



## Probabilities of events

### ► relevant probability formulas ◀

- combined events  $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- mutually exclusive events  $P(A \cup B) = P(A) + P(B)$ , that is  $P(A \cap B) = 0$

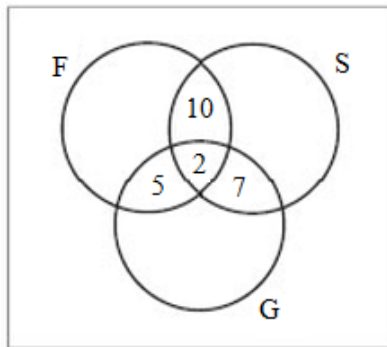
### Exercises

- A fair die is rolled once. Write down the probability that the number shown on top is:
  - an odd number
  - a number greater than 2
  - a number greater than or equal to 2
  - a prime number
  - a number greater than 2 **and** a prime number
  - a number greater than 2 **or** a prime number
  - a number greater than 2 or a prime number, but not both
- A bag contains 6 white, 4 red and 2 black balls. A single ball is selected randomly. What is the probability that it is:
  - red
  - not black
  - white or black
  - white and black
  - red or black
  - red or not black
- A bag contains 5 white and 3 red balls. A ball is removed at random and is not replaced into the bag. A second ball is removed randomly. What is the probability that:
  - both balls are white
  - both balls are red
  - the two balls are different colors
  - the two balls are the same color
  - the first ball is red and the second ball is white
- A bag contains 5 white and 3 red balls. A ball is selected at random and after its color is recorded it is replaced back into the bag and a ball is again selected randomly. What is the probability that:
  - both selections are white
  - both selections are red
  - the two selections are different colors
  - the two selections are the same color
  - the first selection is red and the second selection is white
- Three fair coins are tossed. What is the probability that:
  - all three coins show heads;
  - there is exactly two heads showing;
  - there is only one head showing.



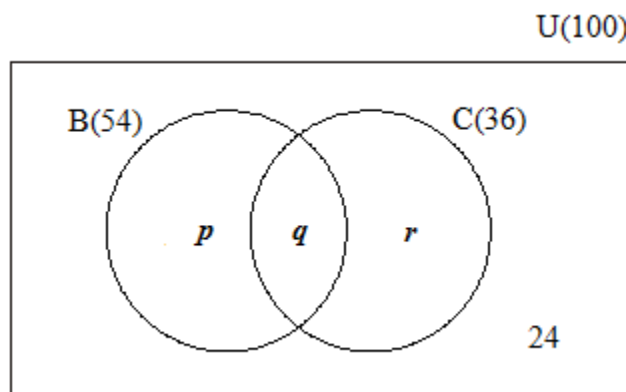
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6. The Venn diagram shows some of the information about 90 students in the last year of a secondary school. In this group of 90, 41 study French (F), 39 study Spanish (S) and 26 study German (G).



A student is chosen at random from the 90 students. Find the probability that the student:

- studies Spanish and French;
  - studies only French;
  - does not study any of these languages.
7. Assume that the probability that a woman giving birth to a boy or to a girl are equal, i.e. the probability of either event is  $\frac{1}{2}$ . Suppose a woman decides to have four children. What is the probability that:
- all four of the children are girls;
  - at least one of the children is a boy.
8. In a group of 100 girls, 54 study biology (B), 36 study chemistry (C) and 24 do not study either subject. This information is represented in the following Venn diagram.



- Calculate the values of  $p$ ,  $q$  and  $r$ .
- A student is selected at random from the group. Calculate the probability that she studies **both** biology and chemistry.
- A group of three students is selected at random from the group.
  - Calculate the probability that none of the three students studies biology.
  - Calculate the probability that at least one of the three students studies biology.