

AU B - either

$$\text{mode} = 3 \times \text{median} - 2 \times \text{mean}$$

Probability

तमारे लिए यहाँ पर्याप्त नहीं हो सकता है।
 3 ग्राम तक की वज़नीयता देखना आवश्यक है।



- ⑥ In a certain game, you pick a card from a standard deck of 52 cards. If the card is a heart, you win. If the card is not a heart, the person replaces the card to the deck, reshuffles, and draws again. You keep repeating that process until you pick a heart. What is the probability that you'll have at least three draws before you pick a heart?

$$\text{Now, } P(\text{at least 3 draws to win}) = 1 - P(2 \text{ or fewer draws to win})$$

$$= 1 - P(1 \text{ draw to win}) - P(2 \text{ draws to win})$$

$$= 1 - \frac{13}{52} - \frac{39}{52} \times \frac{13}{52}$$

$$(0.25) \times (0.75) + (1 - \frac{1}{4}) \times \frac{3}{16} = 0.25 \times 0.75 + 0.75 \times 0.1875$$

$$= \frac{9}{15}$$

want to

- ⑦ There are 5 chairs. Bob, Nitin always left to Rachel. What is the required probability?

$$\text{Ans: Bob left, Rachel right} \Rightarrow \frac{1}{2}$$

$$\text{Bob right, Rachel left} \Rightarrow \frac{1}{2}$$

$$\text{Ans: } \frac{1}{2}$$

- ⑧ There are 6 married couples. If we select 5 people out of 12, what is the probability that none of them are married to each other?

$$\text{Ans: } \frac{\frac{12 \times 10 \times 8 \times 6 \times 4}{5 \times 4 \times 3 \times 2 \times 1}}{\frac{12 \times 11 \times 10 \times 9 \times 8}{5 \times 4 \times 3 \times 2 \times 1}}$$

$$= \frac{12 \times 10 \times 8 \times 6 \times 4}{12 \times 11 \times 10 \times 9 \times 8}$$

$$= \frac{8}{33}$$

⑨ There are 8 employees including Bob and Rachel. If 2 employees are selected, what is the probability that it includes Bob and Rachel?

$$\text{Ans: } \frac{2C_2}{8C_2} = \frac{1}{28}$$

$$\text{or, } 1 - \frac{6C_2}{8C_2} = \frac{7C_2}{8C_2}$$

⑩ Two dice are thrown simultaneously. What is the probability of getting 2 numbers whose product is even?

$$\begin{aligned} P(\text{even}) &= P(E) \times P(E) + P(O) \times P(E) + P(E) \times P(O) \\ &= \frac{3}{6} \times \frac{3}{6} + \frac{3}{6} \times \frac{3}{6} + \frac{3}{6} \times \frac{3}{6} \\ &= \frac{3}{4} \end{aligned}$$

① How many 4 digit numbers are divisible by 13?

$$1001 + \dots + 9997$$

$$\text{Now, } 1001 + (n-1) \times 13 = 9997$$

$$\text{or, } (n-1) \times 13 = 8996$$

$$\text{or, } n-1 = 692$$

$$\therefore n = 693 \text{ (Ans)}$$

② Find the sum of all the multiples of 11 that are 3 digit no.

$$110 + 121 + 132 + \dots + 990 = ?$$

$$\text{Here, } 110 + (n-1) \times 11 = 990$$

$$\text{or, } (n-1) = \frac{880}{11} = 80$$

$$\therefore n = 81$$

$$\left| \begin{array}{l} \text{Sum} = \frac{81}{2} \{ 220 + (81-1) \times 11 \\ \qquad \qquad \qquad 555 \\ = \frac{81}{2} \times 1110 \end{array} \right.$$

11. From a board of 6 men and 5 women, a committee of 4 members is to be formed. If the members are picked at random, then what is the probability that the women outnumbered the men on the committee?

$$\text{Ans: Total possibility} = {}^{11}C_4 = \frac{11 \times 10 \times 9 \times 8}{4 \times 3 \times 2 \times 1} = 330$$

$$\text{Possibility in favor of the event} = {}^5C_4 + {}^5C_3 \times {}^6C_1$$

$$= 5 + \frac{5 \times 4 \times 3}{3 \times 2 \times 1} \times 6$$

$$= 65$$

$$\text{Ans.} = \frac{65}{330} = \frac{13}{66}$$

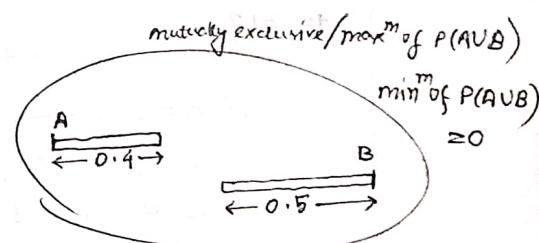
12. The probability of two events is given to be 0.4 and 0.5 respectively.

Which of the following could be the probability of either of the two events occurring?

- (A) 0.2 (B) 0.7 (C) 0.8 (D) 0.9

For the two events mutually exclusive,

$$P(A \cup B) = P(A) + P(B) = 0.9$$

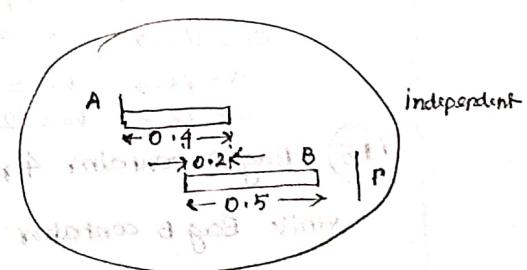


For the two events independent,

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= 0.4 + 0.5 - 0.4 \times 0.5$$

$$= 0.7$$

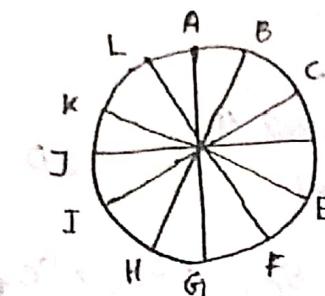


So consider it be B, C, D.

$$P(A \cap B) = 0.5 \quad \text{(this is minmum P(AUB))}$$

$$P(A \cap B) = 0.4, \quad \text{(this is maxm P(AUB))}$$

13: 12 points are equally spaced on a circle. If 3 points are chosen at random, then what is the probability to form an equilateral triangle?



The equilateral triangles are

AEI, BFJ, CGK, DLH, L

\therefore Probability of forming equilateral triangle

$$= \frac{4}{12 \times 11 \times 10} = \frac{4}{3 \times 2 \times 1} = \frac{24}{12 \times 11 \times 10} = \frac{1}{55}$$

14. If a, b, c are distinct numbers randomly chosen from the set of prime numbers from 1 to 20, then what is the probability $a+b+c$ is equal to 31?

