Counting and probability

ANSWERS

1

A lock code is three digits, each from 0 to 9. Digits can repeat. A code is chosen at random. Find the probability that all three digits are even.

All outcomes: $10 \times 10 \times 10 = 1000$

Outcomes wanted: $5 \times 5 \times 5 = 125$

Probability: $\frac{1}{8}$

Answer $\frac{1}{8}$

2

A café has 4 starters, 6 mains and 3 desserts. Soup is one of the starters and 2 of the mains are vegetarian.
Leah picks one of each at random.
Find the probability she picks soup and a vegetarian main.

All outcomes: $4 \times 6 \times 3 = 72$

Outcomes wanted: $1 \times 2 \times 3 = 6$

Probability: $\frac{1}{12}$

Answer $\frac{1}{12}$

3

A password is two different letters from A, B, C, D and E, then a digit from 1 to 9.
One is made at random.
Find the probability that it starts with A and ends with an odd digit.

All outcomes: $5 \times 4 \times 9 = 180$

Outcomes wanted: $1 \times 4 \times 5 = 20$

Probability: $\frac{1}{9}$

Answer $\frac{1}{9}$

4

The letters of MATHS are put in a row in a random order. Find the probability that the row starts with M and ends with S.

Probability: $\frac{1}{20}$

Answer $\frac{1}{20}$

5

A fair dice is rolled three times.
Find the probability of getting at least one 6.

no 6 at all: 5 × 5 × 5 = 125, so at least one 6: 216 − 125 = 91

Answer $\frac{91}{216}$

6

Two different cards from 1, 2, 3, 4 and 5 make a two digit number.
Find the probability that the number is even.

20 numbers; the last digit 2 or 4, then 4 choices: 2 × 4 = 8

Answer $\frac{2}{5}$

7

A code is three letters, each chosen from the same set of letters, and letters can repeat. The probability of guessing a code in one go is $\frac{1}{512}$. How many letters are in the set?

$n \times n \times n = 512$

Answer 8

8

A captain and a vice captain are picked at random from 8 players.
Find the probability that Ava is given one of the two jobs.

8 × 7 = 56 ways; Ava captain 7, Ava vice captain 7

Answer $\frac{1}{4}$

Counting and probability *further practice*

ANSWERS

9

A coin is flipped four times.
Find the probability of getting at least one tail.

16 outcomes, only HHHH has no tail

Answer $\frac{15}{16}$

10

Max has 5 tops, 2 of them red, 3 pairs of trousers and 4 pairs of shoes, 1 pair white. He picks one of each at random. Find the probability of a red top and white shoes.

2 × 3 × 1 = 6 out of 5 × 3 × 4 = 60

Answer $\frac{1}{10}$

11

Jo, Sam, Ali and Bea sit in a row of four chairs in a random order.
Find the probability that Jo and Sam sit at the two ends.

24 orders; Jo and Sam at the ends 2 ways, the middle 2 ways

Answer $\frac{1}{6}$

12

A PIN is four different digits from 0 to 9.
One is chosen at random.
Find the probability that every digit is odd.

5 × 4 × 3 × 2 = 120 out of 10 × 9 × 8 × 7 = 5040

Answer $\frac{1}{42}$

13

Three different letters of PRIME are put in a row at random. Find the probability that the first and last letters are both vowels.

5 × 4 × 3 = 60; vowels at the ends 2 × 1, middle 3 choices

Answer $\frac{1}{10}$

14

A fair dice is rolled three times.
Find the probability that all three numbers are different.

6 × 5 × 4 = 120 out of 216

Answer $\frac{5}{9}$

15

A code is three digits, each from 1 to 9, and digits can repeat.
Find the probability that the code has at least one 1 in it.

no 1 at all: 8 × 8 × 8 = 512, so 729 − 512 = 217

Answer $\frac{217}{729}$

16

Raj says the probability of at least one 6 in two rolls of a fair dice is $\frac{1}{6} + \frac{1}{6} = \frac{1}{3}$.
Explain his mistake and find the right probability.

two 6s is counted twice: 36 outcomes, 25 with no 6, so 11

Answer $\frac{11}{36}$