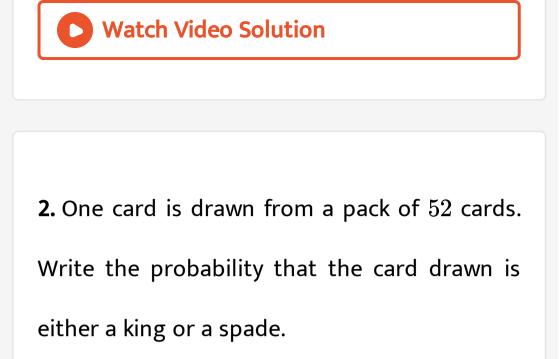# MATHS

BOOKS - ARIHANT PRAKASHAN

PROBABILITY

Topic 1 Practice Questions 1 Mark Question

1. Let A and B be two mutually exclusive events, such that $P(A) = \dfrac{1}{2}$ and $P(B) = \dfrac{1}{3}$. Write the value of $P(A \cup B)$.

2. One card is drawn from a pack of 52 cards. Write the probability that the card drawn is either a king or a spade.

3. Write the probability that two persons have the same birthday (considering the relevant year not to be a leap year).

4. If an event A is independent of it self, then what is $P(A)$?

5. If $P(A) = 0.6$, $P(B) = 0.4$ and $P(A \cap B) = 0.2$, then fimd the value of $P\left(\frac{B}{A}\right)$?

6. What is the probability of getting a sum of 11 when two dice are thrown?

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7. A bag contains 7 white and 9 black balls. If a ball is drawn at random, what is the probability that it is white?

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8. Two dice are rolled in succession. Find the probability that the first dice shows atmost 3 and the second shows an odd number not Jess than 3.

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9. If a die is thrown twice in succession, then find the probability that the sum of numbers obtained is 8.

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10. If $P(A) = \dfrac{1}{2}$ and $P(A \cap B) = \dfrac{1}{3}$ then

what is the probability of $(A - B)$

11. Write the probability of getting exactly two

heads in a single toss of two unbiased coins.

12. A and B are we events with $P(A) = \dfrac{3}{8}$ and $P(A \cap B) = \dfrac{1}{4}$ Then, find $P(A \cap B^c)$.

13. Three dice are rolled. What is the probability that the same numbers will appear on all the dice?

14. Find the probability of having atleast one head in 5 throws of a coin?

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15. Find the probability of getting three heads, when four coins are tossed once?

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16. There are 6 red and 4 blue balls in a bag: Two balls are drawn at random without replacement. Find the probability that the balls are of different colours?

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17. A die was tossed twice. What is the probability of getting a total of 3?

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18. A lot contains 15 items of which 5 are defective. If three items are drawn at random, find the probability that (i) all three are defective

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19. There are two children in a family. What is the probability that both of them are boys?

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20. A four figure number is formed from the figures 1, 2, 3, 5 with no repetition. Find the probability that the number is divisible by 5.

Topic 1 Practice Questions 4 Mark Question

1. A person takes 4 tests in succession. The probability of his passing the first test is p, that of his passing each succeeding test is p or $\frac{p}{2}$ depending on his passing or failing the

preceding test, Find the probabilty of his

passing

just three tests.

2. If $P(A) = 0.6$, $P\left(\dfrac{B}{A}\right) = 0.5$, find

$P(A \cup B)$ when A and B are independent.

3. Five boys and four girls randomly stand in a line. Find the probability that no two girls come together.

4. Let A and b be events with $P(A) = \dfrac{1}{3}$, $P(A \cup B) = \dfrac{3}{4}$ and $P(A \cap B) = \dfrac{1}{4}$, Find $P(A \cup B^c)$

5. Two different digits are selected at random from the digits 1 through 9

If the sum is even, what is the probability that 3 is one of the digits selected?

6. Two balls are drawn from a bag containing 6 red and 4 yellow balls. Find the probability that atleast one of the ball is yellow?

7. A person draws three cards at random one after another from a pack of 52 cards. Find the probability that all these cards are spades.