Here, $a+b+c = 27$

$$\{2, 3, 5, 7, 11, 13, 17, 19\}$$

if $a = 2$, \rightarrow not possible.

$$a = 3 \rightarrow \text{not possible}$$

$$a = 5 \rightarrow b + c = 11 \times 2 \quad \checkmark$$

$$a = 7 \rightarrow \text{not possible}$$

$$a = 11 \rightarrow \text{not possible}$$

$$a = 13 \rightarrow b + c = 2 \times 7 \quad \checkmark$$

$$a = 17 \rightarrow b + c = 2 \times 5 \quad \checkmark$$

Ans: $\frac{3}{8C_3}$

$$= \frac{3}{56}$$

(15) Bag A contains 4 red and 3 white balls.

while Bag B contains 3 red and 4 white balls.

One bag is chosen randomly and 2 balls are picked. What is the probability that both balls are red?

$$P(R) = \frac{1}{2} \times \frac{4}{7} \times \frac{3}{6} + \frac{1}{2} \times \frac{3}{7} \times \frac{2}{6}$$

$$= \frac{3}{14}$$

- (16) A bag contains 7 black marbles, 5 red and 8 blue marbles. What is the probability that you have picked a pair of matching marbles.

$$\text{Ans: } \frac{7 \times 6}{20 \times 19} + \frac{5 \times 4}{20 \times 19} + \frac{8 \times 7}{20 \times 19}$$

- (17) $x+y+z=12$, x, y, z are non-negative integers. How many possible solutions exist?

$$\text{Ans: } {}^{14}C_2$$

Statistics

- (1) The wicket keeper of a cricket team is 36 years old and the captain is 35 years old. If they are replaced, now the age average of the team reduces by 2 years. What is the average of the 2 new players?

$$\frac{962 + 71}{11} = 2 + \frac{962 + x}{11}$$

$$\text{or, } \frac{71}{11} = 2 + \frac{x}{11}$$

$$\text{or, } \frac{x}{11} = \frac{71 - 22}{11}$$

$$\text{or, } x = 49$$

- (2) For a group of n students, the avg. wt. is x kg. When one weighing 80 kg joins the group, the avg. age increases by 1 kg. If another one joins, who weighs 54 kg, then the avg. becomes x kg again. Which is greater... n or x ?

$$\frac{nxt - 80wt}{n} = x \text{ or, } nwt - 80wt = nx$$

$$\frac{nxt - 80wt + 134}{n+2} = x \text{ or, } nx + 134 = nx + 2x$$

$$\therefore x = 67. \text{ Now, } 67n + 80 = 68(n+1) \therefore n = 12$$

$$\therefore x > n$$

③ The least and greatest numbers in a list of 7 real numbers are 2 and 20. The median of the list is 6, and the number 3 occurs most often in the list. Which of the following, would be the average of the numbers in the list?

$$2 < 6 \leq 20$$

PSMT 3 ASSET

$$\frac{2+3+6+20+x+y}{7}$$

$$= \frac{31+x+y}{7}$$

(a) 7 ✓

(b) 8.5 ✓

(c) 10 ✓

(d) 6

(e) 5

for option (a) $\frac{34+x+y}{7} = 7 \therefore x+y = 15 \dots \text{possible.}$

" " (b) $\frac{34+x+y}{7} = 8.5 \therefore x+y = 25.5 \dots \text{possible.}$

" " (c) $\frac{34+x+y}{7} = 10 \therefore x+y = 36 \dots \text{possible.}$

④ There are 50 numbers. Each number is subtracted from 53 and the mean of the numbers so obtained is found to be -3.5. What is the mean of the given numbers?

$$\text{old mean} = \frac{x_1+x_2+\dots+x_{50}}{50}$$

$$\text{new mean} = \frac{(53-x_1)+(53-x_2)+\dots+(50-x_{50})}{50}$$

$$-3.5 = \frac{53 \times 50 - (x_1+x_2+\dots+x_{50})}{50}$$

$$\text{or, } -3.5 = 53 - \text{old mean}$$

$$\text{or, old mean} = 56.5$$

median of the observation Q_2

The first quartile Q_1 is the median of the observation lesser than Q_2

The third quartile Q_3 is the median of the observation greater than Q_2

$$\{2, 4, 4, 5, 7, 7, 7, 7, 7, 8, 8, 9, 9, 9\}$$

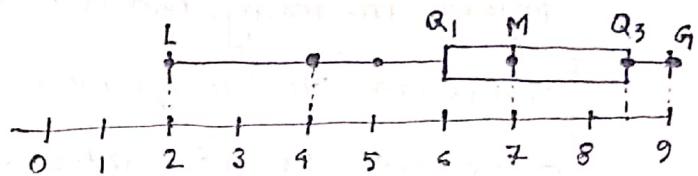
Lowest, $L = 2$

Greatest, $G = 9$

$$Q_2 = M = \frac{7+7}{2} = 7$$

$$Q_1 = \frac{5+7}{2} = 6$$

$$Q_3 = \frac{8+9}{2} = 8.5$$



$$\text{Variance, } b^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

$$\text{Std. deviation, } b = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}}$$

Standard Deviation

- ① A set of 10 numbers has a mean of 10 and a standard deviation of 2, another set of 10 numbers has a mean of 4 and standard deviation of 3.

Quantity A

The standard deviation of 20 numbers

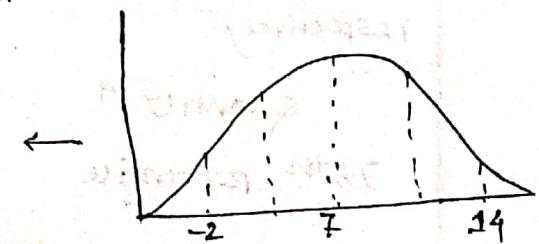
Quantity B

For the first set, $x_1 + \dots + x_{10} = 10 \times 10 = 100 \rightarrow 2\% = 10 - 2 \times 2 = 6$

for the second set, $x_{11} + \dots + x_{20} = 4 \times 10 = 40 \rightarrow 98\% = 10 + 2 \times 2 = 14$

(4) $x_1 + \dots + x_{20} = 140 \rightarrow 2\% = 4 + 3 \times 2 = 10$
 $\therefore \text{mean} = \frac{140}{20} = 7$
 $98\% = 4 - 3 \times 2 = -2$

std.deviation < 5



(2) A given data set has a mean μ and a standard deviation σ

Quantity A

Quantity B

The new standard deviation when every observation is increased by 2 units

The new standard deviation where every observation is increased by 2 times

(3) 600 applications for several post office jobs were rated on a scale from 1 to 50 points. The rating had a mean of 32.5 points and a standard deviation of 7.1 points. How many standard deviations above or below the mean is a rating of 48 points?

Ans:
$$\frac{48 - 32.5}{\text{std. deviation}} = 2.2$$

(4) The weight of a group of children was surveyed and 50 lbs is the third standard deviation to the left of the mean, and 110 lbs also falls on a standard deviation, then which of the following could be the mean weight of the children?

