Chapter 13: Probability

Exercise 13.2

1) The probability that it will rain tomorrow is 0.85. What is the probability that it will not rain tomorrow.

→ Given that,

The probability that it will rain tomorrow = 0.85

To find the probability it will not rain tomorrow:

But we know that, the sum of all event's probability is one.

Here, $P(E) = 0.85$ and $P(\bar{E}) = ?$

$\Rightarrow P(E) + P(\bar{E}) = 1$

$0.85 + P(\bar{E}) = 1$

$P(\bar{E}) = 1 - 0.85 = 0.15$

$$\boxed{P(\bar{E}) = 0.15}$$

Therefore, the probability that it will not rain tomorrow is 0.15

2) A die is thrown. find the probability of getting:

i) a prime number ii) 2 or 4

iii) a multiple of 2 or 3 iv) an even prime number

v) a number greater than 5 vi) a number lying betn 2 & 6.

→ Given a dice is thrown.

Total numbers on a dice = {1, 2, 3, 4, 5, 6}

$n(\text{total outcomes}) = 6$

i) The prime numbers on dice are 2, 3 & 5.

$n(E) = 3$

$$P(\text{getting prime no.}) = \frac{\text{favourable outcomes}}{\text{total outcomes}}$$

P(getting prime number) $= \frac{3}{6} = \frac{1}{2}$

ii) Probability to getting number 2 or 4:

n (favourable outcomes) = 2

P(getting number 2 or 4) $= \frac{\text{favourable outcomes}}{\text{total outcomes}}$

$= \frac{2}{6} = \frac{1}{3}$

iii) The multiples of 2 and 3 are 2, 3, 4 & 6.

n (favourable outcomes) = 4

P(getting multiples of 2 & 3) = 4/6 = 2/3.

iv) Here, even prime number is only 2.

n (favourable outcomes) = 1

P(getting prime number which is even) = $\frac{1}{6}$

v) Here, the number greater than 5 is 6 only.

n (favourable outcomes) = 1

P(getting a number greater than 5) = 1/6

vi) The numbers lying between 2 & 6 are 3, 4 & 5.

n (favourable outcomes) = 3

P(getting no. lying betn 2 & 6) $= \frac{3}{6} = \frac{1}{2}$

3) Three coins are tossed together, find the probability of getting i) exactly two heads
ii) at most two heads
iii) at least one head & one tail
iv) no tails

→ If three coins tossed simultaneously.

The outcomes are {TTT, THT, TTH, THH, HTT, HHT, HTH, HHH}

n(outcomes) = 8

i) For getting exactly two heads, the favourable outcomes are {THH, HHT, HTH}.

$$P(\text{getting two heads}) = \frac{\text{favourable outcomes}}{\text{no. of total outcomes}}$$

$$= \frac{3}{8}$$

ii) For getting at least two heads, the favourable outcomes are {HHT, HTH, HHH, THH} ⇒ no. of favourable outcomes = 4

$$P(\text{getting at least two heads}) = \frac{4}{8} = \frac{1}{2}$$

iii) For getting at least one head & one tail, the favourable outcomes are {THT, TTH, THH, HTT, HHT, HTH}

no. of favourable outcomes = 6

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

iv) for getting an outcome of no tail, HHH.

$$P(\text{getting an outcome of no tail}) = \frac{\text{no. of favourable outcome}}{\text{total outcome}}$$

$$= \frac{1}{8}$$

4) A and B throw a pair of dice. If A throws 9, find B's chance of throwing a higher number solution.

→ When a pair of dice is thrown.

