

Write a short method and give all your answers in fractions.

<p>1. Two balls are drawn from a bag containing 3 red, 3 green and 4 black balls. Find the probability that :</p> <p>(a) both are red, (b) one is green and one is black, (c) both are of the same colour.</p>	<p>(a) $P(\text{both are red}) = \frac{3}{10} \times \frac{2}{9} = \frac{1}{15}$ (b) $P(\text{one is green and one is black}) =$ (c) $P(\text{both are of the same colour}) =$</p>
<p>2. One bag contains 4 red balls and 2 blue balls; another bag contains 3 red balls and 5 blue balls. One ball is drawn from each bag, determine the probability that:</p> <p>(a) both are red, (b) one is red and one is blue.</p>	<p>(a) (b)</p>
<p>3. Four cards are drawn from a pack of 52 cards. Determine the probability that</p> <p>(a) all are aces, (b) they are A, K, Q, J (c) they are of the same suit.</p>	<p>(a) (b) (c)</p>
<p>4. A box contains 5 white cards and 1 red card. A second box contains 4 white cards. 3 cards are drawn from the first box and put into the second box, and then 2 cards are drawn from the second box and put into the first. Determine the probability that the red card is still in the first box.</p>	
<p>5. There are three bags. Bag A contains 2 red coins and 5 white coins. Bag B contains 3 red coins and 4 white coins. Bag C contains 4 red coins and 3 white coins. A bag is selected at random and a coin is drawn from it. Find the probability that a red coin is drawn.</p>	
<p>6. There are 2 red balls and 4 white balls in a box. Two balls are drawn from the box. Find the probability that :</p> <p>(a) both are red. (b) the second ball is red when the first ball drawn is white.</p>	<p>(a) (b)</p>

<p>7. Three light bulbs are chosen at random from 12 bulbs of which 2 are defective. Find the probability that</p> <p>(a) none is defective</p> <p>(b) exactly one is defective.</p>	<p>(a)</p> <p>(b)</p>
<p>8. We are given three bags as follows:</p> <p>Bag A contains 12 balls of which 4 are red</p> <p>Bag B contains 15 balls of which 5 are red.</p> <p>Bag C contains 8 balls of which 2 are red.</p> <p>We select a bag at random and then draw a ball from it.</p> <p>(a) What is the probability that the ball is red?</p> <p>(b) If a ball selected is red, what is the probability that it is drawn from bag A?</p>	<p>(a)</p> <p>(b)</p>
<p>9. In a class of 45 students, 25 students failed Maths, 20 students failed Physics, and 10 students failed both subjects. A student is selected at random.</p> <p>(a) If he failed Physics, find the probability that he failed in Maths.</p> <p>(b) If he failed Maths, find the probability that he failed in Physics.</p> <p>(c) Find the probability that he failed in Maths or Physics, but not both.</p>	<p>(a)</p> <p>(b)</p> <p>(c)</p>
<p>10. Two people fire at a target at the same time. The probability that the first person hits the target is $\frac{1}{4}$, while the second person hits the target is $\frac{1}{5}$. Find the probability that the target is hit.</p>	
<p>11. Four students join the entrance exam of a university, the probabilities of the students being accepted are $\frac{3}{20}$, $\frac{2}{17}$, $\frac{1}{5}$ and $\frac{1}{3}$ respectively. Find the probability that at least one of them being accepted.</p>	
<p>12. Three players thrown a die one by one and the first to throw a 'six' wins. Find the probability that</p> <p>(a) the player who throws first wins,</p> <p>(b) the player who throws next wins.</p>	<p>(a)</p> <p>(b)</p>
<p>13. An urn contains 4 red balls and 6 white balls. A ball is drawn from the urn and a ball of the other colour is then put into the urn. A second ball is then drawn from the urn.</p> <p>(a) Find the probability that the second ball is red.</p> <p>(b) If both balls were of the same colour, what is the probability that they were both red.</p>	<p>(a)</p> <p>(b)</p>

