Probability and Conditional Events

Use this key to check answers and read the explanations.

1. A cup holds three cards labeled 2, 4 and 6. One card is selected. Which list gives the complete sample space for the number drawn?

A. 2, 4, 6
B. 2, 4
C. 2, 4, 6, 8
D. 4, 6, 8

Correct answer: A. 2, 4, 6
The sample space contains every possible number that can be drawn. Only 2, 4 and 6 appear on the cards.

2. Six identical-size tiles are marked A, A, B, C, C and C. If one tile is selected uniformly at random, what is the probability of selecting a C?

A. 2/3
B. 1/3
C. 1/2
D. 1/6

Correct answer: C. 1/2
Three of the six individual tiles carry a C. The probability is 3/6, which reduces to 1/2.

3. A game asks you to pick one of two different hats and one of three different badges. How many distinct hat-and-badge pairs are possible?

A. 5
B. 6
C. 8
D. 9

Correct answer: B. 6
Each of the two hats can be paired with any of the three badges. Multiplying 2 by 3 gives six pairs.

4. One ticket is drawn from tickets numbered 1 through 8. The event is drawing a number greater than 5. Which event is its complement?

A. Drawing a number greater than 6
B. Drawing a number at least 5
C. Drawing a number less than 5
D. Drawing a number at most 5

Correct answer: D. Drawing a number at most 5
The original event includes 6, 7 and 8. All the other possible tickets, including 5, belong to the complement.

5. Of 20 folders on a shelf, 7 have torn labels. One folder is selected uniformly at random. What is the probability that its label is not torn?

A. 7/20
B. 13/20
C. 7/13
D. 1/20

Correct answer: B. 13/20
Thirteen of the 20 folders have labels that are not torn. You can also subtract 7/20 from 1.

6. A spinner has eight equal sections numbered 1 through 8. What is the probability that one spin lands on 2 or 7?

A. 1/4
B. 1/8
C. 3/8
D. 1/16

Correct answer: A. 1/4
The two sections cannot both be the result of one spin. Add their probabilities to get 2/8, or 1/4.

7. You independently roll a fair six-sided die and flip a fair coin. What is the probability of rolling a 4 and getting heads?

A. 1/3
B. 1/6
C. 1/8
D. 1/12

Correct answer: D. 1/12
The die and coin outcomes do not affect one another. Multiply 1/6 by 1/2 to get 1/12.

8. A bag contains 3 orange and 2 blue tokens. An orange token is drawn and set aside. If another token is drawn uniformly at random, what is the probability that it is blue?

A. 1/5
B. 2/5
C. 1/2
D. 2/3

Correct answer: C. 1/2
Two blue tokens remain. There are now four tokens in the bag altogether, so the probability is 2/4, or 1/2.

9. Of 14 choir members, 6 are also in drama. Of 16 students outside choir, 8 are in drama. A student is chosen uniformly from drama. What is the probability the student is in choir?

A. 3/7
B. 1/2
C. 1/5
D. 7/15

Correct answer: A. 3/7
Only drama students can be chosen. There are 6 plus 8, or 14, drama students. Six of those 14 are in choir.

10. For two events, the chance of A is 0.4, the chance of B is 0.5 and the chance that both happen is 0.2. What does this tell you?

A. Whenever B happens, A also happens.
B. A and B cannot happen together.
C. Whenever A happens, B also happens.
D. A and B are independent.

Correct answer: D. A and B are independent.
Independent events have a joint probability equal to the product of their separate probabilities. Here 0.4 times 0.5 equals the stated 0.2.

11. A bag holds 2 green and 3 white tokens. You draw twice uniformly at random, replacing the first token before drawing again. What is the probability of drawing at least one green token?

A. 12/25
B. 9/25
C. 16/25
D. 4/25

Correct answer: C. 16/25
The only way to get no green token is to draw white both times, which has probability 3/5 times 3/5. Subtract 9/25 from 1 to get 16/25.

12. A bag holds 5 purple and 3 yellow tokens. Two are drawn uniformly at random without replacement. What is the probability of drawing exactly one purple token?

A. 15/56
B. 15/28
C. 5/14
D. 3/28

Correct answer: B. 15/28
Purple then yellow has probability 5/8 times 3/7. Yellow then purple has probability 3/8 times 5/7. The two orders total 30/56, which reduces to 15/28.

13. In a group of 35 students, 15 volunteer, 12 play sports and 5 do both. A student is chosen uniformly at random. What is the probability the student volunteers or plays sports, including those who do both?

A. 5/35
B. 27/35
C. 17/35
D. 22/35

Correct answer: D. 22/35
The two group counts add to 27, but that sum counts the five students who do both twice. Subtract 5 once to get 22 favorable choices out of 35.

14. Of 40 festival visitors, 18 took the bus, 14 bought a meal voucher and 6 did both. A visitor is chosen uniformly from those who did not buy a voucher. What is the probability the visitor took the bus?

A. 6/13
B. 3/7
C. 3/10
D. 9/20

Correct answer: A. 6/13
There were 40 minus 14, or 26, visitors without a voucher. Of the 18 bus riders, 6 bought a voucher, leaving 12 bus riders in the eligible group. The answer is 12/26, or 6/13.

15. A fair six-sided die selects pouch A on a 1 or 2 and pouch B otherwise. Pouch A has 3 red and 1 blue token. Pouch B has 1 red and 3 blue tokens. One token is then drawn uniformly from the selected pouch. What is the probability it is red?

A. 7/12
B. 1/2
C. 5/12
D. 1/4

Correct answer: C. 5/12
The A-and-red path contributes 1/3 times 3/4, which is 1/4. The B-and-red path contributes 2/3 times 1/4, which is 1/6. Add the two paths to get 5/12.