The all possible outcomes are

{(1,1), (1,2), (1,3), (1,4), (1,5), (1,6),
(2,1), (2,2), (2,3), (2,4), (2,5), (2,6),
(3,1), (3,2), (3,3), (3,4), (3,5), (3,6),
(4,1), (4,2), (4,3), (4,4), (4,5), (4,6),
(5,1), (5,2), (5,3), (5,4), (5,5), (5,6)
(6,1), (6,2), (6,3), (6,4), (6,5), (6,6)}

The total no. of outcomes = 36

For getting a total numbers on the dice greater than 9, the possible outcomes are

(5,5), (5,6), (6,4), (4,6), (6,5), (6,6)

$$P = \frac{\text{No. of favourable outcomes}}{\text{total no. of outcomes}} = \frac{6}{36} = \frac{1}{6}$$

5) Two unbiased dice are thrown, find the probability that the total of the numbers on the dice is greater than 10.

→ When a pair of dice is thrown.

The outcomes which are possible are:

{(1,1), (1,2), (1,3), (1,4), (1,5), (1,6),
(2,1), (2,2), (2,3), (2,4), (2,5), (2,6),
(3,1), (3,2), (3,3), (3,4), (3,5), (3,6),
(4,1), (4,2), (4,3), (4,4), (4,5), (4,6),
(5,1), (5,2), (5,3), (5,4), (5,5), (5,6)}

The number of total outcomes are = 36

For getting the total numbers on the dice greater than 10 are (5,6), (6,5), (6,6).

$$P(\text{getting total no. on the dice greater than 10}) = \frac{\text{favourable outcomes}}{\text{total no. of outcomes}}$$

$$= \frac{3}{36} = \frac{1}{12}$$

6) A card that is drawn at random from a pack of 52 cards. Find the probability that the card drawn is:

i) a black king

ii) either a black card or a king

→ A card is drawn at random from a pack of 52 cards.

Total no. of cards = 52

Cards which are having black king are = 2

$$P(\text{getting black king}) = \frac{\text{favourable outcomes}}{\text{total outcomes}} = \frac{2}{52} = \frac{1}{26}$$

ii) either a black card or a king

→ Total no. of black cards = (13+13) = 26

From total kings 4, 2 are black king.

So, total no. of black cards = 26+2 = 28

P(getting either a black card or a king) = $\frac{\text{favourable outcomes}}{\text{total outcomes}} = \frac{28}{52} = \frac{14}{26}$

$= \frac{7}{13}$

iii) black and a king

The total no. of cards which are black & a king are 2.

P(getting black & a king card) = $\frac{\text{favourable outcomes}}{\text{total no. of outcomes}}$

$= \frac{2}{52} = \frac{1}{26}$

iv) a jack, queen or a king

From each suit, a jack, queen or king which are 3.

There are total 4 suits.

So, total no. of a jack, queen & a king are 12.

P(getting a jack, queen or a king) = $\frac{12}{52} = \frac{3}{13}$

v) neither a heart nor a king

Total no. of heart cards are 13 & king are 4 which includes king of heart also.

The total no. of cards having heart & king = 13+3 = 16

The total no. of cards that are neither king nor heart = 52−16 = 36

P(getting neither a heart nor a king) = $\frac{36}{52} = \frac{9}{13}$

vi) Spade or an ace

→ The total no. of spade cards are 13.
The total no. of aces are 4 in which ace of spade is included in the no. of spade cards.
Hence, the total no. of cards are an ace or king = 4+4=8
Thus, the total no. of cards that are neither ace nor king = 52-8=44

P(getting spade or an ace) = $\frac{44}{52} = \frac{11}{13}$

vii) neither an ace nor a king.

→ Total no. of ace cards are 4 and king are 4.
Total no. of cards that are an ace or a king = 4+4=8
Thus, the total no. of cards that are neither an ace nor a king = 52-8=44

P(getting neither an ace nor a king) = $\frac{44}{52} = \frac{11}{13}$

viii) neither a red card nor a queen

→ The total no. of red cards is 26.
The total no. of queens are 4 in which 2 red queens are also included.
Hence, total no. of red cards or queen will be = 26+2=28
Thus, the total no. of cards that are neither a red nor a queen = 52-28=24

P(getting neither a red card nor a queen) = $\frac{24}{52} = \frac{6}{13}$

ix) the seven of clubs

→ The total no. of cards other than ace = 52 − 4 = 48

P(getting other than ace) = $\frac{48}{52} = \frac{12}{13}$

x) a ten

→ Total no. of tens in the pack of cards is 4.

