

Practice Questions - Term I

Date: 15/11/2021

Subject: Mathematics

Topic : Probability

Class: X

1. If three coins are tossed simultaneously, then the probability of getting at least one head and tail is _____.

☐ A. $\frac{1}{4}$

☐ B. $\frac{1}{2}$

☒ C. $\frac{3}{4}$

☐ D. $\frac{2}{3}$

Given, a coin is tossed 3 times.

Total possible outcomes = {HHH, HHT, HTT, HTH, THH, TTH, THT, TTT} (where H = Heads, T = Tails)

Total no. of possible outcomes = 8

Favourable outcomes (getting at least one head and tail) = {HHT, HTT, HTH, THH, TTH, THT}

No. of favorable outcomes = 6

Probability of an event E ,

$$P(E) = \frac{\text{number of favourable outcomes}}{\text{total number of outcomes}}$$

$$\Rightarrow P(\text{getting at least one head and tail}) = \frac{6}{8} = \frac{3}{4}$$

\therefore The probability of getting at least one head and a tail is $\frac{3}{4}$

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2. In a simultaneous throw of a pair of dice, find the probability of getting same value on both.

☐ A. $\frac{1}{36}$

☒ B. $\frac{1}{6}$

☐ C. $\frac{1}{3}$

☐ D. $\frac{5}{6}$

There are 36 outcomes for rolling a pair of dice, of which six are favourable: (1,1), (2,2), (3,3), (4,4), (5,5) and (6,6). Hence, the required probability is $= \frac{6}{36} = \frac{1}{6}$

3. A card is drawn at random from a pack of 52 cards. Find the probability that the card drawn is black or king.

☐ A. $\frac{1}{2}$

☒ B. $\frac{7}{13}$

☐ C. $\frac{15}{26}$

☐ D. $\frac{8}{13}$

Total no. of outcomes = 52

Number of black cards (Spade+Club) in a pack of '52' cards = 26

Number of 'Kings' in a pack of cards = 4

Number of 'Black Kings' that have already been included in the number of black cards = 2

$$\therefore \text{Number of favourable outcomes} = 26 + 4 - 2 = 28$$

$$\therefore \text{Probability (getting a black or king)} = \frac{28}{52} = \frac{7}{13}$$

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4. Find the probability that a number selected at random from the numbers 1 to 25 is not a prime number.

☐ A. $\frac{8}{25}$

☐ B. $\frac{9}{25}$

☐ C. $\frac{3}{5}$

☒ D. $\frac{16}{25}$

The numbers from 1 to 25 which are not prime are 1, 4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21, 22, 24 and 25.

Thus, we have 16 favourable outcomes out of 25 outcomes.

We know that, Probability of an event E, $P(E) = \frac{\text{number of favourable outcomes}}{\text{total number of outcomes}}$

Hence, the required probability is $\frac{16}{25}$

5. A card is drawn from a well-shuffled deck of playing cards. Find the probability of drawing a black card which is neither a face card nor an ace?

☐ A. $\frac{9}{52}$

☒ B. $\frac{9}{26}$

☐ C. $\frac{9}{13}$

☐ D. $\frac{10}{13}$

In each suit, there are 9 cards that are not face cards and ace.

Hence, there will be a total of 18 cards in a deck which are black and are not face cards and ace.

We know that, Probability of an event E, $P(E) = \frac{\text{number of favourable outcomes}}{\text{total number of outcomes}}$

\therefore Required probability is $\frac{18}{52} = \frac{9}{26}$

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6. 3 people A, B and C are sitting in a circular fashion. Find the probability that A and B do not sit together.

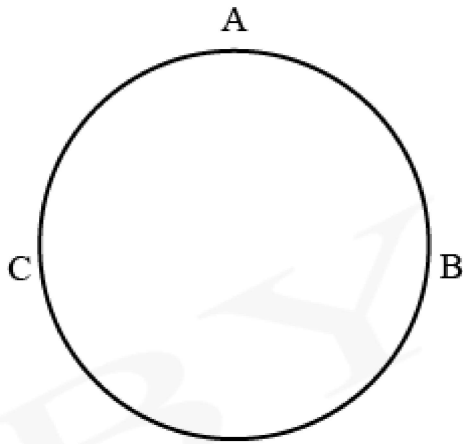
☒ A. 0

☐ B. $\frac{1}{2}$

☐ C. $\frac{1}{3}$

☐ D. 1

Let us draw the figure of their seating arrangement.



Since they are seated in circular fashion, the order does not matter and hence A, B and C will always sit next to each other.

\therefore probability that A and B will not sit next to each other will be 0.