<p>14. A man fires at a target with a probability of $\frac{1}{5}$ hitting it. Find the minimum number of fire in order that the probability of hitting the target is at least $\frac{4}{5}$.</p>	
<p>15. In a competition, the chance for John gets the A price is $\frac{1}{3}$ and gets the B price is $\frac{3}{4}$. What is the chance for him to get at least a price assuming that he cannot get both prices.</p>	
<p>16. A bag contains 19 red balls and 1 white ball. X takes out a ball from the bag at random and asks Y. Y tells X that it is a white ball. The chance Y to tell lie is $\frac{1}{5}$. What is the probability that the ball taken out from the bag is a white ball?</p>	
<p>17. In a television programme, a game is played. A person who has been given \$100 plays under the following rules. At each toss of a fair coin, he bets \$100 dollars on either tail or head with equal return if he wins. The game will be ended if</p> <ul style="list-style-type: none"> (1) he has no money left, (2) the coin has been tossed five times. <p>If he wins five times, an extra of \$2000 will be given.</p> <ul style="list-style-type: none"> (a) Find the probability that the game will be ended at the 3rd toss. (b) Find the probability that he can win five times. <p>Calculate the amount of money he will get in this case.</p> <ul style="list-style-type: none"> (c) Find the probability that he has at least lost one time in the game. 	<p>(a)</p> <p>(b)</p> <p>gb</p> <p>(c)</p>
<p>18. A learner-driver is determined to pass the driving test eventually. The probability that the learner-driver will pass the driving test on any one occasion is $\frac{1}{3}$. Each time the learner-driver takes the driving test, he has to pay \$500.</p> <p>Find the probability that the learner-driver will</p> <ul style="list-style-type: none"> (a) fail the test in both his first and second attempts, (b) fail the test in his first three attempts but pass the test in his fourth attempt, (c) spend exactly \$3000 on driving test, (d) spend more that \$1000 on driving test. 	<p>(a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p>

Write a short method and give all your answers in fractions.

<p>1. Two balls are drawn from a bag containing 3 red, 3 green and 4 black balls. Find the probability that :</p> <p>(a) both are red, (b) one is green and one is black, (c) both are of the same colour.</p>	<p>(a) $\frac{3}{10} \times \frac{2}{9} = \frac{1}{15}$ (b) $\frac{3}{10} \times \frac{4}{9} + \frac{4}{10} \times \frac{3}{9} = \frac{4}{15}$ (c) $\frac{3}{10} \times \frac{2}{9} + \frac{3}{10} \times \frac{2}{9} + \frac{4}{10} \times \frac{3}{9} = \frac{4}{15}$</p>
<p>2. One bag contains 4 red balls and 2 blue balls; another bag contains 3 red balls and 5 blue balls. One ball is drawn from each bag, determine the probability that:</p> <p>(a) both are red, (b) one is red and one is blue.</p>	<p>(a) $\frac{4}{6} \times \frac{3}{8} = \frac{1}{4}$ (b) $\frac{4}{6} \times \frac{5}{8} + \frac{2}{6} \times \frac{4}{8} = \frac{13}{24}$</p>
<p>3. Four cards are drawn from a pack of 52 cards. Determine the probability that</p> <p>(a) all are aces, (b) they are A, K, Q, J (c) they are of the same suit.</p>	<p>(a) $\frac{4}{52} \times \frac{3}{51} \times \frac{2}{50} \times \frac{1}{49} = \frac{1}{270725}$ (b) $\frac{4}{52} \times \frac{4}{51} \times \frac{4}{50} \times \frac{4}{49} \times 4 \times 3 \times 2 \times 1 = \frac{256}{270725}$ (c) $\frac{13}{52} \times \frac{12}{51} \times \frac{11}{50} \times \frac{10}{49} \times 4 = \frac{44}{4165}$</p>
<p>4. A box contains 5 white cards and 1 red card. A second box contains 4 white cards. 3 cards are drawn from the first box and put into the second box, and then 2 cards are drawn from the second box and put into the first. Determine the probability that the red card is still in the first box.</p>	<p>P(red from first box to second box and red from second box to first) $= \frac{1}{6} \times 3 \times \frac{1}{7} \times 2 = \frac{1}{7}$ P(white from first box to second box and white from second box to first) $= \frac{5}{6} \times \frac{4}{5} \times \frac{3}{4} = \frac{1}{2}$ P(red is in first box) $= \frac{1}{7} + \frac{1}{2} = \frac{9}{14}$</p>
<p>5. There are three bags. Bag A contains 2 red coins and 5 white coins. Bag B contains 3 red coins and 4 white coins. Bag C contains 4 red coins and 3 white coins. A bag is selected at random and a coin is drawn from it. Find the probability that a red coin is drawn.</p>	<p>$\frac{1}{3} \times \frac{2}{7} + \frac{1}{3} \times \frac{3}{7} + \frac{1}{3} \times \frac{4}{7} = \frac{3}{7}$</p>
<p>6. There are 2 red balls and 4 white balls in a box. Two balls are drawn from the box. Find the probability that :</p> <p>(a) both are red. (b) the second ball is red when the first ball drawn is white.</p>	<p>(a) $\frac{2}{6} \times \frac{1}{5} = \frac{1}{15}$ (b) $\frac{2}{5}$</p>