$50 + nx = 110$ for value of each deviation
no. of divisions $\therefore nx = 60$

$$4 \times 15 = 60 \rightarrow 50 + 3 \times 25 = 95$$

$$5 \times 12 = 60 \rightarrow 50 + 3 \times 12 = 86$$

$$6 \times 10 = 60 \rightarrow 50 + 3 \times 10 = 80$$

(A) 80 ✓

(B) 85

(C) 86 ✓

(D) 95 ✓

(E) 100

(5) The random variable X is normally distributed. The values of 60th percentile and 90th percentile is 650 and 850 respectively.

Quantity A

Quantity B

75th percentile

750

(6) A is a set of n distinct positive integers. $n > 2$.

Quantity A

Standard deviation of A

Quantity B

Std. dev. of A, when each number is multiplied by (-2)

(7) 25th percentile = 375, 75th percentile = 125.

A

B

90th percentile

450 ✓

(8) A set of 9 integers has a range of 2. The mean and mode of the set is 63.

Quantity A

Quantity B

The 3rd integer when the no's
are arranged in ascending order

The 5th integer when the no's are arranged in ascending
order.

62, 63, 63, 63, 63, 63, 63, 63, 64

Here, mode = mean = 63, 3rd integer = 5th integer

or, 62, 62, 63, 63, 63, 63, 63, 64, 64 Here, mode = mean = 63; 3rd integer = 5th integer.

or, 62, 62, 62, 63, 63, 63, 64, 64, 64, Here mode = 62, 63, 64 and mean = 63 X

so, (A) and (B) are equal.

Answer: (C)

(9) A group of positive integer values are: 1, 5, x , 9, 13, y , 35 and

and $xy = 32$

Here, $xy = 32$

Quantity A Quantity B

Range

Mean

$\therefore x = 4, y = 8$ or, $x = 2, y = 16$

or, $x = 32, y = 1$

\therefore range is always 34

largest mean = $\frac{1+5+9+13+35+32+1}{7} <$ range

Answer: A

(10) The average car price is \$8000. If 4 of the cars are priced under \$1000 and none of the cars are more than \$16000, then which of the following could be the no. of car sale?

- (A) 6 (B) 7 (C) 8 (D) 11 (E) 15

$$\text{Now, } 4 \times 1000 + (n-4) \times 16000 > n \times 8000$$

$$\text{or, } 4000 + 16000n - 64000 > 8000n$$

$$\text{or, } 8000n > \underline{\underline{24000}}^{60}$$

$$\text{or, } n > 7.5$$

Ans: (C), (D), (E)

(11)



which are true?

- (A) The median is closer to the upper half of the data than the lower half of the data.
- (B) The data is normally distributed.
- (C) The set has a std. deviation greater than zero (0)
- (D) The median of the lower half of the data is closer to the median of the entire data than the median of the upper half of the data.

Ans: (A), (C)

(12) Three dice are drawn at random. What will be the probability that sum of digit on all three dice is not seven (7)?

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

$$\text{or, } x+y+z=7 \quad x \geq 1,$$

$$y \geq 1$$

$$z \geq 1$$

$$\frac{3!}{2!} + \frac{3!}{2!} + \frac{3!}{2!} + \frac{3!}{2!}$$

$$\therefore 6C_2 = 15$$

$$= 15.$$

$$\text{Ans: } \frac{15}{6 \times 6 \times 6} = \frac{15}{216}$$

(13) Two cards are drawn from a pack of 52 cards. The probability that either both are red or both are kings is —

$$\frac{26 \times 25}{52 \times 51} + \frac{4 \times 3}{52 \times 51} - \frac{2 \times 1}{52 \times 51} \rightarrow \text{Red King}^{2 \text{ in}}$$

(14) 22 identical English and 19 identical Hindi books are kept in a shelf. In how many ways Hindi books are placed so that two books on Hindi may not be together?

Ans: If we place English Books First,

then there will be $20+1+1=22$ positions to place 19 Hindi books

$$\therefore 22C_{19} = \frac{22 \times 21 \times 20}{2 \times 1 \times 1} = 1540 \text{ (Ans)}$$

(15) In how many ways 12 different books can be distributed equally among 4 persons?

$$12C_3 \times 9C_3 \times 6C_3 \times 3C_3$$

16) Four dice are thrown together.

Quantity A

Quantity B

Probability that product of the numbers
is a prime no.

$$\frac{1}{72}$$

(1, 1, 3, 1), (1, 5, 1, 1), ~~(1, 1, 1, 1)~~, (2, 1, 1, 1)



$$\frac{4!}{3!} + \frac{4!}{3!} + \frac{4!}{4!} + \frac{4!}{3!}$$

$$= 12$$

Ans: $\frac{12}{64} = \frac{1}{108}$ (B) ✓

(17) A girl has 3 library tickets and 8 books of her interest.

She does not want to borrow physics II, unless she borrows physics I.

In how many ways, she choose the 3 books?

No Physics $\rightarrow {}^6C_3 = 20$

All $n \rightarrow {}^2C_2 \times {}^6C_1 = 6$

Physics I borrowed by but not a Physics II

$$= 1 \times {}^6C_2 = 15$$

$$\text{Total} = 41$$

(18) What is the probability that two squares selected share only one common corner on a chess board?

Here, possible ways of selecting 2 squares = ${}^{64}C_2$

$$\begin{aligned} & n \quad n \quad n \quad n \quad 2 \text{ n } \text{ having one common corner} \\ & \frac{(7 \times 7) \times 4}{2 \times 1} \\ & = 98 \end{aligned}$$

$$\text{Ans: } \frac{98}{{}^{64}C_2} = \frac{7}{144}$$

19. In how many ways 4 Indians and 3 Englishmen can be seated on a round table such that no two Englishmen sit together?

$$\text{Ans: } (4-1)! \times {}^4C_3 \times 3!$$

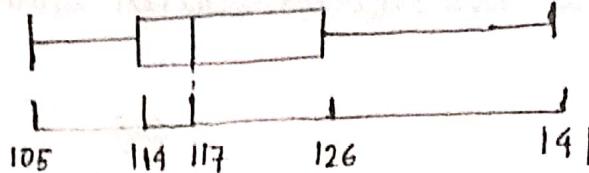
↓ ↓ ↓
Indians Set 4 men 3 Englishmen

20. There are 27 students on the college debate team.

What is the probability that at least 3 of them have their birthday in the same month?

Ans. 1. (think our Pigeon-Hole problem)

(21)



Eight hundred insects were weighed.

If 80th percentile is 130 mg.

Then how many measurements are between 126 milligram and 130 milligrams?

Here, 80th percentile = 130 = $\frac{4}{5} \times 800 = 640$ Data.

75th percentile = 126 = $\frac{3}{4} \times 800 = 600$ Data.

\therefore There are $= (640 - 600) = 40$ Data in between 126 - 130 mg.