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7. Two players, Anand and Vishwa are playing a tennis match. The probability of Vishwa winning the match is 0.75. What is the probability of Anand winning the match?

☐ A. $\frac{4}{3}$

☐ B. $\frac{2}{4}$

☒ C. $\frac{1}{4}$

☐ D. $\frac{3}{4}$

Let E be the event of Vishwa winning the match and (not E) be the event of Anand winning the match.

$$P(E) = \frac{(\text{Number of outcomes favourable to E})}{(\text{Total number of outcomes})}$$

$$= 0.75 = \frac{3}{4}$$

We know the sum of probabilities will always be equal to be 1,

$$P(E) + P(\text{not } E) = 1$$

$$P(\text{not } E) = 1 - P(E) = 1 - \frac{3}{4} = \frac{1}{4}$$

Hence, probability of Anand winning the match = $\frac{1}{4}$

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8. There are 2 men X and Y who were born in the same year. If X's date of birth is on 19th December 1990, how many dates are possible for Y to be born such that he doesn't have the same birthday as X?

- ☒ A. 364
- ☐ B. 360
- ☐ C. 365
- ☐ D. 300

1990 is not a leap year. Hence there are 365 days in the year.

If X's birthday is any one particular day, other than this day there are 364 days (i.e. $365 - 1$) left in the year.

Now, Y can be born in any one of these 364 days for not having his and X's birthdays on the same day.

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9. Ram is about to toss 2 fair coins. If he is asked to find the probability that there is at least 1 head, list the favourable outcomes.

- ☐ A. (H, H) (H, T)
- ☐ B. (H, T) (T, H)
- ☒ C. (H, H) (H, T) (T, H)
- ☐ D. (T, T) (H, T) (T, H)

Sample space = {(T, T), (H, T), (T, H), (H, H)}

'At least 1' means any number greater than or equal to one. Hence the outcomes in which there is one head and 2 heads both have to be considered.

There will be 2 outcomes with exactly one head. This is because this one head can occur in any one of the 2 coins. But there will be only one outcome with 2 heads.

∴ Favorable outcomes are: {(H, T) (T, H)}

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10. A factory produces cricket balls. The probability that the manufactured ball is defective is 0.05. Then, the probability of the ball being perfect will be:

- ☒ A. 0.95
- ☐ B. 1.05
- ☐ C. 1
- ☐ D. 0

The balls manufactured in the factory can either be defective or perfect. Thus, these are complementary events.

The probability that the selected ball is defective, $P(E) = 0.05$

Let, $P(E')$ be the probability that the selected ball is perfect.

In case of complementary events,

$$P(E) + P(E') = 1$$

$$\Rightarrow 0.05 + P(E') = 1$$

$$\Rightarrow P(E') = 0.95$$

Thus probability of the ball being perfect = 0.95.

11. If $P(E)$ and $P(E')$ are the probabilities of two complementary events, then which of the following is always true?

- ☐ A. $P(E) + P(E') = 0$
- ☒ B. $P(E) + P(E') = 1$
- ☐ C. $P(E) = P(E')$
- ☐ D. $P(E) + P(E') = \frac{1}{2}$

In a random experiment, the probabilities of all possible events must total to 1,

which means some or the other outcome must occur on every trial.

Now, in a complementary event there are only two possible outcomes.

Thus,

$$P(E) + P(E') = 1.$$

Or, the correct option is B.

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12. The lock of a suitcase is a 3 digit number. The owner of the suitcase has forgotten the digit at unit's place. If the digit is an even number, then the number of favourable outcomes for units place is__.

- ☒ A. 2
- ☒ B. 4
- ☒ C. 5
- ☒ D. 10

Total number of possible outcomes are 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. For the number to be even the digit at unit's place must be an even number or '0'. Thus, the favourable outcomes are 0, 2, 4, 6 and 8.
 \therefore The number of favourable outcomes is 5.

13. A bag contains 8 red, 2 black and 7 white balls. One ball is drawn at random. The probability that the ball drawn is not white is__.

- ☒ A. $\frac{5}{17}$
- ☒ B. $\frac{10}{17}$
- ☒ C. $\frac{2}{17}$
- ☒ D. $\frac{8}{17}$

Total number of balls
 = No. of red balls + No. of black balls + No. of white balls = 17
 Number of white ball = 7
 $\Rightarrow P(\text{getting white ball}) = \frac{7}{17}$
 For complementary events, $P(\bar{E}) = 1 - P(E)$
 $\Rightarrow P(\text{not white}) = 1 - P(\text{getting white balls}) = 1 - \frac{7}{17} = \frac{10}{17}$

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14. The probability of an event not happening is 0.95, then the probability of the event happening is ____

- ☐ A. 0.5
☒ B. 0.05
☐ C. 5.0
☐ D. 0.25

If E and \bar{E} (not E) are complementary events, then, we have, $P(\text{not } E) + P(E) = 1$, where $P(E)$ is the probability of the event happening.

