 0.98 = 0.588$, $0.4 \times 0.05 = 0.020$, $0.4 \times 0.95 = 0.380$. These sum to 1.



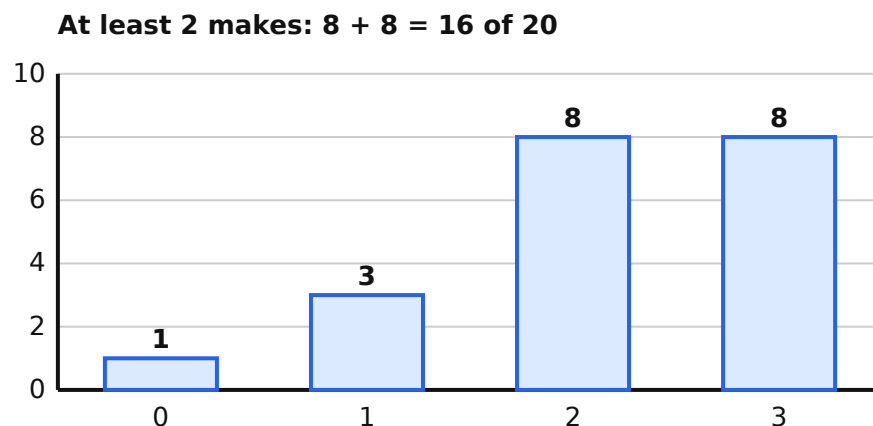
Joint probabilities.

$P(\text{defective}) = 0.012 + 0.020 = 0.032$. **0.032**

AP Statistics Probability Worksheet Answer Key: problems 16-20

Problem 16: Simulation design

Let digits 0 to 6 be a make (7 of 10 digits = 70%) and 7, 8, 9 a miss. Read three digits per trial and count the makes. Repeat for many trials.



Trials with 2 or 3 makes.

$$\frac{8+8}{20} = 0.80. \text{ The estimate is } 0.80.$$

Problem 17: Valid distribution

Probabilities sum to 1: $0.1+0.3+k+0.2=1$, so $k=0.4$.

$$P(X \geq 2) = 0.4+0.2=0.6. \quad k=0.4 \text{ and } 0.6$$

Problem 18: Mean of a random variable

$$\mu_X = 0(0.2)+1(0.5)+2(0.2)+3(0.1) = 0+0.5+0.4+0.3 = 1.2. \quad \mathbf{1.2 \text{ pets}}$$

Problem 19: Standard deviation of a random variable

$$\begin{aligned} \sigma_X^2 &= (0-1.2)^2(0.2)+(1-1.2)^2(0.5)+(2-1.2)^2(0.2)+(3-1.2)^2(0.1) \\ &= 0.288+0.020+0.128+0.324 = 0.76, \text{ so } \sigma_X = \sqrt{0.76} \approx 0.87. \quad \mathbf{\text{About } 0.87 \text{ pets}} \end{aligned}$$

Problem 20: Raffle

$$\mu_X = 300 \cdot \frac{1}{200} + 50 \cdot \frac{2}{200} + 10 \cdot \frac{4}{200} + 0 \cdot \frac{193}{200} = 1.50 + 0.50 + 0.20 = 2.20 \text{ dollars.}$$