(22) Find out the range and IQ range:

2, 4, 4, 5, 7, 7, 7, 7, 7, 7, 8, 8, 9, 9, 9, 9, 10

Here, Range = 10 - 2 = 8

Avg. of 5, 7 is 6 which is Q₁

Avg. of 9, 9 is 9 which is Q₃

\therefore IQ = 9 - 6 = 3.

(23) The sum of all natural numbers lying between 1 and 100, which are multiples of 3 or 7 is —

$$\text{multiple of } 3 : 3+6+\dots+99 \quad \text{sum} = \frac{33}{2} \{2 \times 3 + (32-1) \times 3\} = 1683$$

$$\text{multiple of } 7 : 7+14+21+\dots+98 \quad \text{sum} = \frac{14}{2} \{2 \times 7 + (14-1) \times 7\} = 734$$

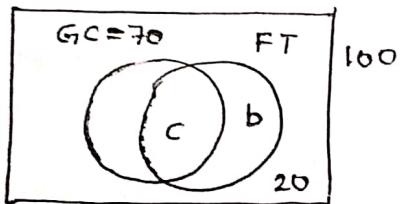
$$\text{multiple of } 3 \text{ and } 7 : 21+42+63+84, \text{ sum} = 210$$

$$\text{Ans: } 1683 + 734 - 210 = 2208$$

(24) A Jar contains 29 marbles; 6 red, 8 white, 10 blue. What is the minimum no. of marbles that must be picked to be certain that you have at least 2 marbles of each color?

$$\text{Ans: } 10 + 8 + 2 = 20$$

(25) In a group of 100 students, more students are on the football team than are members of the golf club. If 70 are in the club and 20 are neither on the team nor in the club, what is the minimum number of students who could be both on the team and in the club.



from graph,

$$GC \leftarrow 70 + b + 20 = 100$$

$$\text{or, } b = 10$$

Again, $FT > GC$

$$\therefore FT > 70$$

$$\text{or, } b + c > 70$$

$$\text{or, } 10 + c > 70$$

$$\therefore c > 60$$

Ans: minimum

$$60 + 1 = 61 \text{ students}$$

play both.

(26) The probability that 2 people chosen at random were born on the same day of week or same month of the year — which one is greater?

$$\text{For same days of the week} = 1 \times \frac{1}{7}$$

$$\text{In a year} = 1 \times \frac{1}{12}$$

① Which is the ordering of $2\sqrt{13}$, $4\sqrt{3}$, $5\sqrt{2}$, $3\sqrt{6}$?

② If $\frac{1}{2^{11} \times 5^{17}}$ is expressed as a terminating decimal, how many non-zero digits will the decimal have?

$$\frac{1}{2^{11} \times 5^{17}}$$

$$= \frac{2}{(2 \times 5)^{17}}$$

$$= \frac{64}{10^{17}}$$

$$= 64 \times \underbrace{0 \dots 0}_{16 \text{ zeros}} \underline{\quad} 1$$

$$= \underbrace{0 \dots 0}_{15 \text{ zeros}} \underline{\quad} 64$$

Ans: 02



③ If $a_1 + a_3 + a_5 = 27$

and each term is equal to the preceding term + k (without a_1)
then $a_2 + a_4 = ?$

$$a_2 = a_1 + k$$

$$a_3 = a_1 + 2k$$

$$a_4 = a_1 + 3k$$

$$a_5 = a_1 + 4k$$

Now, $a_1 + a_1 + 2k + a_1 + 4k = 27$

or, $3a_1 + 6k = 27$

or, $a_1 + 2k = 9$

So, third term $a_3 = 9$

2nd

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(4) The total amount that Mary paid for a book was equal to the price of the plus 4 percent sales tax on the price of the book. Mary paid 10 taka and got change of less than 2 taka. Which is/are true?

- (A) The price of the book is less than 9.50 taka
- (B) The price of the book is greater than 6.90 taka
- (C) The sales tax was less than 0.45 taka.

\Rightarrow Total money Mary had to pay ≤ 10

$$\begin{aligned} \text{or, } & 7 < P + 4\% \text{ of } P \leq 10 \\ & \quad \swarrow \\ \text{or, } & 7 < 104\% \text{ of } P \leq 10 \end{aligned}$$

If the price $P = 7$ taka, then tax $= 0.28$ taka.
So if $P = 6.9$, then tax should be ^{at least} greater than $0.29 - 0.1$ taka

So, A is incorrect.

If price is $P = 10$ taka, then tax $= 0.4$ taka

so, if price is $P = 9.5$ taka, then tax will be less than 0.4 taka

So, B is incorrect.

Maximum sales tax is less than $10 \times 0.04 = 0.4$ taka.

So, C is correct.

(5) The integer v is greater than 1. If v is the square of an integer which of the following is also the square of an integer?

(A) $81v^2$ ✓

(B) $25v + 10\sqrt{v} + 1$ ✓

(C) $4v^2 + 4\sqrt{v} + 1$

(D) $27v$

(6) What is not a factor of $25!$?

(A) 26 $\rightarrow 13, 2$

(B) 28 $\rightarrow 14, 2$

(C) 36 $\rightarrow 12, 3$

(D) 56 $\rightarrow 7, 8$

(E) 58 ✓ $\rightarrow \underline{\underline{(29, 2)}}$

(7) The company at which Mark is employed has 80 employees, each having different salary. Mark's salary is the 2nd highest in the first quartile of 80 salaries. The company hired 8 new employees whose salaries are always less than the new employee's ^{now} salary. What would Mark's salary be w.r.t. quartile.

New quartile $\rightarrow 22$ (2nd highest)

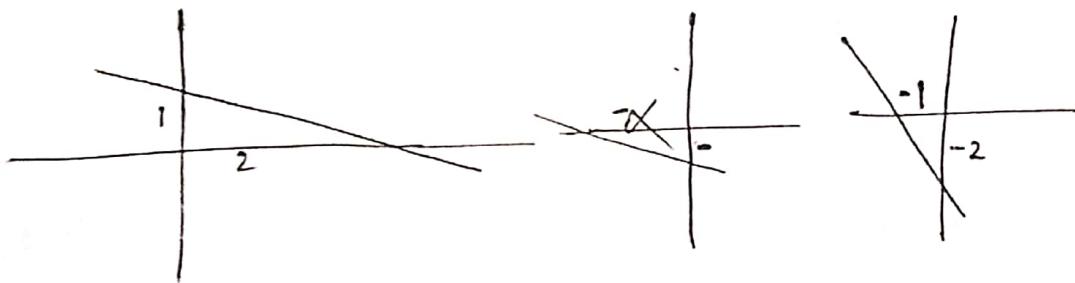
Mark 2nd quartile $\rightarrow 20$ (2nd highest)

$\rightarrow (8 + 19) \rightarrow 1st \text{ and } 2nd$ quartiles $\rightarrow (15, 16, 17, 18, 19)$

2nd Quartile
5th place

(8) In the XY plane, line K doesn't pass through origin which is correct to determine whether the slope of line K is negative?

