

Precalculus · Counting, Permutations, Combinations and Probability · Quiz

Common Core S-CP.B.8, S-CP.B.9, S-MD.A.1, S-MD.A.2 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

This precalculus counting probability quiz asks 10 multiple-choice questions on counting, permutations, combinations and probability, and each answer comes with a short explanation.

Ten multiple-choice questions on counting, permutations and combinations, dice and card probability, the multiplication rule and expected value. Exactly one option is correct, and each explanation points out the typical mistake.

Precalculus Common Core: S-CP.B.8 · S-CP.B.9 · S-MD.A.1 · S-MD.A.2

Questions

Question 1

A cafeteria meal has 1 of 3 salads, 1 of 4 entrees and 1 of 2 drinks. How many different meals are possible?

- A. 24
- B. 9
- C. 12
- D. 48

Question 2

Six runners are in a race. In how many ways can first place and second place be awarded?

- A. 15
- B. 12
- C. 36
- D. 30

Question 3

Evaluate ${}_8C_3$.

- A. 56
- B. 336
- C. 24

D. 512

Question 4

How many distinct arrangements of the letters in LEVEL are there?

- A. 120
- B. 30
- C. 60
- D. 24

Question 5

		Die 1					
		1	2	3	4	5	6
Die 2	1	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10
	5	6	7	8	9	10	11
	6	7	8	9	10	11	12

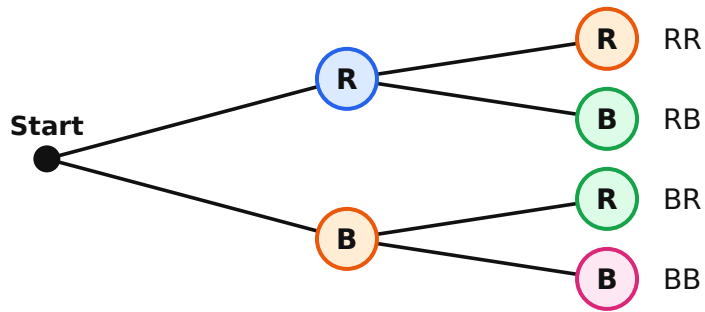
Sums equal to 9 are highlighted: 4 of 36 outcomes

Each cell is one equally likely outcome.

Two fair dice are rolled. What is the probability that the sum is 9?

- A. $\frac{1}{6}$
- B. $\frac{1}{9}$
- C. $\frac{1}{12}$
- D. $\frac{5}{36}$

Question 6



Multiply along the branches to get the probability of each outcome.

A bag has 3 red and 2 blue marbles. Two are drawn without replacement. What is the probability that both are red?

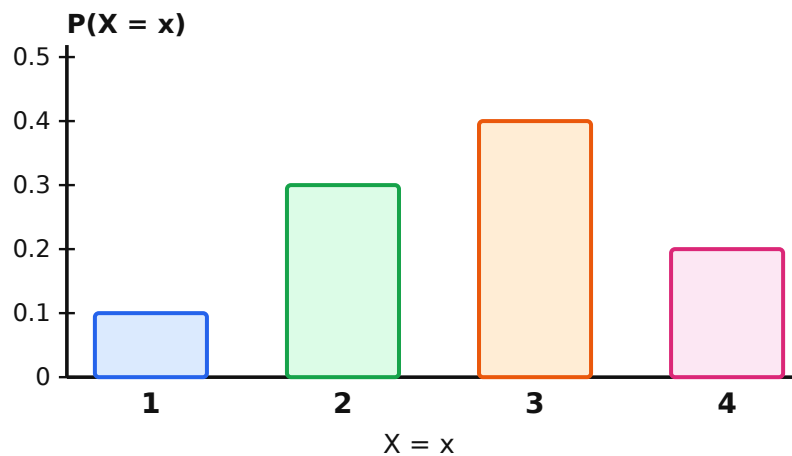
- A. $\frac{9}{25}$
- B. $\frac{3}{5}$
- C. $\frac{3}{10}$
- D. $\frac{3}{20}$

Question 7

Events A and B have $P(A)=0.5$ and $P(B|A)=0.4$. What is $P(A \text{ and } B)$?

- A. 0.9
- B. 0.8
- C. 0.1
- D. 0.2

Question 8



Bar heights are probabilities and add to 1.

The graph shows the distribution of X . What is $E(X)$?

- A. 2.7
- B. 2.5
- C. 3.0
- D. 1.0

Question 9

A game costs . Roll a fair die and win if the result is a six, otherwise win nothing. What is the expected net result per play?

- A. .00
- B. .00
- C. -.00
- D. -.00

Question 10

A fair coin is flipped 3 times. What is the probability of at least one tail?

- A. $\frac{1}{1000}$
- B. $\frac{7}{1000}$
- C. $\frac{7}{10000}$
- D. $\frac{7}{100000}$

Answer key

1. **A** - Multiply the choices: $3 \times 4 \times 2 = 24$. Adding gives 9, and leaving out the drinks gives 12.
2. **D** - ${}_6P_2 = 6 \cdot 5 = 30$ because order matters. Dividing by 2 gives the combination 15.
3. **A** - ${}_8C_3 = \frac{8 \cdot 7 \cdot 6}{3!} = 56$. The number 336 is the permutation, which forgets to divide by 3!.
4. **B** - There are 5 letters with L twice and E twice: $5!/(2! \cdot 2!) = 30$. Using 5! counts repeated letters as different.
5. **B** - Four of the 36 cells have sum 9, so the probability is $4/36 = 1/9$. A probability of $1/6$ belongs to a sum of 7.
6. **C** - Multiply along the RR path: $3/5 \times 2/4 = 3/10$. The value $9/25$ comes from drawing with replacement.
7. **D** - Multiply: $0.5 \times 0.4 = 0.2$. Adding the probabilities gives 0.9, and dividing gives 0.8.
8. **A** - $E(X) = 1(0.1) + 2(0.3) + 3(0.4) + 4(0.2) = 2.7$. The plain average 2.5 ignores the probabilities.
9. **C** - Expected winnings are $12 \times 1/6 = .00$, so the net result is $2 - 3 = -.00$. The value .00 forgets the cost to play.
10. **B** - Use the complement: $1 - (1/2)^3 = 7/8$. The value $1/8$ is the probability of no tails.

How does this quiz work?

Read each question, choose one answer among A, B, C and D, then check it: a short explanation appears after every answer. Your score out of 10 is shown at the end, and you can restart the quiz as often as you like.

What should you review before the quiz?

Reread the key facts of the lesson and the worked example. If a question is hard, go back to the matching part of the lesson, then try the quiz again. Write your work on scrap paper: most mistakes come from skipping a step, not from the idea itself.

Remember:

- Standards S-CP.B.8, S-CP.B.9, S-MD.A.1 and S-MD.A.2: use the multiplication rule, permutations and combinations, and expected value.
- Permutations ${}_nP_r = \frac{n!}{(n-r)!}$; combinations ${}_nC_r = \frac{n!}{r!(n-r)!}$.
- General multiplication rule: $P(A \text{ and } B) = P(A) \cdot P(B|A)$.
- Expected value: $E(X) = \sum x \cdot P(X = x)$; a game is fair when the expected net result is \$0.
- Two dice have 36 equally likely outcomes, and a standard deck has 52 cards.

How to use this precalculus counting probability quiz

Retake this precalculus counting probability quiz until every answer is right, then move on to the worksheet and the test.

