

## Probability

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### Exercise A

1. Which of these events are mutually exclusive? For those events that are mutually exclusive, find  $P(A \text{ or } B)$ .
  - (a) On a fair six-sided dice:
    - (i) Event A: rolling a multiple of 3; Event B: rolling a multiple of 4
    - (ii) Event A: rolling an even number; Event B: rolling a multiple of 5
  - (b) One card is selected from a standard pack of 52 cards.
    - (i) Event A: selecting a king; Event B: selecting a red card
    - (ii) Event A: selecting an ace; Event B: selecting a spade
  - (c) Two fair dice are rolled and the scores added.
    - (i) Event A: the total is a multiple of 6; Event B: the total is less than 5.
    - (ii) Event A: the total is greater than 7; Event B: the total is less than 9.
  
2. Which pairs of events from question 1 are independent? For those that are, calculate  $P(A \text{ and } B)$ .
  
3. Daniel has three blocks with letters C, A and T written on them. He arranges the blocks in a row randomly.
  - (a) Write down all possible arrangements of the three letters.
  - (b) Find the probability that the blocks make the word 'CAT' or 'ACT'.
  
4. A fair six-sided dice is rolled once. Define events  
 A: the dice shows an even number; B: the dice shows a prime number.
  - (a) Find  $P(A \text{ and } B)$ .
  - (b) Determine whether events A and B are independent.
  
5. 300 students in years 9, 10 and 11 at a school were asked to say which of Biology, Chemistry and Physics is their favourite science. The results are shown in this table.

Year group	Biology	Chemistry	Physics	Total
Year 9	41	29	27	97
Year 10	35	36	34	105
Year 11	37	30	31	98
Total	113	95	92	300



7.

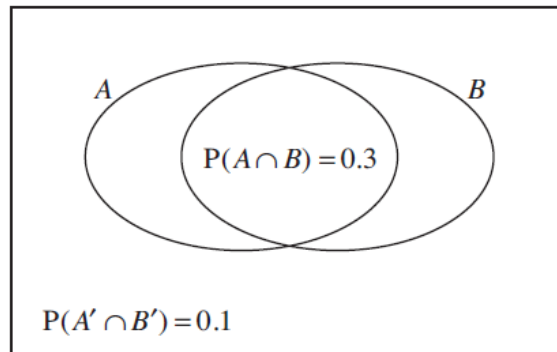
The events  $M$  and  $N$  are such that  $P(M) = P(N) = 2P(M \cap N)$ .

Given that  $P(M \cup N) = 0.6$ , find:

- (a)  $P(M \cap N)$       (b)  $P(M)$       (c)  $P(M' \cap N')$   
(d)  $P(M \cap N')$ .

8.

The Venn diagram illustrates the occurrence of two events  $A$  and  $B$ .



You are given that  $P(A \cap B) = 0.3$  and that the probability that neither  $A$  nor  $B$  occurs is 0.1. You are also given that  $P(A) = 2P(B)$ .

Find  $P(B)$ .

[3]

9.

A survey of all the households in the town of Bury was carried out. The survey showed that 70% have a freezer and 20% have a dishwasher and 80% have either a dishwasher or a freezer or both appliances. Find the probability that a randomly chosen household in Bury has both appliances.

10.

The probability that a child in a school has blue eyes is 0.27 and the probability they have blonde hair is 0.35. The probability that the child will have blonde hair or blue eyes or both is 0.45. A child is chosen at random from the school. Find the probability that the child has

- a** blonde hair and blue eyes,
- b** blonde hair but not blue eyes,
- c** neither feature.

11.

A patient going in to a doctor's waiting room reads *Hiya* Magazine with probability 0.6 and *Dakor* Magazine with probability 0.4. The probability that the patient reads either one or both of the magazines is 0.7. Find the probability that the patient reads

- a** both magazines, **b** *Hiya* Magazine only.