- ✓ 1. The X intercept of line K is twice the Y intercept.
- ✓ 2. The product of the X and Y intercept of line K is positive.
- ✓ 3. Line K passes through the point $(a, b), (r, s)$ where, $(a-r)(b-s) < 0$



So, 1 and 2 are correct.

Now, $\frac{a-r}{b-s} < 0$, i.e., negative slope.

\therefore 3 is also correct.

$$(9) \quad \frac{1-x}{x-1} = \frac{1}{x}$$

Quantity A	Quantity B
x	$-\frac{1}{2}$

$$\text{Here, } x(1-x) = x-1$$

$$\text{or, } x-x^2 = x-1$$

$$\therefore x^2 = 1$$

$$\therefore x = \pm 1$$

for, $x=1$, denominator = 0

\therefore solution is -1 . (B)

30. A Number N is a positive 3 digit number. If x is in its hundreds place and y is in its unit place, then $(N - 100x - y)$ is divisible by?

Here, $N = 100x + \overset{100x}{10a}y$

$$N - 100x - y = 10a$$

$$= 5 \times 2 \times a$$

\therefore must be divisible by 5, 2

54. If m, n, p are prime no's greater than 10, find the no. of factors of mnp .

$$m \times n \times p = 11^1 \times 13^1 \times 17^1 \quad (\text{can be})$$

$$\therefore \text{No. of factor} = (1+1)(1+1)(1+1) \\ = 8$$

74. If $Z = 123^4 - 123^3 - 123^2 - 123$,

then what is the remainder when Z is divided by 122?

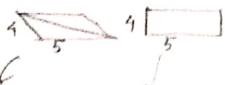
$$\begin{aligned} \text{Ans: } Z &= 123^4 - 123^3 - 123^2 - 123 \\ &= 123^3(123 - 1) - 123(123 - 1) \\ &= 123^3 \times 122 - 123 \times 122 \\ &= 122(123)(123^2 - 1) \end{aligned}$$

which is divisible by 122

$$\therefore \text{remainder} = 0$$

Area of parallelogram = base * height

Area of parallelogram = base * height



Area of parallelogram = base * height

$$\frac{1}{2} \times 2 \times 4 - 5 = 5$$

$$\frac{1}{2} \times 2 \times 4 \times 5 = 20$$

- (149) A number between 10 and 100, when divided by 4, 6, or 7 leaves a remainder of 2.

Quantity A

Quantity B

Remainder when divided by 11

9

(a)

(b)

(c)

- (117) Given 6 balls, numbered 1, 2, 3, 4, 5, 6. If two balls are picked from them, what is the probability that their sum is 8?

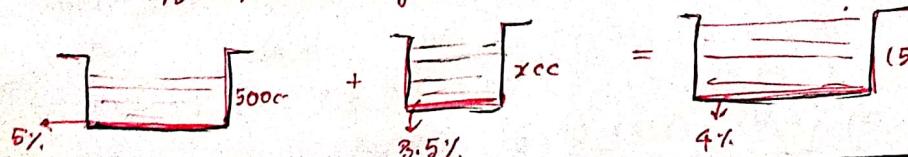
(2,6), (3,5) \rightarrow 2 events; order is not considered

Ans: $\frac{2}{6C_2}$

- (126) 6 consecutive positive numbers Range is 6.8 and of 7 consecutive numbers is 13.2. If none of the numbers in the two groups are same, what would be the range of 13 numbers?

Ans: Range must be greater than or equal to $(6.8 + 13.2) = 20$

- (130) A solution having 5% salt concentration. To the 500cc of the above solution how much amount of a 3.5% salt concentration solution should be added in order to get a 4% salt solution?



$$500 \times 5\% + x \times 3.5\% = (500+x) \times 4\%$$

$$\therefore x = 100 \text{ cc.}$$

155. Given a rhombus and a square with sides 5 each and angles of the rhombus were 120° and 60° .

Quantity A	Quantity B
Area of the rhombus	25

If it were a square, the area would be $= 5^2 = 25$

which must be greater than Rhombus for same Perimeter.

Answer: B.

156. There are 25 integers and each integer is a multiple of m .

If the highest value of new integer is 250 then,

Quantity B	Quantity A
5	m .

$$\text{Now, } 250 = 2 \times 5 \times 5 \times 5$$

So, old highest integer can be $= 5 \times 5 \times 5 = 125$; ($m=2$)

$$\text{Or, } 5 \times 5 = 25 \quad (m=2 \times 5=10)$$

$$\text{Or, } 2 \times 5 \times 5 = 50 \quad (m=5)$$

for $m=2$, $A < B$

$m=5$, $A=B$

$m=10$, $A > B$

Answer: D)

162. In how many ways 3 couples can be seated on 6 seats, so that husband and wife seat adjacent?

Ans:	1st seat	2nd seat	3rd seat	4th seat	5th seat	6th seat
	↓	↓	↓	↓	↓	↓

6 man 1 woman 4 man 1 woman 2 women 1 woman

$$\therefore 6 \times 4 \times 2 = 48$$

Or, 3 couple can be seated in $= 3!$ ways

each couple " " " $= 2!$

$$\therefore 3! \times 2! \times 2! \times 2! = 48$$

172. Given that a circle passes through $(8, 0)$ and $(0, 6)$ then

Quantity A

Diameter of the circle

Quantity B

10

can

Maxm distance between $(8, 0)$ and $(0, 6)$ will be the diameter of the circle.

$$\text{Maxm diameter} = \sqrt{(8-0)^2 - (0-6)^2} = 10$$

for this, $A > B$, otherwise, if these two points make a chord,

the diameter of the circle is greater than 10

" (A)

178. Two distinct numbers are taken from $1, 2, 3, \dots, 28$. Find the probability that their sum ≤ 13 ?

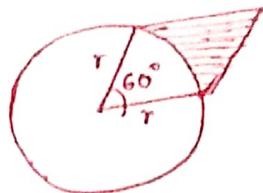
If first no. is 12, the other no. = 1. $(12, 1)$

If first no. is 11, the other no. = 1 or 2. $(11, 1), (11, 2), (13, 1), (3, 2), (2, 1)$,
 similarly $(10, 1), (10, 2), (10, 3), (9, 1), (9, 2), (9, 4), (9, 3), (8, 1), (8, 2)$,
 $(8, 3), (8, 4), (8, 5), (7, 1), (7, 2), (7, 3), (7, 4), (7, 5), (7, 6), (6, 1), (6, 2), (6, 3), (6, 4)$,
 $(5, 1), (5, 2), (5, 3), (5, 4), (4, 1), (4, 2), (4, 3), (6, 5), (6, 6), (6, 7), (5, 1), (5, 2), (5, 3), (5, 4), (4, 1), (4, 2), (4, 3)$,