<p>7. Three light bulbs are chosen at random from 12 bulbs of which 2 are defective. Find the probability that</p> <p>(a) none is defective</p> <p>(b) exactly one is defective.</p>	<p>(a) $\frac{10}{12} \times \frac{9}{11} \times \frac{8}{10} = \frac{6}{11}$</p> <p>(b) $\frac{2}{12} \times \frac{10}{11} \times \frac{9}{10} \times 3 = \frac{9}{22}$</p>
<p>8. We are given three bags as follows: Bag A contains 12 balls of which 4 are red Bag B contains 15 balls of which 5 are red. Bag C contains 8 balls of which 2 are red. We select a bag at random and then draw a ball from it.</p> <p>(a) What is the probability that the ball is red?</p> <p>(b) If a ball selected is red, what is the probability that it is drawn from bag A?</p>	<p>(a) $\frac{1}{3} \times \frac{4}{12} + \frac{1}{3} \times \frac{5}{15} + \frac{1}{3} \times \frac{2}{8} = \frac{11}{36}$</p> <p>(b) P(red ball is chosen in bag A)</p> $= \frac{1}{3} \times \frac{4}{12} = \frac{4}{36}$ <p>P(selected ball is drawn from bag A)</p> $= \frac{4}{36} \div \frac{11}{36} = \frac{4}{11}$
<p>9. In a class of 45 students, 25 students failed Maths, 20 students failed Physics, and 10 students failed both subjects. A student is selected at random.</p> <p>(a) If he failed Physics, find the probability that he failed in Maths.</p> <p>(b) If he failed Maths, find the probability that he failed in Physics.</p> <p>(c) Find the probability that he failed in Maths or Physics, but not both.</p>	<p>(a) $\frac{\# \text{ failed both subjects}}{\# \text{ failed Physics}} = \frac{10}{20} = \frac{1}{2}$</p> <p>(b) $\frac{\# \text{ failed both subjects}}{\# \text{ failed Maths}} = \frac{10}{25} = \frac{2}{5}$</p> <p>(c) $\frac{25 + 20 - 2 \times 10}{45} = \frac{5}{9}$</p>
<p>10. Two people fire at a target at the same time. The probability that the first person hits the target is $\frac{1}{4}$, while the second person hits the target is $\frac{1}{5}$. Find the probability that the target is hit.</p>	$1 - \left(1 - \frac{1}{4}\right) \left(1 - \frac{1}{5}\right) = 1 - \frac{3}{5} = \frac{2}{5}$
<p>11. Four students join the entrance exam of a university, the probabilities of the students being accepted are $\frac{3}{20}$, $\frac{2}{17}$, $\frac{1}{5}$ and $\frac{1}{3}$ respectively. Find the probability that at least one of them being accepted.</p>	$1 - \frac{17}{20} \times \frac{15}{17} \times \frac{4}{5} \times \frac{2}{3} = \frac{3}{5}$
<p>12. Three players thrown a die one by one and the first to throw a 'six' wins. Find the probability that</p> <p>(a) the player who throws first wins,</p> <p>(b) the player who throws next wins.</p>	<p>$P(A) + P(B) + P(C) = 1$,</p> <p>$P(B) = \frac{5}{6} P(A)$, $P(C) = \frac{5}{6} P(B) = \frac{25}{36} P(A)$</p> <p>(a) $\frac{36}{91}$ (b) $\frac{30}{91}$</p>
<p>13. An urn contains 4 red balls and 6 white balls. A ball is drawn from the urn and a ball of the other colour is then put into the urn. A second ball is then drawn from the urn.</p> <p>(a) Find the probability that the second ball is red.</p> <p>(b) If both balls were of the same colour, what is the probability that they were both red.</p>	<p>(a) $\frac{4}{10} \times \frac{3}{10} + \frac{6}{10} \times \frac{5}{10} = \frac{21}{50}$</p> <p>(b) $P(R, R) = \frac{4}{10} \times \frac{3}{10} = \frac{12}{100}$, $P(W, W) = \frac{6}{10} \times \frac{5}{10} = \frac{30}{100}$</p> $\therefore \frac{12}{12+30} = \frac{2}{7}$

