

Probability

1. Cards
2. Coin
3. Dice

Explanation of each category

Total Cards 52

13 diamonds, 13 clubs , 13 hearts , 13 spades

4 kings, 4 queens , 4 aces, 4 jokers, 4 2's, and so on. Every card is 4 times.

Sample Space for Choosing a Card from a Deck

Ace	2	3	4	5	6	7	8	9	10	Jack	Queen	King
												
Ace	2	3	4	5	6	7	8	9	10	Jack	Queen	King
												
Ace	2	3	4	5	6	7	8	9	10	Jack	Queen	King
												
Ace	2	3	4	5	6	7	8	9	10	Jack	Queen	King
												

Related questions.

1. A card is drawn random , find the probability of a king?

Answer : Since there are 4 kings in the deck of cards. Total cards are 52

so $4/52 = 1/13$

2. A card is drawn random , find probability of a diamond king?

Answer : Since there are 13 diamonds and 4 kings.

Diamonds consist of K,J,Q,A,2,3,4,5,6,7,8,9,10
only 1 king in diamonds

So $1/52$.

Similarly probability of 1 diamond queen, 1 diamond Ace etc all will be $1/52$.

3. Two cards are drawn random , find the probability that both will be kings?

Answer. Probability of 1st king = $4/52$
now probability of 2nd king

We have 3 kings left in the deck and 51 total cards

So $3/51$

$$4/52 * 3/51 = 1/221$$

Another method :

$${}^4C_2 / {}^{52}C_2$$

$${}^4C_2 = 4! / 2!(4-2)!$$

$${}^{52}C_2 = 52! / 2!(52-2)!$$

Solve it then

4. A card is drawn random , find the probability of king or queen?

Answer. King or queen

Probability of king = $4/52$

Probability of queen = $4/52$

Or is used so add both

$8/52 = 4/26 = 2/13$ answer

5. A card is drawn random, find probability of a heart?

Ans . since there are 13 hearts in a deck of 52 cards

So $13/52 = 1/4$

Next topic

Probability of coin related questions.

Probability of head = $1/2$

Probability of tail = $1/2$

To find sample space in problems of coin use formula 2^n where n is number of times that coins tossed..

1. Two coins are tossed , find probability of at least 1 head?

Ans. Sample space = $2^2 = 4$

At least 1 head means either 1 head or 2 heads

Outcomes = HH, HT , TH, TT

3 cases are there which have either 1 head or two heads

So $\frac{3}{4}$

Similar is the case for at least 1 tail.

2. Two coins are tossed , find probability of 1 head?

Ans. Statement differs from question 1 statement

Outcomes = HH , HT , TH , TT

2 cases which consist of 1 head HT and TH

So $\frac{2}{4} = \frac{1}{2}$

3. Three coins are tossed , find probability of exactly 1 tail?

Ans. Sample space = $2^3 = 8$

First Coin	Second Coin	Third Coin	End Result
Heads	Heads	Heads	HHH
		Tails	HHT
	Tails	Heads	HTH
		Tails	HTT
Tails	Heads	Heads	THH
		Tails	THT
	Tails	Heads	TTH
		Tails	TTT

3 cases which consist of only 1 tail

$\frac{3}{8}$

Probability of dice

Dice have 6 faces, 1,2,3,4,5,6

Probability of each face = $\frac{1}{6}$

Probability of odd number = $\frac{3}{6} = \frac{1}{2}$ (because 3 odd numbers are there 1,3,5)

Same for even number

Sample space can be found by 6^n where n is number of times dice is rolled.

1. A dice is rolled, find probability of number greater than 2?

Ans. Greater than 2

Means 3,4,5,6

4 possibilities

So $\frac{4}{6} = \frac{2}{3}$

2. A dice is rolled, find probability of number greater than 6?

Ans. Since no number is greater than 6 so zero.

3. Two dices are rolled , find probability of same number on both dices?

Ans. Sample space = $6^2 = 36$

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

Same number cases are

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

6 cases

So $6/36 = 1/6$

4. Two dices are rolled , find the result will sum 9 from both dices?

Ans.