\therefore Total event in favor = $\frac{36}{36}$

$$\text{Now, Probability} = \frac{36}{26C_2} = \frac{\frac{36}{2}}{\frac{26 \times 25}{2} \times \frac{3}{1}} = \frac{2}{21}$$

- (181) A parallelogram is drawn as below. Find the area of the shaded region.



$$\text{Area of the parallelogram} = \frac{\sqrt{3}}{4} \times r^2 \times 2$$

$$\text{Area of the sector of circle} = \frac{1}{6} \pi r^2$$

$$\therefore \text{Area of shaded region} = \frac{\sqrt{3}}{2} r^2 - \frac{1}{6} \pi r^2$$

- (182) If, $x=5, 7, 6, 8, 9$ and, $y=11, 12, 13, 14$. By selecting one from x and one from y , how many sets of distinct values we get from $x+y$?

$$\text{Highest value} = 14+9 = 23$$

$$\text{Lowest value} = 11+5 = 16$$

$$\text{Distinct value} = 23-16+1 = 8$$

- (219) When a number s is divided by 9, the remainder is 1 and when the number is divided by 11, the remainder is 8, find s ?

For the 1st condition, $s = \{10, 19, 28, 37, 46, 55, 64, 73, 82, 91, 100\}$

$$\{109, 118, 127, 136, \dots\}$$

for the 2nd condition, $s = \{19, 30, 41, 52, 63, 74, 85, 96, 107, 118, 129, 140, 151, \dots\}$

$$Ans = \{99, 118, 217, 316, 415, \dots\}$$

(225) $s_1=5, s_2=7$, then find s_n such that, $s_n = 10[s(n-1)]$ for n divisible by 3
 $s_n \neq s(n-1)$ for n not divisible by 3.

$$s_3 = 10 \times 7 = 70$$

$$s_4 = 70$$

$$s_5 = 70$$

$$s_6 = 10 \times 70 = 700$$

(237) If a triangle is given with 2 sides each 20, Find the range of values of 3rd side

$$20 - 20 < x < 20 + 20$$

$$\therefore 0 < x < 40$$

(240) Quantity A Quantity B
 $3^{(4n+2)} + 5$ when divided by 4
10 leaves remainder

$$\text{when, } n=1, 3^{11} = \dots 7$$

$$\text{when, } n=2, 3^{15} = \dots 7$$

Always unit digit is 7

\therefore remainder = 7

$B > A$

(248) John wrote a phone number on a note that was later lost.

John can remember the number has 7 digits,

the digit 1 appeared in the last 3 places and 0 did not appear at all.

What is the probability that the phone number contains at least 2 prime numbers?

Prime nos. are 2, 3, 5, 7

Other nos. can be 4, 6, 8, 9

If the first 4 digits have 2 prime numbers

$$= \frac{4 \times 4 \times 4 \times 4}{8 \times 8 \times 8 \times 8} = \frac{4 \times 4 \times 4 \times 4}{8 \times 8 \times 8 \times 8}$$

No prime digit 1 prime digit

$$= \frac{1}{16}$$

Probability

0.0625

(25) If $\alpha_2 = \alpha_1 + 4\alpha_1$ and $\alpha_1 = 3$ then what is the 19th term?

$$\alpha_2 = 5\alpha_1 = 15 = 5 \times 3$$

$$\alpha_3 = 5\alpha_2 = 75 = 5 \times 3 \times 5$$

$$\alpha_7 = 5 \times 75 = 5 \times 3 \times 5 \times 5$$

$$\alpha_{19} = 5 \times 3 \times 5^{17}$$

$$= 3 \times 5^{18}$$

(268) Given numbers from 1 to 10. Two numbers are to be selected from these 10 numbers, and they can be same also. What is the probability that at least one of them is even?

Ans: $1 - \frac{1}{10} \times \frac{1}{10}$ odd 23rd suggest

$$= 1 - \frac{5}{10} \times \frac{5}{10}$$

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

(274) Given series P_1, P_2, P_3, \dots . If $P_1 = 1$ and $P_n = 24P_{n-1} + 8$, then,

Quantity A
the remainder when P_{66} is divided by 6

Quantity B
4

$$\text{Here, } P_2 = 24 + 8 ; \frac{P_2}{6} = \frac{24+8}{6} = \frac{24}{6} + \frac{8}{6} = \text{remainder 2}$$

$$P_3 = 24 \times P_2 + 8 ; \frac{P_3}{8} = \text{remainder 2}$$

$A > B$

Magoosh-① Quantity A Quantity B
the number of multiples of 3 the number of
between 3^{31} and 3^{41} multiples between
 7^{21} and 7^{31}

Think about the no. of multiples of 2 betw 2^3 and 2^5

$$\text{They are: } \frac{2^5 - 2^3}{2} = 2^4 - 2^2 = 16 - 4 = 12$$

There are $12 - 1 = 11$ multiples.
(But 2^5 is not included)

They are: 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30 $\rightarrow 11$ (including 2⁵)

$$A \rightarrow \frac{3^{41} - 3^{31}}{3} = \frac{3^{31} (3^{10} - 1)}{3} = 3^{30} (3^{10} - 1)$$

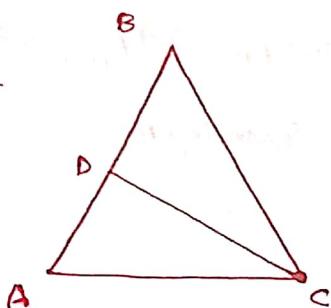
$$B \rightarrow \frac{7^{31} - 7^{20}}{7} = \frac{7^{20}(7^{10} - 1)}{7} = 7^{20}(7^{10} - 1)$$

$$\text{Now, } 7^{10} - 1 > 3^{10} - 1$$

$$7^{20} = (49)^{10} > (27)^{10} = 3^{30}$$

$$\therefore B > A$$

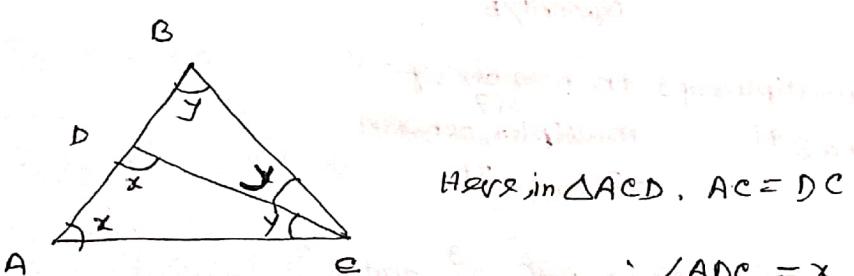
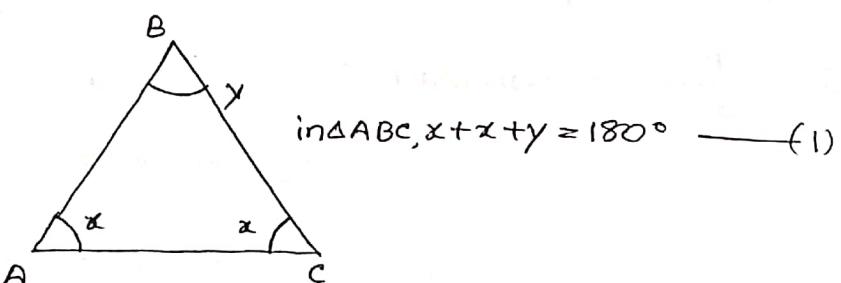
Magoosh-2