P(getting a ten) = $\frac{4}{52} = \frac{1}{13}$

xi) a spade

→ The total no. of spade is 13.

P(getting a spade) = $\frac{\text{favourable outcomes}}{\text{total no. of outcomes}} = \frac{13}{52} = \frac{1}{4}$

xii) a black card

→ The total no. of black cards in the pack are 26.

P(getting a black card) = $\frac{\text{favourable outcomes}}{\text{total no. of outcomes}} = \frac{26}{52} = \frac{1}{2}$

xiii) a seven of clubs

→ The total no. of 7 of club = 1

P(getting a seven of clubs) = $\frac{1}{52}$

xiv) a jack

→ Total no. of jacks are = 4

P(getting a jack) = 4/52 = ~~13~~ 1/13

xv) an ace of spade

→ Total no. of an ace of spade = 1

P(getting an ace of spade) = 1/52

xvi) a queen

→ Total no. of queens is 4.

P(getting a queen) = 4/52 = 1/13

xvii) a heart card

→ total no. of heart card = 13

P(getting a heart card) = 13/52 = 1/4

xviii) a red card

→ Total no. of red cards = 26

P(getting a red card) = 26/52 = 1/2

xix) neither an queen nor a king

→ The total no. of kings & queen = 4+4 = 8

Thus, total no. of cards that are neither a king nor a queen is (52-8) = 44

P(getting neither an queen nor a king) = $\frac{44}{52}$ = 11/13

7) In a lottery of 50 tickets numbered 1 to 50, one ticket is drawn. find the probability that the drawn ticket bears a prime number.

→ Given that, tickets are numbered from 1 to 50.

And one ticket is drawn at random.

Total no. of tickets = 50

Tickets which bears prime no. 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47.

Total no. of tickets having prime no. = 15

P(getting a ticket with prime no.) = $\frac{\text{favorable outcomes}}{\text{total outcomes}}$

$= \frac{15}{} = \frac{3}{}$

8) An urn contains 10 red & 8 white balls. One ball is drawn at random. find the probability that the ball drawn is white.

→ Given that, a bag contains 10 red & 8 white balls.

Total no. of balls = 10+8 = 18

Total no. of white balls = 8

P(getting white ball) = 8/18 = 4/9

9) A bag contains 3 red balls, 5 black balls & 4 white balls. A ball is drawn at random from the bag? What is the probability that the ball drawn is

i) white ii) red iii) black iv) not red

→ A bag is having total 3 red balls, 5 black balls and 4 white balls.

Total no. of balls = 3+5+4 = 12

i) P(getting white ball) = $\frac{4}{12} = \frac{1}{3}$

ii) P(getting red ball) = $\frac{3}{12} = \frac{1}{4}$

iii) P(getting black ball) = $\frac{5}{12}$

iv) The balls which are not red = 3 5+4 = 9

P(getting no red ball) = 9/12 = 3/4

10) What is the probability that a number selected from the numbers 1, 2, 3, ..., 15 is a multiple of 4?

→ Given that, The no. are from 1, 2, 3, ... 15.

Any one number is selected.

Total no. present betn 1 to 15 = 15

Total no. which are multiple of 4 = 3 (4, 8, 12)

P(getting a no. multiple of 4) = 3/15 = 1/5

11) A bag contains 6 red, 8 black and 4 white balls. A ball is drawn at random. What is the probability that the ball is drawn which is not black?

→ Given that, a bag contains 6 red, 8 black & 4 white balls
And a ball is drawn at random.

Total no. of balls = 6+8+4 = 18

Total no. of black balls = 8

Total no. of balls which are not black = 18−8 = 10

P(getting a ball which is not black) = 10/18 = 5/9

12) A bag contains 5 white balls & 7 red balls. One ball is drawn at random. What is the probability that the ball drawn is white?

