

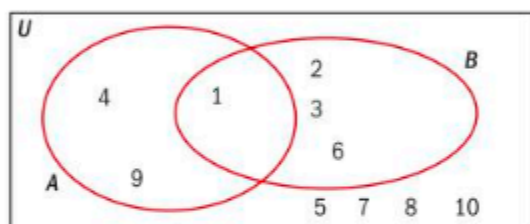
PRACTICE 7.3 – Probability Formulae: Union and Intersection

* Full, worked solutions can be found in the folder linked on the Course Website ☺

Exercise 7F

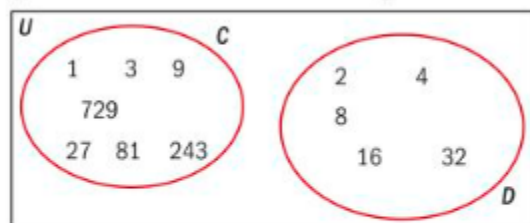
- 1 A fair decahedral die numbered 1, 2, 3, ..., 10 is thrown and the number noted.

The events A , “throw a square number”, and B , “throw a factor of six”, are represented on the Venn diagram below:



- Find $P(A)$, $P(B)$, $P(A \cap B)$ and $P(A \cup B)$.
 - Hence show that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.
 - State with a reason whether events A and B are mutually exclusive.
- 2 A fair dodecahedral die numbered 1, 2, 3, 4, 8, 9, 16, 27, 32, 81, 243 and 729 is thrown and the number noted.

The events C , “throw an odd number”, and D , “throw an even number”, are represented on the Venn diagram below:



- Find $P(C)$, $P(D)$, $P(C \cap D)$ and $P(C \cup D)$.
- Hence show that $P(C \cup D) = P(C) + P(D)$.
- State with a reason whether events C and D are mutually exclusive.

- 3 A school is inspecting 24 student lockers before the start of the new academic year to see if they have been left tidy. It is found that some lockers have some food items left inside and some lockers have stationery items inside. Lockers 2, 5, 7, 8, 11, 17, 18 and 19 all have food items and lockers 1, 3, 4, 11, 13, 15, 17, 20 and 21 all have stationery items.

- Draw this information on a Venn diagram.
 - State with a reason whether events “a randomly chosen locker contains food items” and “a randomly chosen locker contains stationery items” are mutually exclusive.
 - Find the probability that a locker selected at random has at least one type of item left inside.
- 4 Finn explores the ages of the people in his family. He represents his family’s ages with the set $U = \{2, 3, 4, 6, 8, 9, 10, 12, 14, 15, 16, 25, 35, 55, 65\}$.
- Draw U and each of the following sets on a Venn diagram:
 $A = \{\text{even numbers}\}$, $B = \{\text{multiples of 3}\}$, $C = \{\text{prime numbers}\}$ and $D = \{\text{numbers greater than 30}\}$.
 - Finn chooses a family member at random. Use your diagram to determine which, if any, of A , B , C or D can form a mutually exclusive pair of events.