In the diagram above,

$$AB = BC \text{ and } AC = DC = BD$$

$$\angle DAC = ?$$



$$\therefore \angle ADC = x$$

Here in $\triangle BCD$,

$$\therefore \angle ACD = y$$

$$BD = CD$$

$$\text{Here, } \angle B = y, \text{ so } \angle DCB = y$$

$$\therefore x = 2y \therefore y = \frac{1}{2}x$$

$$\text{in } \triangle ABC, 2x + \frac{1}{2}x \geq 180^\circ \therefore x = 72^\circ \text{ (Ans)}$$

Magoosh-③ Edward and Klara are both nurses who are good friends.
 Edward works in Brigade hospital in every 10 day cycle,
 he works first 7 days and gets 3 days off.
 Klara works in Cedar hospital in every 7 day cycle,
 she works first 5 days and gets 2 days off.

In which weeks both get same two days off?

3 4 5 6 7 8 9 10

Ans: 7 and 10

Magoosh-④ John has 100 candies to distribute among 10 children. If each child receives at least 1 candy and no two children receive the same number of candies, what is the maximum number of candies that a child can receive?

Ans:

$$1+2+3+4+5+6+7+8+9+x = 100$$

$$\therefore x = 55$$

Magoosh-⑤ A weighted coin has a probability P of showing heads.

If successive flips are independent, and the probability of getting at least one head in two flips is greater than 0.5, then what could P be.

(A) 0.1

(B) 0.2

(C) 0.3

(D) 0.4

(E) 0.6

(F) 0.7

= 1 - Probability of getting 2 tails

$$= 1 - x \times x \quad [\text{Here } x = \text{Probability of getting Tail}]$$

$$= 1 - x^2$$

$$\text{Now, } 1 - x^2 > \frac{1}{2} \quad \text{or, } \frac{1}{2} > x^2 \quad \therefore x < 0.71 \quad \therefore x > 0.71 \text{ or, } 1 - x > 0.29$$

Ans: (C, D, E, F)

Magoosh-6) Among all the students at a certain high school, the probability of picking a left-handed student is $\frac{1}{4}$, the probability of picking a student who is learning Spanish is $\frac{2}{3}$. Which of the following could be the probability of picking a student who is either left-handed or learning Spanish or both.

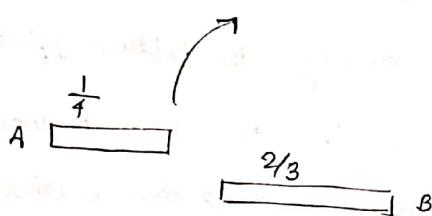
(A) $\frac{1}{2}$

(B) $\frac{2}{3}$

(C) $\frac{3}{4}$

(D) $\frac{5}{6}$

(E) $\frac{7}{8}$



A $\frac{1}{4}$

B $\frac{2}{3}$ $\max^m P(A \cup B) = \frac{2}{3}$

when $P(A \cap B) = \frac{1}{4}$

$\frac{2}{3} \leq P(A \cup B) \leq \frac{11}{12}$

Ans: B, C, D, E.

Manica-7) In Basketball, when Monica takes her first free throw, she has a 50% chance of scoring. If she takes an additional throw, she has a 75% chance of making it. On this throw if she scored on the immediately previous throw. Suppose she has to take three (3) free throws in a row, and she does not score on the first one.

what is the probability that she scores at least 1 in the one of subsequent two throws?

$$P(\text{scoring at least 1 throw}) = \frac{1}{4} \times \frac{1}{4} + \frac{3}{4} \times \frac{1}{4} = \frac{7}{16}$$

2nd scored 3rd not scored
↑
2nd throw not scored → 3rd throw scored

$$\text{or, } P(\text{scoring at least 1 throw}) = 1 - P(\text{no throw scored})$$

$$= 1 - \frac{3}{4} \times \frac{3}{4}$$

$$= \frac{7}{16}$$

Magoosh 8) In a certain sock drawer, there are 4 pairs of black socks, 3 pairs of gray socks and 2 pairs of orange socks. If socks were removed without replacement, what is the minimum no. of socks that must be removed in order to ensure that two socks of the same color have been removed?

Ans: 4, because once we select out 4th sock we are guaranteed to have a same color pair.

Magoosh 9) A weighted die, numbered 1 through 6, has a probability of $\frac{1}{4}$ of rolling a six. If this die is rolled 3 times, and each roll is independent, what is the probability of rolling at least 2 sixes?

$$P(\text{at least 2 sixes}) = 1 - P(1 \text{ six})$$

$$= 1 - P(SNN) - P(NSN) - P(NNS)$$

$$= 1 - \frac{1}{4} \times \frac{3}{4} \times \frac{3}{4} - \frac{3}{4} \times \frac{1}{4} \times \frac{3}{4} - \frac{3}{4} \times \frac{3}{4} \times \frac{1}{4}$$

$$= \underline{\underline{\frac{5}{32}}}$$

Magosh ⑩ If k is the greatest positive integer such that 3^k is a divisor of $15!$ the $k = ?$

$$15! = 1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10 \times 11 \times 12 \times 13 \times 14 \times 15$$

$$= 1 \times 2 \times (3) \times 4 \times 5 \times (3 \times 2) \times 7 \times 8 \times (3 \times 3) \times 10 \times (11 \times (3 \times 4)) \times 13 \times 14 \times (3 \times 5)$$

$$k=6$$

Magoosh #11 Sid intended to type a seven digit integer, but the two 8's he meant to type did not appear. What appeared instead was the 5 digit no. 52115. How many different 7 digit numbers could Sid have meant to type?

$$\text{Ans: } 7C_2 = 21$$

$$\text{Magoosh} + 12 \quad N = 60! + 55! + 50!$$

The unit digit of N and a number of digits to the left of the unit digit are consecutive zeros before we come to the 1st non-zero digit. How many such consecutive zeros are there until the first non-zero digit?

Ans: If we add three numbers with three different strings of consecutive zeros, the one with the fewer consecutive zeros would be the limiting factor.
because: $501 = \dots 000000$ (n)

because , $50! = \ldots 000$ (say)

$$\begin{array}{r} \cancel{601} = \cancel{XXX} \cancel{X} 00 \quad 000 \\ \hline \quad \quad \quad 000 \longrightarrow \text{LF} \end{array}$$

Now, 50! has 10 multiples of 5

for 25 \rightarrow extra 1 multiple of 5

for 50 \rightarrow n - 1 " of 5

12 multiples of 5

huge(>12) n - n - 2

12 zeros

Magoosh-13) Set A = {1, 3, 4, 6, 9, 12, 15}

If 3 numbers are randomly selected from set A without replacement, what is the probability that their sum is divisible by 3?