<p>14. A man fires at a target with a probability of $\frac{1}{5}$ hitting it. Find the minimum number of fire in order that the probability of hitting the target is at least $\frac{4}{5}$.</p>	<p>P(hitting target in one of the n fires) $= 1 - P(\text{not hitting target in all n fires})$ $1 - \left(\frac{4}{5}\right)^n \geq \frac{4}{5} \Rightarrow \left(\frac{4}{5}\right)^n \leq \frac{1}{5} \Rightarrow \left(\frac{5}{4}\right)^n \geq 5$ $n \geq \frac{\log 5}{\log(5/4)} = 7.21, \quad n = 8$</p>
<p>15. In a competition, the chance for John gets the A price is $\frac{1}{3}$ and gets the B price is $\frac{3}{4}$. What is the chance for him to get at least a price assuming that he cannot get both prices.</p>	<p>$\frac{1}{3} + \frac{2}{3} \times \frac{3}{4} = \frac{7}{4} = \frac{7}{4}$ $1 - \frac{1}{3} \times \frac{3}{4} = \frac{3}{4} = \frac{9}{12}$</p>
<p>16. A bag contains 19 red balls and 1 white ball. X takes out a ball from the bag at random and asks Y. Y tells X that it is a white ball. The chance Y to tell lie is $\frac{1}{5}$. What is the probability that the ball taken out from the bag is a white ball?</p>	<p>P(Y tells X the ball is white) $= \frac{19}{20} \times \frac{1}{5} + \frac{1}{20} \times \frac{4}{5} = \frac{23}{100}$ P(the ball is white) = $\frac{4}{100} / \frac{23}{100} = \frac{4}{23}$</p>
<p>17. In a television programme, a game is played. A person who has been given \$100 plays under the following rules. At each toss of a fair coin, he bets \$100 dollars on either tail or head with equal return if he wins. The game will be ended if</p> <ol style="list-style-type: none"> (1) he has no money left, (2) the coin has been tossed five times. <p>If he wins five times, an extra of \$2000 will be given.</p> <ol style="list-style-type: none"> (a) Find the probability that the game will be ended at the 3rd toss. (b) Find the probability that he can win five times. Calculate the amount of money he will get in this case. (c) Find the probability that he has at least lost one time in the game. 	<p>(a) $\left(\frac{1}{2}\right)^3 = \frac{1}{8}$ (b) $\left(\frac{1}{2}\right)^5 = \frac{1}{32}$ \$100 + \$500 + \$2000 = \$2600 (c) $1 - \left(\frac{1}{2}\right)^5 = \frac{31}{32}$</p>
<p>18. A learner-driver is determined to pass the driving test eventually. The probability that the learner-driver will pass the driving test on any one occasion is $\frac{1}{3}$. Each time the learner-driver takes the driving test, he has to pay \$500.</p> <p>Find the probability that the learner-driver will</p> <ol style="list-style-type: none"> (a) fail the test in both his first and second attempts, (b) fail the test in his first three attempts but pass the test in his fourth attempt, (c) spend exactly \$3000 on driving test, (d) spend more that \$1000 on driving test. 	<p>(a) $\frac{2}{3} \times \frac{2}{3} = \frac{4}{9}$ (b) $\frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{1}{3} = \frac{8}{81}$ (c) $\frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{1}{3} = \frac{32}{729}$ (d) $\frac{2}{3} \times \frac{2}{3} = \frac{4}{9}$</p>