Possibilities in which sum is 9 are

(3,6) , (6,3) , (5,4) , (4,5)

So $4/36 = 1/9$

5. Two dices are rolled , find probability of sum will be odd number?

Ans. See above diagram and find the answer .

$$18/36 = \frac{1}{2}$$

Topic # 02

Clock Angle

A **clock** is a circle, and a circle always contains 360 degrees. Since there are 60 minutes on a **clock**, each minute mark is 6 degrees. Since there are 12 hours on the **clock**, each hour mark is 30 degrees

Use this simple formula for finding angle between MINUTE HAND and HOUR HAND.

$$|30 * \text{hour} - 5.5 * \text{minute}|$$

1. Find angle between minute hand and hour hand at 10:15?

Ans. Hour = 10

minute = 15

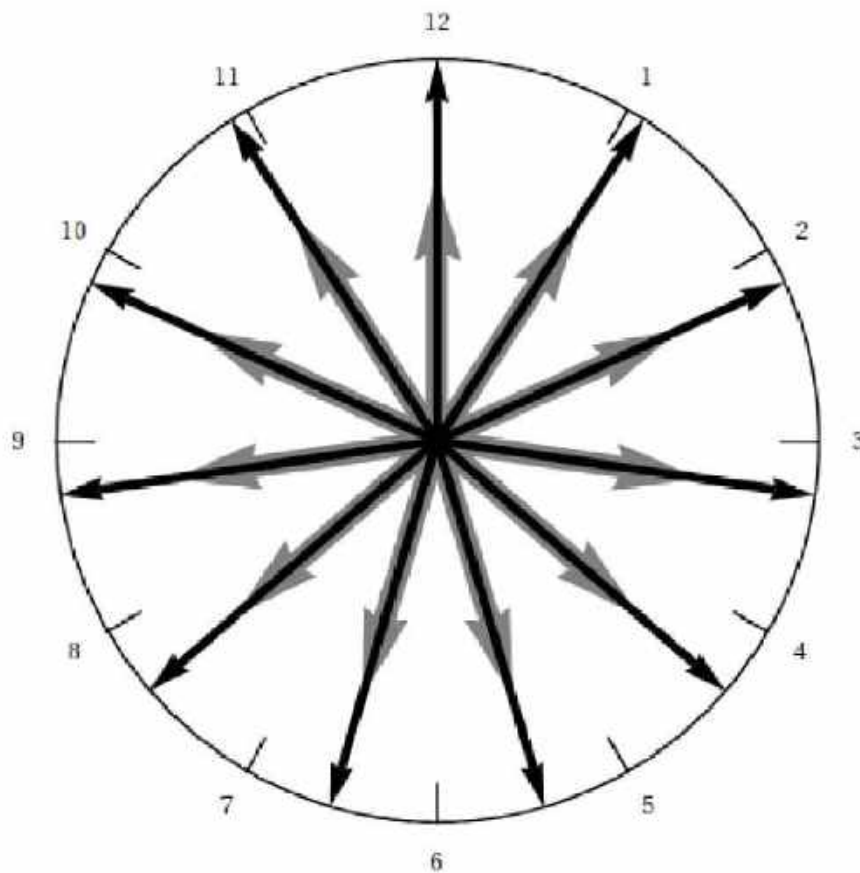
$$|30 * 10 - 5.5 * 15| = |300 - 82.5| = 217.5 \text{ degree}$$

Note : if angle is greater than 180 then subtract it from 360.

So $360 - 217.5 = 142.5$ degree

2. How many times in a day clock hands coincide?

Ans. 22 times



3. Find angle at 10 : 00 am.

Ans. $|30 * 10 - 5.5 * 0| = 300$

So angle is greater than 180

$$360 - 300 = 60 \text{ degree}$$

Topic # 03

ZAKAAT

Divide the given amount by 40

Find Zakaat on 864000 at rate of 2.5% ?

$2.5 \% = 2.5 / 100 = 1/40$. So simply divide by 40

Simply divide by 40 u will get required answer

Topic # 04

Median

Median refers to middle element

1. Find median of 11,34,12,21,12,25,14

Ans. Count the numbers. There are 7 numbers.

Arrange in ascending order

11 , 12 , 12 , 14 , 21 , 25 , 34

Middle element is 14. 14 is the answer

2. In case of even numbers. Let 1,3,2,4,7,3,4,5

8 numbers are there arrange in ascending order

1,2,3,3,4,4,5,7

Middle numbers are 2 numbers in even case. 3 and 4 here. So $\frac{3+4}{2} = 3.5$ answer

Topic # 05

MODE

Most repeating element in a given data is MODE

1. Find MODE of 44,43,54,44,32,43,56,54,44

Hence most repeating number is 44.

Topic # 06

Average

Average = sum of quantities / number of quantities

1. Reeya obtained 65, 67, 76, 82 and 85 out of 100 in different subjects, What will be the average.

Explanation:

$$(65+67+76+82+85) / 5 = 75$$

2. Find average of first 4 multiples of 5?

Ans. 5 , 10 , 15 , 20

$$5+10+15+20 / 4 = 50 / 4 = 12.5$$

Another method. $1^{\text{st}} + \text{last} / 2$

$$5+20 / 2 = 12.5$$

3. Find the sum of first 30 natural numbers

Answer.