Given, the probability of an event not happening is 0.95. Then the probability of the event happening = $1 - 0.95 = 0.05$

15. Out of 50 students in a class taking a test, 35 of them passed whereas the other 15 failed. What is the probability that a student selected at random passed the test?

- ☐ A. 0.15
☐ B. 0.3
☐ C. 0.35
☒ D. 0.7

Total number of students in a class = 50

Number of students who passed the test = 35

$$P(P) = \frac{\text{Number of favourable outcomes}}{\text{Total number of possible outcomes}}$$

where $P(P)$ = Probability that student passed the test

$$= \frac{\text{Number of students who passed the test}}{\text{Total number of students in a class}}$$

$$= \frac{35}{50} = 0.7$$

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16. In a cricket match, a batsman hit a boundary 6 times (out of 30 balls). Find the probability that next ball he plays is not a boundary.

- ☒ A. 0.2
☒ B. 0.4
☒ C. 0.6
☒ D. 0.8

Total number of balls played = 30

Number of balls in which the batsman hit a boundary = 6

Number of balls in which he did not hit a boundary
 = $30 - 6$
 = 24

$$\begin{aligned}
 &\therefore \text{Probability of not hitting a boundary} \\
 &= \frac{\text{Number of balls in which he does not hit a boundary}}{\text{Total number of balls played}} \\
 &= \frac{24}{30} \\
 &= 0.8
 \end{aligned}$$

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17. The record of a weather station shows that out of the past 200 consecutive days, its weather forecasts were correct 150 times.

What is the probability that the weather report will be incorrect for the next day?

- ☐ A. 0.2
- ☐ B. 0.75
- ☐ C. 0.35
- ☒ D. 0.25

We know, for an event E,

$$P(E) = \frac{\text{Number of trials in which the event happened}}{\text{Total number of trials}}$$

The weather station's forecast was correct on 150 days out of 200 days.

⇒ The forecast was not correct on 50 of the days.

Therefore, the probability that the report will be incorrect is:

$$\begin{aligned} P(E) &= \frac{\text{Number of days in which the forecast was not correct}}{\text{Total number of days}} \\ &= \frac{50}{200} \\ &= \frac{5}{20} \\ &= 0.25 \end{aligned}$$

18. Nick tosses three coins simultaneously. What is the probability of getting at least two heads?

- ☐ A. $\frac{3}{4}$
- ☐ B. $\frac{5}{8}$
- ☐ C. $\frac{7}{8}$
- ☒ D. $\frac{1}{2}$

Let E be the event 'getting at least two head'.

Sample space, $S = \{(HHH), (HHT), (HTH), (THH), (THT), (TTH), (HTT), (TTT)\}$.

Total no. of outcomes $n(S) = 8$

Favourable outcomes for 'getting atleast two heads', $F = \{(HHH), (HHT), (HTH), (THH)\}$.

∴ No. of favourable outcomes = 4

$$\text{Probability } P(E) = \frac{\text{Number of outcomes favorable to E}}{\text{Number of all possible outcomes of the experiment}} = \frac{4}{8} = \frac{1}{2}$$

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19. A box contains tickets, numbered with 11, 12, 13, ..., 40. A ticket is taken out from the box at random. Find the probability that the number on the drawn ticket is greater than 25 and multiple of 7.

- ☒ A. $\frac{1}{20}$
☒ B. $\frac{1}{15}$
☐ C. $\frac{1}{5}$
☐ D. $\frac{3}{20}$

Total no. of outcomes (count of numbers from 11 to 40) = 30

Outcomes which are divisible by '7' and greater than '25' are 28 and 35.

\therefore Total no. of favourable outcomes = 2

Let E be the event of getting numbers which are divisible by '7' and greater than '25'.

$$\text{Probability } P(E) = \frac{\text{Number of outcomes favorable to } E}{\text{Number of all possible outcomes of the experiment}}$$

$$P(\text{number is greater than 25 and multiple of 7}) = \frac{2}{30} = \frac{1}{15}$$

20. The probability of picking the letter K if you pick a random letter from the word $TREKKING$ is $\frac{x}{4}$. Then x is ____.

- ☒ A. 1
☐ B. 0
☐ C. 2
☐ D. 0.5

The word $TREKKING$ has 8 characters of which 2 are favourable (K 's).
 Hence, the probability is $\frac{2}{8} = \frac{1}{4}$.

$$\implies x = 1$$