$$\text{Net gain: } 2.20 - 5 = -\$2.80.$$

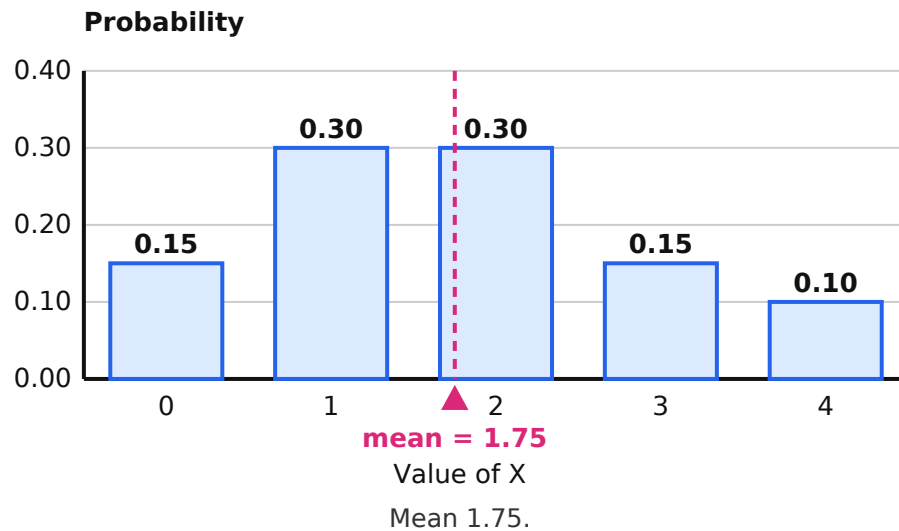
The mean prize is \$2.20, and the mean net gain is −\$2.80. Over many tickets, a buyer loses an average of \$2.80 per ticket, which is how the school raises money.

AP Statistics Probability Worksheet Answer Key: problems 21-24

Problem 21: Claw machine

$$\mu_X = 0+0.30+0.60+0.45+0.40 = 1.75.$$

$$\begin{aligned} \sigma_X^2 &= (1.75)^2(0.15)+(0.75)^2(0.30)+(0.25)^2(0.30)+(1.25)^2(0.15)+(2.25)^2(0.10) \\ &= 0.459375+0.16875+0.01875+0.234375+0.50625 = 1.3875, \text{ so } \sigma_X = \sqrt{1.3875} \approx 1.18. \end{aligned}$$



Within one SD: 1.75 ± 1.18 gives the interval from 0.57 to 2.93, which contains 1 and 2:
 $0.30 + 0.30 = 0.60$. $\mu = 1.75$, $\sigma \approx 1.18$, **probability 0.60**

Problem 22: Die game

$$P(9) = \frac{1}{6}, P(3) = \frac{2}{6}, P(0) = \frac{3}{6}.$$

$$\mu_X = 9 \cdot \frac{1}{6} + 3 \cdot \frac{2}{6} = 1.5 + 1 = 2.5.$$

$$\sigma_X^2 = (6.5)^2 \frac{1}{6} + (0.5)^2 \frac{2}{6} + (2.5)^2 \frac{3}{6} = 7.0417 + 0.0833 + 3.125 = 10.25, \text{ so } \sigma_X = \sqrt{10.25} \approx 3.20.$$

Net gain: $2.5 - 3 = -\$0.50$. **The game is not fair: the player loses \$0.50 per game on average.**

Problem 23: Screening test

With the condition: 50 people, of whom $0.90(50) = 45$ test positive and 5 test negative. Without it: 950 people, of whom $0.08(950) = 76$ test positive and 874 negative.

	Positive	Negative	Total
Condition	45	5	50
No condition	76	874	950
Total	121	879	1,000

$$P(\text{positive}) = \frac{121}{1000} = 0.121.$$

$$P(\text{condition}|\text{positive}) = \frac{45}{121} \approx 0.372.$$

0.121 and about 0.372: most positive tests are false alarms because the condition is rare.

Problem 24: Battery inspection

$P(0) = \frac{8}{10} \cdot \frac{7}{9} = \frac{28}{45}$, $P(2) = \frac{2}{10} \cdot \frac{1}{9} = \frac{1}{45}$, $P(1) = 2 \cdot \frac{8}{10} \cdot \frac{2}{9} = \frac{16}{45}$. They sum to $\frac{45}{45} = 1$.

$$\mu_X = 0 \cdot \frac{28}{45} + 1 \cdot \frac{16}{45} + 2 \cdot \frac{1}{45} = \frac{18}{45} = 0.4.$$

$$\sigma_X^2 = (0.4)^2 \frac{28}{45} + (0.6)^2 \frac{16}{45} + (1.6)^2 \frac{1}{45} \approx 0.0996 + 0.1280 + 0.0569 = 0.2844, \text{ so } \sigma_X \approx 0.53.$$

$$\mu_X = 0.4 \text{ and } \sigma_X \approx 0.53$$

How to use this ap statistics probability worksheet answer key

Read this ap statistics probability worksheet answer key after trying each problem yourself, and redo any problem you missed.