8. A class consists of 25 boys and 15 girls. If a committee of 6 is to be chosen at random, find the probability that are exactly 3 boys in the committee

9. If 8 person are to sit around a table what is the probability that X and Y don't sit together

10. A and B are two events. If $P(A) = \dfrac{3}{8}$, $P(B) = \dfrac{1}{2}$ and $P(A \cap B) = \dfrac{1}{4}$, then find $P(A^c \cap B^c)$ and $P(A \cap B^c)$
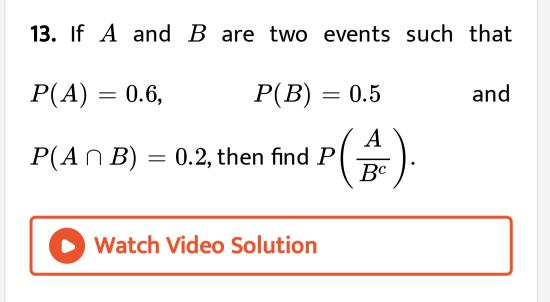
11. If A and B are independent events,show that

A^c and B^c are independent,

12. A and B are two events. If $P(A) = \dfrac{3}{8}$, $P(B) = \dfrac{1}{2}$ and $P(A \cap B) = \dfrac{1}{4}$, then find $P\left(\dfrac{A}{B^c}\right)$.

13. If A and B are two events such that $P(A) = 0.6$, $P(B) = 0.5$ and $P(A \cap B) = 0.2$, then find $P\left(\dfrac{A}{B^c}\right)$.

14. Find the probability of obtaining a total of 9 in a single throw of two dice.

15. If A and B are independent events,show that

A^c and B are independent.

16. From a bag containing 5 black and 7 white balls, 3 balls are drawn in succession . Find the probability that

each colour is represented.

17. The probability that A speaks truth is $\dfrac{4}{5}$ while the probability for B is $\dfrac{3}{4}$. Then, find the probability that they contradict each other, when asked to speak on a fact.

18. If A and B are two events such that $P(A) = 0.6$, $P(B) = 0.2$ and $P\left(\dfrac{A}{B}\right) = 0.5$. Then, find the value of $P\left(\dfrac{A^c}{B^c}\right)$.

19. A and B play a game by alternately throwing a pair of dice. One who throws 8 wins the game. If A starts the game, find their chances of winning.

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Topic 1 Practice Questions 6 Mark Question

1. The probability that student will pass the final examination in both English and Hindi is 0.5 and the probability of passing neither is 0.1. If the probability of passing English examination is 0.75, what is the probability of passing the Hindi Examination?

2. Three persons hit a target with probability $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{4}$ respectively. If each one shoot at

the target once,

find the probability that exactly one of them

hits the target

3. If $P(A) = 0.4$, $P(B/A) = 0.3$ and $P\left(\dfrac{B^c}{A^c}\right) = 0.2$. Find $P(B)$.

4. Find the probability that in a well-shuffled pack of 52 cards, the four Kings will remain together and also the four Queens will be together.

5. Three NCC cadets A, B and C took part in a shooting competition. Their probabilities of hitting the target are respectively 0.8, 0.9 and 0.7. They fire once each. What is the

probability that atleast two shots hit the target?

6. A bag contains 10 red, 3 white balls while another bag contains 3 red and 5 white halls. Two balls are drawn from first bag and put into the second bag and then a ball is drawn from the latter. Find the probability that it is a red ball.

7. 3 cards are drawn at random from a pack of well-shuffled 52 cards. Find the probability that (i) all the three cards are of same suit. (ii) one is King, the other is a Queen and third is a Jack.

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Topic 1 Topic Test 1

1. Events E and F are such that $P(\text{not}\,E\,\text{or}\,\text{not}\,F) = 025$, State whether E and F are mutually exclusive.

2. In a race, the probabilities of A and B winning the race are $\dfrac{1}{3}$ and $\dfrac{1}{6}$ respectively. Find the probability of neither of them winning the race.

3. Kamal and Monica appear for an interview for two vacancies. The probability of Kamal.s selection is $1/3$ and that of Monica.s selection is $1/5$. Find the probability that only one of them will be selected.

4. The probability of A, B and C solving a problem are $\dfrac{1}{3}$, $\dfrac{2}{7}$ and $\dfrac{3}{8}$ respectively. If all try

and solve the problem simulimeously find the probability that only one of them will solve it.

5. Bag A contains three red and four white halls, bag B contains two red and three white bails. If one ball is drawn from bag A and two balls from hag B, find the probability that

(i) one ball is red and two balls are white.

(ii) all the three balls are of the same color.

6. If A and B are two events such that $P(A) = \dfrac{1}{2}$, $P(B) = \dfrac{1}{3}$ and $P(A \cap B) = \dfrac{1}{4}$, then find

(i) $P(\overline{A}/B)$.

(ii) $P(B/A)$.