→ Given that, a bag contains 5 white balls, 7 red balls.
And a ball is drawn at random.

Total no. of balls = 7+5 = 12

Total no. of white balls = 5

P(getting a white ball) = 5/12

13) Tickets numbered from 1 to 20 are mixed up and a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 7?

→ Given that, tickets numbered from 1 to 20 are mixed up.
And one ticket is picked up at random.

Total no. of cards = 20

Cards which are having no. multiple of 3 or 7
= 3, 6, 7, 9, 12, 14, 15 & 18

Total cards are = 8.

P(getting a card having no. multiple of 3 or 7) $= \frac{8}{20} = \frac{2}{5}$

14) In a lottery there are 10 prizes and 25 blanks. What is the probability of getting a prize?

→ Given that, In a lottery there are 10 prizes & 25 blanks.

Total no. of tickets = 10 + 25 = 35

Total no. of prize carrying tickets is 10.

P(winning a prize) = 10/35 = 2/7

15) If the probability of winning a game is 0.3, what is the probability of losing it?

→ Given that, probability of winning a game = P(E) = 0.3

The sum of probability of occurence of an event and probability of non-occurence of an event is 1.

So, $P(E) + P(\overline{E}) = 1$

$0.3 + P(\overline{E}) = 1$

$P(\overline{E}) = 1 - 0.3 = 0.7$

Thus, the probability of losing game is $P(\overline{E}) = 0.7$

16) A bag contains 5 black, 7 red & 3 white balls. A ball is drawn from the bag at random. find the probability that the ball drawn is

i) red ii) black or white iii) not black

→ Given that, A bag contains 5 black, 7 red & 3 white balls.

And a ball is drawn at random.

Total no. of balls = 7+5+3 = 15

i) Total no. of red balls = 7

P(getting a red ball) = 7/15

ii) Total no. of black or white balls = 5+3 = 8

P(getting white or black ball) = 8/15

iii) Total no. of black balls = 5

P(getting black ball) = 5/15 = 1/3

P(getting a ball which is not black) = 1 - 1/3

= 2/3

17) A bag contains 4 red, 5 black and 6 white balls. A ball is drawn at random. find the probability that the ball drawn is:
i) white ii) Red iii) Not black iv) Red or white

→ Given that, A bag contains 4 red, 5 black & 6 white balls

Total no. of balls = 4+5+6 = 15

i) Total no. of white balls = 6

P(getting a white ball) = 6/15 = 2/5

ii) Total no. of red balls = 4

P(getting red ball) = 4/15

iii) Total no. of black balls = 5

P(getting black ball) = 5/15 = 1/3

P(getting not a black ball) = 1 - 1/3 = 2/3

iv) Total no. of red or white balls = 4+6 = 10

P(getting red or white balls) = 10/15 = 2/3.

18) Five cards - ten jack, queen, king and an ace of diamond are shuffled face downwards. One card is picked at random.

i) What is the probability that the card is a queen?

→ Given that, five cards - ten jack, queen, king and ace of diamond are ~~suf~~ shuffled face downwards.

Total no. of cards = 5

i) Total no. of cards which is a queen = 1

P (getting cards which is queen) = 1/5

ii) If a king is drawn first & put aside then

Total no. of cards become = 4

a) Total no. of ace present = 1

P (getting an ace card) = 1/4

b) Total no. of king cards = 0

P (getting a king) = 0

20) A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is

i) red ii) black

→ Given that, a bag contains 3 red balls & 5 black balls. Total no. of balls = 3 + 5 = 8

i) Total no. of red balls = 3

P (getting a red ball) = 3/8

ii) Total no. of black ball = 5

P(getting a black ball) = 5/8

21) A game of chance consists of spinning an arrow which is equally likely to come to rest pointing to one of the number 1, 2, 3, ..., 12 as shown in fig. What is the probability that it will point to

i) 10? ii) an odd number?

iii) a number which is multiple of 3?

iv) an even number?

→ Given that, A game of chance consists of spinning an arrow which equally likely to come to rest pointing to one of the number 1, 2, 3, ... 12.

