

Probability 1

Q1.

Christa takes her dog for a walk every day. The probability that they go to the park on any day is 0.6. If they go to the park there is a probability of 0.35 that the dog will bark. If they do not go to the park there is a probability of 0.75 that the dog will bark.

- (i) Find the probability that they go to the park on more than 5 of the next 7 days. [2]
 - (ii) Find the probability that the dog barks on any particular day. [2]
 - (iii) Find the variance of the number of times they go to the park in 30 days. [1]
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Q2.

Three friends, Rick, Brenda and Ali, go to a football match but forget to say which entrance to the ground they will meet at. There are four entrances, A , B , C and D . Each friend chooses an entrance independently.

- The probability that Rick chooses entrance A is $\frac{1}{3}$. The probabilities that he chooses entrances B , C or D are all equal.
 - Brenda is equally likely to choose any of the four entrances.
 - The probability that Ali chooses entrance C is $\frac{2}{7}$ and the probability that he chooses entrance D is $\frac{3}{5}$. The probabilities that he chooses the other two entrances are equal.
- (i) Find the probability that at least 2 friends will choose entrance B . [4]
 - (ii) Find the probability that the three friends will all choose the same entrance. [4]
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Q3.

It was found that 68% of the passengers on a train used a cell phone during their train journey. Of those using a cell phone, 70% were under 30 years old, 25% were between 30 and 65 years old and the rest were over 65 years old. Of those not using a cell phone, 26% were under 30 years old and 64% were over 65 years old.

- (i) Draw a tree diagram to represent this information, giving all probabilities as decimals. [2]
 - (ii) Given that one of the passengers is 45 years old, find the probability of this passenger using a cell phone during the journey. [3]
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Q4.

When Ted is looking for his pen, the probability that it is in his pencil case is 0.7. If his pen is in his pencil case he always finds it. If his pen is somewhere else, the probability that he finds it is 0.2. Given that Ted finds his pen when he is looking for it, find the probability that it was in his pencil case. [4]

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Q5.

- (a) (i) Find the probability of getting at least one 3 when 9 fair dice are thrown. [2]
- (ii) When n fair dice are thrown, the probability of getting at least one 3 is greater than 0.9. Find the smallest possible value of n . [4]
- (b) A bag contains 5 green balls and 3 yellow balls. Ronnie and Julie play a game in which they take turns to draw a ball from the bag at random without replacement. The winner of the game is the first person to draw a yellow ball. Julie draws the first ball. Find the probability that Ronnie wins the game. [4]
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Q6.

Bag A contains 4 balls numbered 2, 4, 5, 8. Bag B contains 5 balls numbered 1, 3, 6, 8, 8. Bag C contains 7 balls numbered 2, 7, 8, 8, 8, 8, 9. One ball is selected at random from each bag.

- (i) Find the probability that exactly two of the selected balls have the same number. [5]
- (ii) Given that exactly two of the selected balls have the same number, find the probability that they are both numbered 2. [2]
- (iii) Event X is 'exactly two of the selected balls have the same number'. Event Y is 'the ball selected from bag A has number 2'. Showing your working, determine whether events X and Y are independent or not. [2]
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Q7.

There are a large number of students in Lutley College. 60% of the students are boys. Students can choose exactly one of Games, Drama or Music on Friday afternoons. It is found that 75% of the boys choose Games, 10% of the boys choose Drama and the remainder of the boys choose Music. Of the girls, 30% choose Games, 55% choose Drama and the remainder choose Music.

- (i) 6 boys are chosen at random. Find the probability that fewer than 3 of them choose Music. [3]
- (ii) 5 Drama students are chosen at random. Find the probability that at least 1 of them is a boy. [6]
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Q8.

In a group of 30 teenagers, 13 of the 18 males watch 'Kops are Kids' on television and 3 of the 12 females watch 'Kops are Kids'.

- (i) Find the probability that a person chosen at random from the group is either female or watches 'Kops are Kids' or both. [4]
- (ii) Showing your working, determine whether the events 'the person chosen is male' and 'the person chosen watches Kops are Kids' are independent or not. [2]
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Q9.

Human blood groups are identified by two parts. The first part is A, B, AB or O and the second part (the Rhesus part) is + or -. In the UK, 35% of the population are group A+, 8% are B+, 3% are AB+, 37% are O+, 7% are A-, 2% are B-, 1% are AB- and 7% are O-.

- (i) A random sample of 9 people in the UK who are Rhesus + is taken. Find the probability that fewer than 3 are group O+. [6]
- (ii) A random sample of 150 people in the UK is taken. Find the probability that more than 60 people are group A+. [5]
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Q10.

A box of biscuits contains 30 biscuits, some of which are wrapped in gold foil and some of which are unwrapped. Some of the biscuits are chocolate-covered. 12 biscuits are wrapped in gold foil, and of these biscuits, 7 are chocolate-covered. There are 17 chocolate-covered biscuits in total.

- (i) Copy and complete the table below to show the number of biscuits in each category. [2]

	Wrapped in gold foil	Unwrapped	Total
Chocolate-covered			
Not chocolate-covered			
Total			30

A biscuit is selected at random from the box.

- (ii) Find the probability that the biscuit is wrapped in gold foil. [1]

The biscuit is returned to the box. An unwrapped biscuit is then selected at random from the box.

- (iii) Find the probability that the biscuit is chocolate-covered. [1]

The biscuit is returned to the box. A biscuit is then selected at random from the box.

- (iv) Find the probability that the biscuit is unwrapped, given that it is chocolate-covered. [1]

The biscuit is returned to the box. Nasir then takes 4 biscuits without replacement from the box.

- (v) Find the probability that he takes exactly 2 wrapped biscuits. [4]
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