7. If $P(B) = \dfrac{3}{5}$, $P(A/B) = \dfrac{1}{2}$, and $P(A \cup B) = \dfrac{4}{5}$ then find $P(A \cap B)$

8. Two integers are selected at random from integers 1 to 11. If the sum is even, then find the probability that both the numbers are odd.

9. In a college, 70% students pass in Physics, 75% students pass in Mathematics and 10% students fail in both. One student is chosen at

random. What is the probability that

(i) he passes in Physics and Mathematics?

(ii) he passes in Mathematics, given that he passes in Physics?

(iii) he passes in Physics, given that he passes in Mathematics?

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10. A can hit a target 4 times out of 5 times, B can hit the target 3 times out of 4 times and C can hit the target 2 times out of 3 times. They

fire simultaneously. Find the probability that any two out of A, B and C will hit the target.

11. Three coins are tossed simultaneously. Consider the event E .three heads or three tails., F .atleast two heads. and G .atmost two heads.. Of the pairs $(E, F), (E, G)$ and (F, G) , which are independent or dependent events ?

12. A committee of 4 persons has to be chosen from 8 boys and 6 girls, consisting of atleast one girl. Find the probability that the committee consists of more girls than boys.

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1. In a match, Davis Cup tie between India and South Korea, write the probability that India is

ahead $2 - 1$ after 3 matches assuming that both the teams are equally likely to win each match.

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2. A binomial distribution has mean 4 and variance 3. Write the number of trials.

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Topic 2 Practice Question 4 Mark Question

1. Find the probability distribution of number of heads in three tosses of a coin.

2. A bag A contains 2 white and 3 red balls and another bag B contains 4 white and 5 red balls. One ball is drawn at random from a bag chosen at random and it is found to be red. Find the probability that it was drawn from bag B.

3. Suppose that the probability that your alarm goes off in the morning is 0.9. If the alarm goes off, the probability is 0.8 that you attend your 8 a.m. class. If the alarm does not go to off, the probability that you make your 8 a.m.class is 0.5. Find the probability that you make your 8 a.m. class.

4. A box contains 4 orange and 4 green balls, another box contains 3 orange and 5 groen balls, one of the two box is selected at random and a ball is drawn from the box, which is found to be orange. Find the probability that the ball is drawn from the first box.

5. There are 25 girls and 15 boys in class XI and 30 boys and 20 girls in class XII. If a student

chosen from a class, selected at random, happens to be a boy, find the probability that he has been chosen from class XII.

6. A random variable X has the following probability distribution

$X = x$	0	1	2	3	4	5
$P(X)$	0	R	$2R$	$3R$	$3R$	R

Determine

(i)R

(ii) $P(X < 2)$

(iii) $P(X \geq 4)$

(iv) $P(2 \leq X \leq 5)$

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Topic 2 Practice Question 6 Mark Question

1. Out of the adult population in a village 50% are farmers, 30% do business and 20% are service holders. It is known that 10% of the farmers, 20% of the business holders and 50% of service holders are above

poverty line. What is the probability that a member chosen from any one of the adult population, selected at random, is above poverty line?

2. Four cards are drawn successively with replacement from a well shuffled pack of 52 cards. Find the probability distribution of the number of aces. Calculate the mean and variance of the number of aces.

3. If a random variable X has a binomial distribution $B\left(8, \dfrac{1}{2}\right)$ then find X for which the outcome is the most likely.

4. From a box containing 32 bulbs out of which 8 are defective 4 bulbs are drawn at random successively one after anoter with

replacement. Find the probability distribution of the number of defective bulds.

5. The probability of a shooter hitting a target is $\dfrac{3}{4}$ Find the minimum number of times he must fire, so that the probability of hitting the target atleast once is greater than 0.999.

6. A bag contains 5 white and 3 black balls, a second bag contains 4 white and 5 black balls, a third bag contains 3 white and 6 black balls. A bag is selected at rendom and a ball is drawn. Find the probability that the ball is black.

Do the problem assuming that the probability of choosing the first bag is twice as much as choosing the second bag, which is twice as much as choosing the third bag.

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7. A biased coin where the head is twice as likely to occur as the tail is, tossed thrice. Find the probability distribution of number of heads.

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8. Find the mean and the variance of the number obtained on a throw of an unbiased coin.

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9. From a survey conducted in a cancer hospital it is found that 10% of the patients were alcoholics, 30% chew gutka and 40% have no specific carcinogenic habits. If cancer strikes 80% of the smokers, 70% of alcoholics, 50% of the non specific, then estimateic the probability that a cancer patient chosen from any one of the above types, selected at random, has no specific carcinogenic habits.