Explanation:

Sum of n natural numbers

$$= n(n+1) / 2$$

Here $n = 30$

$$=30(30+1) / 2$$

$$=30(31) / 2$$

$$=465$$

4. The average of four consecutive odd numbers is 24. Find the largest number.

Explanation:

Let the numbers are , $x+1$, $x+3$, $x+5$, $x+7$
then

$$\Rightarrow (x+1)+(x+3)+(x+5)+(x+7) / 4=24$$

$$\Rightarrow (x+1)+(x+3)+(x+5)+(x+7) = 24*4$$

$$\Rightarrow 4x+16 = 96$$

$$\Rightarrow 4x = 80$$

$$X=20$$

So largest number is $x+7 = 20 + 7 = 27$

5. A batsman makes a score of 87 runs in the 17th inning and thus increases his average by 3. Find his average after 17th inning?

Solution

Let the average after 7th inning = x

Then average after 16th inning = $x - 3$

$$\therefore 16(x-3)+87 = 17x$$

$$\therefore x = 87 - 48 = 39$$

6. Average of 2,7 and x is 12, find x

$$\text{Ans. } 2+7+x / 3 = 12$$

$$9+x = 36$$

$$X = 27$$

Topic # 07

Time and work

Formula is $1 / AB = 1/A + 1/B$

1. A can do work in 4 hours. B can do it in 12 hours. How much time need for both to complete work?

Answer. $1/AB = 1/4 + 1/12$

take lcm of 4 and 12 which is 12

$$3 + 1/12 = 4/12 = 1/3$$

$$1/AB = 1/3$$

$$AB = 3 \text{ hours}$$

Another method. Multiply separate work of A and B in numerator and Add them in denominator and then divide them.

$$\text{So } AB = A * B / A + B$$

$$AB = 4 * 12 / 4 + 12$$

$$AB = 48 / 16 = 3 \text{ hours}$$

2. A can do work in 10 days and both A , B combine can do it 8 days.
Find how much time needed for B to do the same work?

Solution. Question is different from previous one.

$$AB = A * B / A + B$$

$$8 = 10B / 10+B$$

$$8 (10+B) = 10B$$

$$80 + 8B = 10B$$

$$80 = 2B$$

$$B = 40 \text{ days}$$

Another method : $1/AB = 1/A + 1/B$

$$1/8 = 1/10 + 1/B$$

$$1/B = 1/8 - 1/10$$

Take LCM of 8 and 10 which is 40

$$1/B = 5*1 - 4*1 / 40$$

$$1/B = 5-4 / 40$$

$$1/B = 1/40$$

$$B = 40 \text{ days}$$

Topic # 08
Percentage

1. Sale price of an object increases 30% in first month and 10% in second month. Find total increase

Solution : Ans is 43%

Let sale price = x then 30% of $x = 0.3x$

$$x + 0.3x = 1.3x$$

$$\text{Now } 1.3x + 0.1(1.3x) = 1.3x + 0.13x = 1.43x$$

$$\text{So } 1.43x - x = 0.43 \text{ or } 43\%$$

2. What percent of 30 is 24 or 24 is what percent of 30? Both are same statements.

Solution. Of means multiplication is means equal to

$$x/100 * 30 = 24$$

$$30 x = 2400$$

$$X = 80\%$$

3. In an election between two candidates, one got 55% of the total valid votes, 20% of the votes were invalid. If the total number of votes was 7500, the number of valid votes that the other candidate got, was :

Explanation:

Total number of votes = 7500

Given that 20% of Percentage votes were invalid

=> Valid votes = 80%

Total valid votes = $7500 \times \frac{80}{100} = 6000$

1st candidate got 55% of the total valid votes.

Hence the 2nd candidate should have got 45% of the total valid votes

=> Valid votes that 2nd candidate got = total valid votes $\times \frac{45}{100}$

$$6000 \times \frac{45}{100} = 2700$$

4. If the price of a book is first decreased by 25% and then increased by 20%, then the net change in the price will be.

Solution : **Explanation:**

Let the original price be Rs. 100.

New final price = 120 % of (75 % of Rs. 100) = Rs. $(\frac{120}{100} \times \frac{75}{100} \times 100)$ = Rs. 90.

Decrease = 10%

Or shortcut $\frac{120}{100} \times \frac{75}{100} \times 100 = 90$

$$100 - 90 = 10$$

5. If 75% of a number is added to 75, then the result is the number itself. The number is

Solution. Let the number be x, Then

$$75\% \text{ of } x + 75 = x$$

$$0.75x + 75 = x$$

$$x - 0.75x = 75$$

$$0.25x = 75$$

$$x = 75/0.25 = 300$$

6. A man spends 20% of his salary on clothes , 30% on rent , 25% on shopping, and still left with 1500. Find his net salary?

How to approach these type of questions

$$20+25+30= 75\%$$

Means he spends 75% so left 25%

And 25% is 1500

$$0.25x = 1500$$

$$x = 1500/0.25 = 6000$$