

1. Events  $A$  and  $B$  are such that  $P(A) = 0.3$  and  $P(B) = 0.4$ .
- (a) Find the value of  $P(A \cup B)$  when
- $A$  and  $B$  are mutually exclusive;
  - $A$  and  $B$  are independent.
- (4)
- (b) Given that  $P(A \cup B) = 0.6$ , find  $P(A | B)$ .
- (3)
- (Total 7 marks)**

2. In a population of rabbits, 1 % are known to have a particular disease. A test is developed for the disease that gives a positive result for a rabbit that **does** have the disease in 99 % of cases. It is also known that the test gives a positive result for a rabbit that **does not** have the disease in 0.1 % of cases. A rabbit is chosen at random from the population.
- (a) Find the probability that the rabbit tests positive for the disease.
- (2)
- (b) Given that the rabbit tests positive for the disease, show that the probability that the rabbit does not have the disease is less than 10 %.
- (3)
- (Total 5 marks)**

3. Jenny goes to school by bus every day. When it is not raining, the probability that the bus is late is  $\frac{3}{20}$ . When it is raining, the probability that the bus is late is  $\frac{7}{20}$ . The probability that it rains on a particular day is  $\frac{9}{20}$ . On one particular day the bus is late. Find the probability that it is not raining on that day.
- (Total 5 marks)**

4. In a class of 20 students, 12 study Biology, 15 study History and 2 students study neither Biology nor History.
- (a) Illustrate this information on a Venn diagram.
- (2)
- (b) Find the probability that a randomly selected student from this class is studying both Biology and History.
- (1)
- (c) Given that a randomly selected student studies Biology, find the probability that this student also studies History.
- (1)
- (Total 4 marks)**