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1. The bag A contains 3 white and 2 black balls while the bag B contains 2 white and 5 black balls. One of the bags is chosen at random and a ball is drawn from it. What is the probability that the ball is white

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2. An urn contains 2 white and 2 black balls. A ball is drawn at random, If it is white, it is not replaced into the urn. Otherwise, it is replaced with another ball of the same colour. The process is repeated. Find the probability that the third ball drawn is black.

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3. In a class of 75 students, 15 are above average, 45 are average and the rest below

average achievers. The probability that an above average achieving student fail is 0.005, that an average achieving student fails is 0.05 and the probability of a below average achieving student failing is 0.15. If a student is known to have passed, then what is the probability that he is a below average achiever?

4. From a survey conducted in a cancer hospital it is found that 10% of the patients were alcoholics, 30% chew gutka and 40% have no specific carcinogenic habits. If cancer strikes 80% of the smokers, 70% of alcoholics, 50% of the non specific, then estimateic the probability that a cancer patient chosen from any one of the above types, selected at random,

has no specific carcinogenic habits.

5. A biased coin where the head is twice as likely to occur as the tail is, tossed thrice. Find the probability distribution of number of heads.

6. In a meeting, 70% of the members favour a certain proposal, 30% being opposite. A member is selected at random and let $X = 0$,

if he opposed and $X = 1$, if he is in favour.

Find $E(X)$ and $V(X)$.

7. From a lot of 6 items containing 2 defective items, a sample of 4 items are drawn at random, Let the random variable X denote the number of defective items in the sample. If the sample is drawn without replacement, find

(i) The probability distribution of X

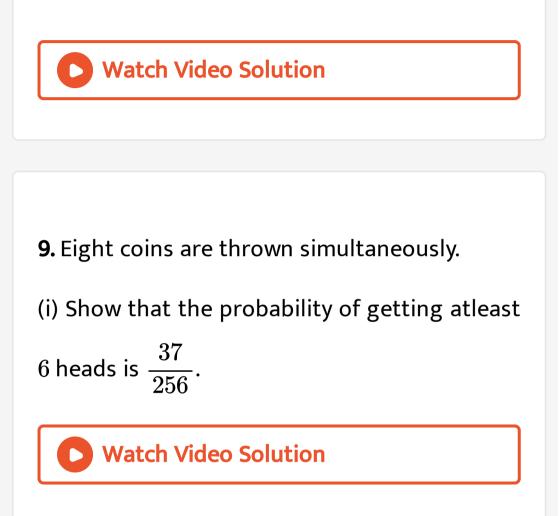(ii) Mean of X

(ii) Variance of X

8. The probability that a bulb produced by a factory will fuse in 100 days of use is 0.05, Find the probability that out of 5 such bulbs, after 100 days of use

(i) none fuse.

(ii) no more than one fuses.

(iii) more than one fuses.

(iv) atleast one fuses.

9. Eight coins are thrown simultaneously.

(i) Show that the probability of getting atleast 6 heads is $\dfrac{37}{256}$.

10. In a Binomial distribution, the sum of its mean and the variance is 1.8. Find the probability of two successes, if the event was conducted 5 times.
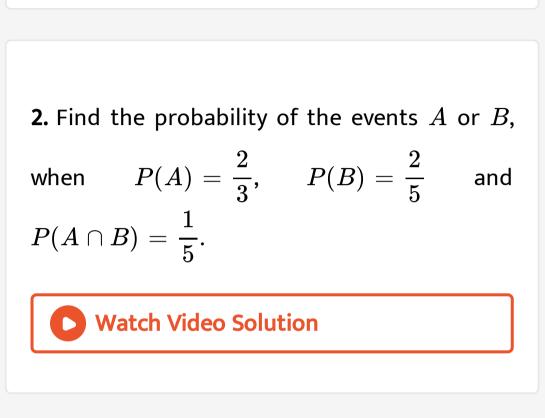
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Chapter Test 1 Mark Question

1. Three coins are tossed once, then find the probability of getting all heads.

2. Find the probability of the events A or B, when $P(A) = \dfrac{2}{3}$, $P(B) = \dfrac{2}{5}$ and $P(A \cap B) = \dfrac{1}{5}$.

3. A coin is tossed twice, what is the probability that atleast one tail occurs?

4. Two cards are drawn from a pack of 52 cards, find the probability that they are of different suits.

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5. Find the probability of obtaining a total of 9 in a single throw of two dice.