Total no. on the spin = 12

i) to get 10, the favourable outcome is 1

P(getting 10) = 1/12

ii) to get an odd no. 1, 3, 5, 7, 9, 11.

The favourable outcome is 6.

P(getting odd no.) = 6/12 = 1/2

iii) to get a multiple of 3 are 3, 6, 9, 12.

The favourable outcome is 4.

P(getting multiple of 3) = 4/12 = 1/3

iv) to get a even number 2, 4, 6, 8, 10, 12.

The favourable outcomes are 6

P(getting an even no.) = 6/12 = 1/2

22) In a class, there are 18 girls & 16 boys. The class teacher wants to choose one pupil for class monitor. What she does, she writes the name of each pupil on a card and puts them into a basket and mixes thoroughly. A child is asked to pick one card from the basket. What is the probability that the name written on the card is

i) The name of a girl

ii) The name of a boy

→ Given that, in a class, there are 18 girls & 16 boys. The class teacher wants to choose one pupil for class monitor. she wrote the name of each pupil on a card and puts them into a basket & mixes thoroughly. A child picke one card

Total no. of students in the class = 18+16 = 34

i) Total no. of girls are = 18

P(getting a girl on the card) = 18/34 = 9/17

ii) Total no. of boys are = 16

P(getting a boy on the card) = 16/34 = 8/17

23) Why is tossing a coin considered to be a fair way of deciding which team should choose ends in a game of cricket?

→ No. of outcomes when coin is tossed = 2

P(getting head) = 1/2

P(getting tail) = 1/2

As, the probability of both the events are equal. These events are called as equally like events. Thus, tossing a coin is considered to be a fair way of deciding which team should choose ends in a game of cricket.

24) What is the probability that a number selected at random from the no. 1, 2, 2, 3, 3, 3, 4, 4, 4, 4 will be their average?

→ Here, given numbers are : 1, 2, 2, 3, 3, 3, 4, 4, 4, 4.

Total outcomes which are possible = 10

$$\text{Average of the no's} = \frac{\text{sum of numbers}}{\text{total numbers}}$$

$$= \frac{(1+2+2+3+3+3+4+4+4+4)}{10}$$

$$= 30/10 = 3$$

Let us consider, E be an event of getting no. 3.

Thus, no. of favourable outcomes = 3 (3, 3, 3)

$$P(E) = 3/10$$

Thus, the probability that a no. selected at random will be the average is 3/10.

25) There are 30 cards, of same size in a bag on which numbers 1 to 30 written. One card is taken out of the bag at random. Find the probability that the no. of p on the selected card is not divisible by 3.

→ Given that, 30 cards having same size in a bag on which numbers 1 to 30 written. One card is taken out of the bag at random.

Total no. of possible outcomes = 30 (1, 2, 3, ... 30)

Let us consider, E is an event of getting a number which is divisible by 3.

The favourable outcomes = 10 {3, 6, 9, 12, 15, 18, 21, 24, 27, 30}

$P(E) = 10/30$

$\boxed{P(E) = 1/3}$

$\vec{E}$ - be the event of getting a no. which is not divisible by 3.

$P(\vec{E}) = 1 - P(E)$

$= 1 - 1/3$

$\boxed{P(\vec{E}) = 2/3}$

26) A bag contains 5 red, 8 white and 7 black balls. A ball is drawn at random from the bag. find the probability that the drawn ball is

i) red or white ii) not black

iii) neither white nor black

→ Total outcomes = 5 + 8 + 7 = 20

i) Total no. of red or white ball = 5 + 8 = 13

P (getting red or white ball) = 13/20

ii) total no. of balls which are not black = 13

P (getting a ball which is not black) = 13/20

iii) Total no. of balls which are neither white nor black } = 5

P (getting neither white nor black ball) = 5/20 = 1/4

27) find the probability that a number selected from the number 1 to 25 is not a prime number when each of the given numbers is equally likely to be selected.

