

Conditional probability

Q1. A bag contains three black balls and seven red balls. A ball is taken out and not replaced. This is repeated twice. What is the probability of each of these outcomes?

a all three are black

b exactly two are black

c exactly one is black

d none are black

Q2. One my way to work, I pass two sets of traffic lights. The probability that the first is green is $\frac{1}{3}$. If the first is green, the probability that the second is green is $\frac{1}{3}$. If the first is red, the probability that the second is green is $\frac{2}{3}$. What is the probability of each of these?

a both are green

b none are green

c exactly one is green

d at least one is green

Q3. A hand of five cards is dealt. What is the probability of each of these outcomes?

a all five are Spades

b all five are the same suit

c they are four Aces and any other card

d they are four of a kind and any other card

Q4. An engineering test is in two parts, a written test and a practical test. It is known that 90% who take the written test pass. When a person passes the written test, the probability that he/she will also pass the practical test is 60%. When a person fails the written test, the probability that he/she will pass the practical test is 20%.

a What is the probability that someone passes both tests?

b What is the probability that someone passes one test?

c What is the probability that someone fails both tests?

d What is the combined probability of the answers to parts **a**, **b** and **c**?

Q5. Each day Mr Smith runs home from work. He has a choice of three routes. The road, the fields or the canal path. On Monday, each route has an equal probability of being chosen. The route chosen on any day will not be picked the next day and so each of the other two routes has an equal probability of being chosen.

a Write down all the possible combinations so that Mr Smith runs home via the canal path on Wednesday (there are four of them). _____

b Calculate the probability that Mr Smith runs home via the canal path on Wednesday. _____

c Calculate the probability that Mr Smith runs home via the canal path on Tuesday. _____

d Using your results from parts **b** and **c**, write down the probability that Mr Smith runs home via the canal path on Thursday. _____

e Explain the answers to parts **b**, **c** and **d**.

Q6. Dooglies are notoriously difficult to make and 20% of them fail during the manufacturing process. Unfortunately, this failure cannot be detected until they are tested using the well known *Doogly Differentiation Routine*. Michelle has the job of testing them. She has a box of 15 Dooglies to test and, sure enough, 20% of them are dud. She takes three Dooglies from the box and tests them. She does not return them.

a) Draw a tree diagram to show the possible outcomes in terms of working or failing. _____

b) What is the probability of all three failing the *Doogly Differentiation Routine*? _____

c) What is the probability of all three passing the *Doogly Differentiation Routine*? _____

d) What is the probability of the first two passing and the third failing the *Doogly Differentiation Routine*? _____

e) What is the probability of two of the three passing the *Doogly Differentiation Routine*? _____

Q7. Shaheen has four black and five red socks in a drawer. She takes out two socks at random.

a) What is the probability that they are both black? _____

b) What is the probability that they are both red? _____

c) What is the probability that the first is red and the second is black or the first is black and the second is red? _____

d) Her little brother throws a yellow sock into the drawer. If she were now to choose a third sock at random, what is the probability it would be the yellow sock?

Q8. Six fair dice are thrown one after the other. What is the probability that five dice are sixes and one is not a six?

Q9. Alf is late for school with a probability of 0.9. Bert is late with a probability of 0.7. Chas is late with a probability of 0.6. On any particular day what is the probability of each of these?

a exactly one of them being late

b exactly two of them being late

Q10. Four fair dice are thrown one after the other. What is the probability that numbers in all dice are less than 6?