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6. Three unbiased coins are tossed. What is the probability of getting atleast 2 heads?

7. If A and B are two events such that $P(A) = 0.3, \; P(B) = 0.4, \; P(A \cup B) = 0.6.$ Find $P\left(\dfrac{A}{B}\right).$

8. A man has three children out of them atleast one is boy, then find the probability that he has two boys and one girl.

9. Events E and F are such that $P(\text{not}\,E\,\text{or}\,\text{not}\,F) = 025$, State whether E and F are mutually exclusive.

10. If $P(A) = \dfrac{7}{13}$, $P(B) = \dfrac{9}{13}$ and $P(A \cap B) = \dfrac{4}{13}$ Then, find $P(A/B)$.

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Chapter Test 4 Mark Question

1. A fair coin and an unbiased die are tossed. Let A be the event 'head appears on the coin' and B be the event 3 on the die'. Check whether A and B are independent events or not.

2. Two integers are selected at random from integers 1 to 11. If the sum is even, then find the probability that both the numbers are odd.

3. Two balls are drawn at random with replacement from'a box containing 10 black

and 8 red balls. Find the probability that both balls are red.

4. Suppose 10000 tickets are sold in a lottery each for Rs. 1. First prize is of Rs. 3000, the second prize is of Rs. 2000 and third prize is of Rs. 500 each. If you buy one ticket, then what is your expectation.

5. A person takes 3 tests in succession. The probability of his (her) passing the first test is 0.8. The probability of passing each successive test is 0.8 or 0.5 according as he passes or fails the preceding test. Find the probability of his (her) passing at least 2 tests.

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6. Three coins are tossed simultaneously. Consider the event E .three heads or three tails., F .atleast two heads. and G .atmost two

heads.. Of the pairs $(E, F), (E, G)$ and (F, G), which are independent or dependent events ?

7. 10% of the bulbs produced in a factory are of red colour and 2% are red and defective. If one bulb is picked up at random, then determine the probability of its being defective, if it is red.

8. A person buys a lottery ticket in 50 lotteries in each of which his chance of winning a prize is 1/100. What is the probability that he will win a prize atleast once?

9. There are 3 bags B_1, B_2 and B_3 having respectively 4 white, 5 black, 3 white, 5 black and 5 white, 2 black balls. A bag is chose at

random and a ball is drawn from it. Find the

probability that the ball is white.

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10. Four cards are drawn successively with

replacement from a well shuffled pack of 52

cards. Find the probability distribution of the

number of aces. Calculate the mean and

variance of the number of aces.

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1. Assume that in a family, each child is equally likely to be a boy or a girl. A family with three children is chosen at random. Find the probability that the eldest child is girl, given that the family has atleast one girl.

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2. A doctor is visit to a patient. From the past experience, it is known that the probabilities

that he will come by train, bus, scooter or by other means of transport, are respectively $\frac{3}{10}, \frac{1}{5}, \frac{1}{10}$ and $\frac{2}{5}$ The probabilities that he will be late are $\frac{1}{4}, \frac{1}{3}$ and $\frac{1}{12}$ if he comes by train, bus and scooter respectively, but if he comes by other means of transport, then he will not be late. When he arrives, he is late. What is the probability that he comes by train?

3. Let X denotes the number of hours you study during a randomly selected school day. The probability that X can take the values x, has the following form, where is some unknown. constant.

$$P(x) = \begin{cases} 0.1 & \text{if } x = 0 \\ kx & \text{if } x = 1 \text{ or } 2 \\ k(5 - x) & \text{if } x = 3 \text{ or } 4 \\ 0 & \text{otherwise} \end{cases}$$

what is the probability that you study

(a) atleast 2 h

(b) exactly 2 h

(c) atmost 2 h

4. The probability that a student securing first division ia an examination is $\dfrac{1}{10}$. What is the probability that out of 100 students twenty pass in first division ?

5. A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are

drawn and are found to be diamonds. Find the

probability of the lost card being a diamond.

6. A man is known to speak the truth 3 out of 5

times. He throws a die and reports that it is 1.

Find the probability that it is actually 1.

7. Out of a group of 30 honest people, 20 always speak the truth. Two persons are selected at random from the group. Find the probability distribution of the number of selected persons who speak the truth. Also, find the mean of the distribution.

8. For a Binomial distribution, the mean is 6 and the standard deviation is $\sqrt{2}$. Find the

probability of getting 5 successes.

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