→ Total possible outcomes = 25 (1, 2, 3, ... 25)

The total prime no. = 2, 3, 5, 7, 11, 13, 17, 19, 23

No. of favourable outcomes = 9

P(getting a prime no.) = 9/25

P(getting not a prime no.) = 1 - 9/25

= 16/25

28) A bag contains 8 red, 6 white & 4 black balls. A ball is drawn at random from the bag. find the probability the drawn ball is i) Red or white

ii) Not black

iii) Neither white nor black

→ Total no. of balls = 8 + 6 + 4 = 18

i) Total no. of red or white balls = 8 + 6 = 14

P(getting red or white ball) = 14/18 = 7/9

ii) Total no. of black ball = 4

Total no. of balls which are not black = 18 - 4 = 14

P(getting a ball which is not black) = 14/18 = 7/9

iii) The total no. of neither white nor black balls

= 18 - 6 - 4 = 8

P(getting neither white nor black) = 8/18 = 4/9

29) Find the probability that a no. selected at random from the number 1, 2, 3, ... 35 is a

i) prime number

ii) multiple of 7 iii) multiple of 3 or 5

→

Total no. from 1, 2, ... 35 = 35

i) Total no. which are prime no. = 11

(2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31)

P(getting a prime no.) = 11/35

ii) Total no. which are multiple of 7 = 5 (7, 14, 21, 28, 35)

$$P(\text{getting a no. which is multiple of 7}) = \frac{5}{35} = \frac{1}{7}$$

iii) Total no. which are multiple of 3 or 5 = 16

{3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 5, 10, 20, 25, 35}

$$P(\text{getting a no. which is multiple of 3 or 5}) = \frac{16}{35}$$

31) A bag contains lemon flavoured candies only. Malini takes out one candy without looking into the bag. What is the probability that she takes out,

i) an orange flavoured candy

ii) a lemon flavoured candy

→

The bag contains lemon flavoured candies only.

Then probability of getting orange flavoured candy is not possible

P(getting orange flavoured candy) = 0

ii) As we know that, the bag contains only lemon flavoured candies.

Hence, probability of getting lemon flavoured candy is 1.

32) It is given that in a group of 3 students, the probabilit of 2 students not having the same birthday is 0.992. What is the probability that the 2 students have the same birthday.

→ Let us consider, E - is the event of students not having same birthday.

$P(E) = 0.992$

$\overline{E}$ - be the event of students having same birthday.

$P(\overline{E}) = 1 - P(E)$

$= 1 - 0.992$

$\boxed{P(\overline{E}) = 0.008}$

33) A bag contains 3 red balls & 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is i) red ii) not red.

→ Given that, A bag contains 3 red balls & 5 black balls.

Total no. of balls $= 3 + 5 = 8$

i) Total no. of red balls $= 3$

P(getting a red ball) $= 3/8$

ii) total no. of balls which are not red $= 8 - 3 = 5$

P(getting a ball which is not red) $= 5/8$

34) A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will be i) red ii) not green

→ Given that, a box contains total balls = 5+8+4 = 17

i) total red balls = 5

P(getting a red ball) = 5/17

ii) total balls which are not green = 17 − 4 = 13

P(getting balls which are not green) = 13/17

35) A lot consists of 144 ball pens of which 20 are defective and others good. Nuri will buy a pen if it is good, but will not buy if it is defective. The shopkeeper draws one pen at random and gives it to her. What is the probability that

i) she will buy it ii) she will not buy it

→ Total no. of good pens = 144 − 20 = 124

Total no. of defective pens = 20

Total pens = 144

i) If the pen is good then only Nuri buy it.

$$P(\text{she will buy it}) = \frac{\text{total no. of good pens}}{\text{total pens}} = \frac{124}{144}$$

$$= \frac{31}{36}$$

ii) she will not buy the defective pens only

$$P(\text{she will not buy it}) = \frac{\text{total no. of defective pens}}{\text{total pens}}$$

$$= \frac{20}{144} = \frac{5}{36}$$

36) 12 defective pens are accidentaly mixed with 132 good ones. It is not possible to just look at pen and tell whether or not it is defective. One pen is taken out at random from this lot. Determine the probability that the pen taken out is good one.

