

1. At a nursing college, 80 % of incoming students are female. College records show that 70 % of the incoming females graduate and 90 % of the incoming males graduate. A student who graduates is selected at random. Find the probability that the student is male, giving your answer as a fraction in its lowest terms.
(Total 5 marks)
2. 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)
3. 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)
4. Two players, A and B, alternately throw a fair six-sided dice, with A starting, until one of them obtains a six. Find the probability that A obtains the first six.
(Total 7 marks)
5. An influenza virus is spreading through a city. A vaccination is available to protect against the virus. If a person has had the vaccination, the probability of catching the virus is 0.1; without the vaccination, the probability is 0.3. The probability of a randomly selected person catching the virus is 0.22.
- (a) Find the percentage of the population that has been vaccinated. (3)
- (b) A randomly chosen person catches the virus. Find the probability that this person has been vaccinated. (2)
- (Total 5 marks)

6. Let A and B be events such that $P(A) = 0.6$, $P(A \cup B) = 0.8$ and $P(A | B) = 0.6$.

Find $P(B)$.

(Total 6 marks)

7. Only two international airlines fly daily into an airport. UN Air has 70 flights a day and IS Air has 65 flights a day. Passengers flying with UN Air have an 18% probability of losing their luggage and passengers flying with IS Air have a 23% probability of losing their luggage. You overhear someone in the airport complain about her luggage being lost.

Find the probability that she travelled with IS Air.

(Total 6 marks)

8. If $P(A) = \frac{1}{6}$, $P(B) = \frac{1}{3}$, and $P(A \cup B) = \frac{5}{12}$, what is $P(A' | B')$?

(Total 6 marks)

9. Bag A contains 2 red and 3 green balls.

- (a) Two balls are chosen at random from the bag without replacement. Find the probability that 2 red balls are chosen.

(2)

Bag B contains 4 red and n green balls.

- (b) Two balls are chosen without replacement from this bag. If the probability that two red balls are chosen is $\frac{2}{15}$, show that $n = 6$.

(4)

A standard die with six faces is rolled. If a 1 or 6 is obtained, two balls are chosen from bag A, otherwise two balls are chosen from bag B.

- (c) Calculate the probability that two red balls are chosen.

(3)

- (d) Given that two red balls are chosen, find the probability that a 1 or a 6 was obtained on the die.

(4)

(Total 13 marks)