

Probability 3

- 1) There are 20 students in a classroom. Each student plays only one sport. The table below gives their sport and gender.

	Football	Tennis	Hockey
Female	5	3	3
Male	4	2	3

- (a) One student is selected at random.
- (i) Calculate the probability that the student is a male or is a tennis player.
- (ii) Given that the student selected is female, calculate the probability that the student does not play football. *[4 marks]*
- (b) Two students are selected at random. Calculate the probability that neither student plays football. *[3 marks]*

- 2) The letters of the word PROBABILITY are written on 11 cards as shown below.

P R O B A B I L I T Y

Two cards are drawn at random without replacement.

Let A be the event the first card drawn is the letter A.

Let B be the event the second card drawn is the letter B.

- (a) Find $P(A)$. *[1 mark]*
- (b) Find $P(B|A)$. *[2 marks]*
- (c) Find $P(A \cap B)$. *[3 marks]*

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[Maximum mark: 12]

- 3) In a class of 100 boys, 55 boys play football and 75 boys play rugby. Each boy must play at least one sport from football and rugby.

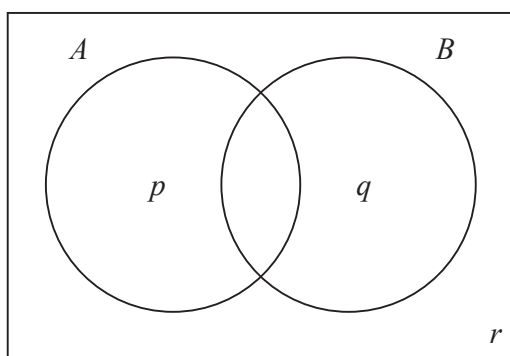
- (a) (i) Find the number of boys who play both sports.
(ii) Write down the number of boys who play only rugby. [3 marks]
- (b) One boy is selected at random.
(i) Find the probability that he plays only one sport.
(ii) Given that the boy selected plays only one sport, find the probability that he plays rugby. [4 marks]

Let A be the event that a boy plays football and B be the event that a boy plays rugby.

- (c) Explain why A and B are **not** mutually exclusive. [2 marks]
- (d) Show that A and B are **not** independent. [3 marks]

- 4) Consider the events A and B , where $P(A) = 0.5$, $P(B) = 0.7$ and $P(A \cap B) = 0.3$.

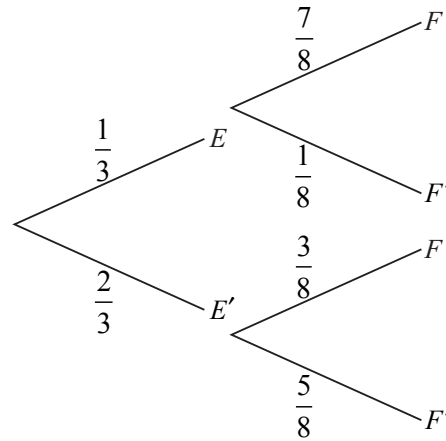
The Venn diagram below shows the events A and B , and the probabilities p , q and r .



- (a) Write down the value of
(i) p ;
(ii) q ;
(iii) r . [3 marks]
- (b) Find the value of $P(A|B')$. [2 marks]
- (c) Hence, or otherwise, show that the events A and B are **not** independent. [1 mark]

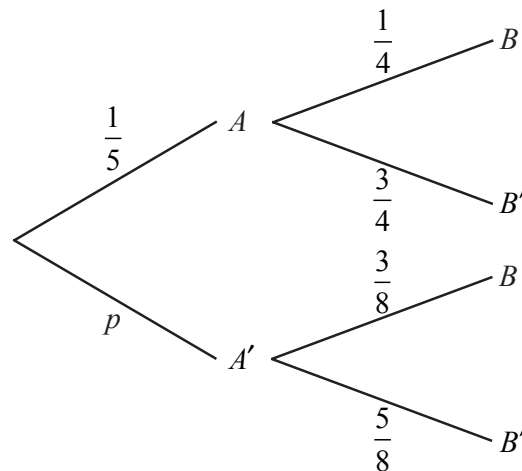
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- 5) José travels to school on a bus. On any day, the probability that José will miss the bus is $\frac{1}{3}$.
 If he misses his bus, the probability that he will be late for school is $\frac{7}{8}$.
 If he does not miss his bus, the probability that he will be late is $\frac{3}{8}$.
 Let E be the event “he misses his bus” and F the event “he is late for school”.
 The information above is shown on the following tree diagram.



- (a) Find
- (i) $P(E \cap F)$;
 - (ii) $P(F)$. [4 marks]
- (b) Find the probability that
- (i) José misses his bus and is not late for school;
 - (ii) José missed his bus, given that he is late for school. [5 marks]

- 6) The diagram below shows the probabilities for events A and B , with $P(A') = p$.



- (a) Write down the value of p . [1 mark]
- (b) Find $P(B)$. [3 marks]
- (c) Find $P(A'|B)$. [3 marks]