→ Given that, no. of good pens = 132

no. of defective pens = 12

Total no. of pens = 132 + 12 = 144

Let us consider, E is the event of getting good pen

$$P(E) = \frac{\text{total favourable outcomes}}{\text{total outcomes}} = \frac{132}{144} = \frac{11}{12}$$

Exercise 13.2

1) Suppose you drop a tie at random on the rectangular region shown in fig. What is the probability that it will land inside the circle with diameter 1 m?

→ Circle is having radius 0.5.

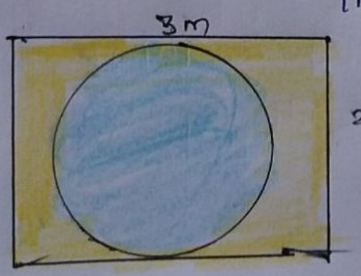
Area of circle $= \pi r^2 = \pi (0.5)^2 = 0.25\pi \text{ m}^2$

Area of rectangle $= 3 \times 2 = 6 \text{ m}^2$

$$\text{Probability} = \frac{\text{area of circle}}{\text{area of rectangle}} = \frac{0.25\pi \text{ m}^2}{6 \text{ m}^2}$$

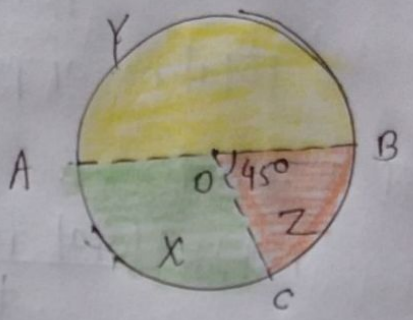
$$= \frac{\pi}{24}$$

Thus, the probability that the tie will land inside the circle is $\pi/24$.



2) In the accompanying diag a fair spinner is placed at the centre 'O' of the circle. Diameter AOB and radius OC divide the circle into three regions labelled X, Y and Z. If $\angle BOC = 45°$.
What is the probability that the spinner will land in the region X?

→



Given that,

$\angle BOC = 45°$

$\angle AOC = 180 - 45 = 135°$

Area of circle $= \pi r^2$

Area of region X $= \frac{\theta}{360} \times \pi r^2$

$= \frac{135}{360} \times \pi r^2$

$= \frac{3}{8} \pi r^2$

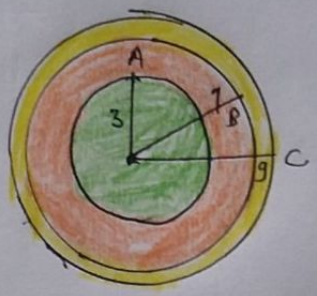
Thus, the probability that the spinner will land in the region is

$$X = \frac{\text{Area of region X}}{\text{total area of circle}}$$

$$= \frac{3/8 \pi r^2}{\pi r^2}$$

$$\boxed{X = \frac{3}{8}}$$

3) A target is shown in fig. below consists of three concentric circles of radii 3, 7 and 9cm respectively. A dart is thrown and lands on the target. What is the probability that the dart will land on the shaded region?



Here, 1st circle is with $r = 3$

2nd circle is with $r = 7$

3rd circle is with $r = 9$

⇒ Area of 1st circle $= \pi(3)^2 = 9\pi$

Area of 2nd circle $= \pi(7)^2 = 49\pi$

Area of 3rd circle $= \pi(9)^2 = 81\pi$

Area of shaded region = Area of 2nd circle − Area of 1st circle

$= 49\pi - 9\pi$

$= 40\pi$

Thus, the probability that, it will land on the shaded region $= \frac{\text{area of shaded region}}{\text{area of third circle}}$

$= \frac{40\pi}{81\pi}$

$= \frac{40}{81}$