P(divisible by 3) = P(1 or 4 can't be selected)

$$= \frac{5C_3}{7C_3} = \frac{3}{14}$$

Magoosh-14) From the letters in MAGOOSH, we are going to make 3 letter words. How many words can be formed?

Ans: If we select 2 O's then, ways of selecting another letter

$$= 5C_1 \text{ and words can be formed } = 5C_1 \times \frac{3!}{2!} = 15$$

Otherwise ways $= 6C_3 \times 3!$ (M, A, G, O, S, H)

$$= 120$$

$$\text{Total} = 120 + 15 = 135$$

Magoosh-15) When a certain coin is flipped, the probability of heads is 0.5. If it is flipped six times, what is the probability that there are exactly 3 heads.

$$\text{Ans: } 6C_3 \left(\frac{1}{2}\right)^3 \left(\frac{1}{2}\right)^3 = \frac{5}{16}$$

Magoosh - 16) In how many ways 16 different gifts be divided among 4 children such that each gets exactly 4 gifts?

$$\frac{16C_4}{\text{1st child}} \quad \frac{12C_4}{\text{2nd child}} \quad \frac{8C_4}{\text{3rd child}} \quad \frac{4C_4}{\text{4th child}}$$

$$= \frac{16! 12! 8! 4!}{(4!)^3 12! 8! 4!}$$

$$= \frac{16!}{(4!)^4}$$

Magoosh - 17) A popular website required to create a password consisting of digits only without repeating and must be at least 9 digit long. How many passwords are possible?

Ans: $10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 + 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$

$$= 10! \times 2$$

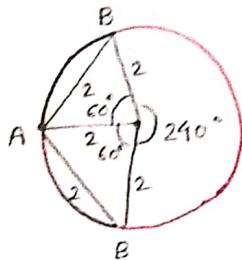
Magoosh - 18) In how many different ways, 3 identical green shirts and 3 identical yellow shirts can be given to 6 children such that each gets 1 shirt?

$$\overline{1} \quad \overline{2} \quad \overline{3} \quad \overline{4} \quad \overline{5} \quad \overline{6}$$

1, 4, 5 \rightarrow 6 ways or 3
 5, 1, 4 \rightarrow 6 ways
 Order doesn't matter

Ans: $6C_3 = 20$ or $\frac{6!}{3! 3!}$

Magoosh(19) If A and B are randomly placed on the circumference of circle with radius 2, what is the probability that the length of chord AB is greater than 2?



Considering our 1st point is A

$AB = 2$, so the block region $\angle 2$ rad $n > 2$

$$P(>2) = \frac{240}{360} = \frac{2}{3}$$

Magoosh(20) Javon must paint 3 rooms. Room A can be painted orange, red or green. Room B can be painted O, White or Red. Room C can be painted white, red or green. The 3 rooms can't be painted with same col^r. How many different ways Javon can paint the room?

Ans: $3 \times 3 \times 3 - 1 = 26$ ways

Magoosh(21) If 3 prime no.s are selected less than 30 and no prime no. can be chosen more than once, what is the probability that their sum is even?

Ans: $\frac{9C_3}{\Theta 10C_3} = \frac{3}{10}$ (2, 3, 5, 7, 11, 13, 17, 19, 23, 29)
 \downarrow
 2 and 210 O + E = E.

Magoosh(22) There are 10 people in a room. If each person shake hand with exactly 3 people, what is the total no. of handshakes?

A	B	C	D	E	F	G	H	I	J
3	3	3	3	3	3	3	3	3	3

Project 3568 Handshake

Handshake should be $= 3 \times 10 = 30$

Total \rightarrow 7 answers are given. I \rightarrow I is a mirror image, and 2 are counted

Magoosh-(21) How many integers between 1 and 10^{21}
such that sum of the digits is 2?

$$10^{21} = 1\underset{0}{\cancel{0}} \underset{0}{\cancel{0}} \underset{0}{\cancel{0}} \underset{0}{\cancel{0}} \underset{0}{\cancel{0}} \underset{0}{\cancel{0}} \underset{0}{\cancel{0}} \underset{0}{\cancel{0}} \underset{0}{\cancel{0}} \underset{0}{\cancel{0}} \underset{0}{\cancel{0}}$$

$$000 \ 000 \ 000 \ 000 \ 000 \ 000$$

$$22! \text{ & } 21C_2 \rightarrow 21C_2 = 210$$

$$2720 \times 2620 \rightarrow 21C_1 = 21$$

$$\underline{\underline{231}}$$

Magoosh-(22) Given that the length of each side of a quadrilateral is a distinct integer and that the longest side is not greater than 7, how many different possible combinations of side lengths are possible?

$$\text{Ans } 7C_4 = 35 - \{1, 2, 3, 6\} - \{1, 2, 3, 7\}, \{1, 2, 4, 7\} \\ \underline{\underline{= 32}}$$

Magoosh-(23) How many positive integers less than 10000
are such that the product of their digits is 210?

$$210 = 2 \times 3 \times 5 \times 7$$

Case I: 4 digits no with 2, 3, 5, 7 $\rightarrow 4!$

Case II: 3 digit number with $(2 \times 3) = 6, 5, 7$

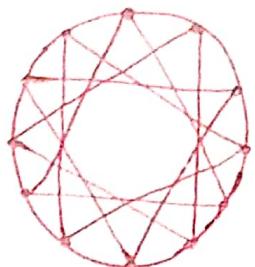
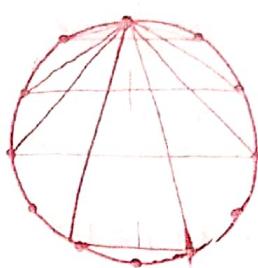
3! possibility

Case III: 4 digit no. with 1, 5, 6, 7 $\rightarrow 4!$

$$24+6+24 = 56 \text{ possibilities}$$

Magoosh - (24) There are points numbered A to L

How many isosceles and equilateral triangles can be drawn?



$$\begin{aligned} \text{For 1 point isosceles triangles are } & 4 \\ " 12 " & " " " 14 \times 12 \\ & = 48 \end{aligned}$$

$$\text{Equilateral triangles } = 4$$

$$\text{Total} = 52$$

Magoosh - (25) $\{N, 13, 15, 11, 18, 19\}$ In the list; N is some positive integer. Which of the following, for some value of N, a possible median of the list?

- 13.5 14 14.5 15 16 15.5 16.5 17 17.5

Magoosh - (26) Set X: $\{5, 6, 9\}$, set Y: $\{0, 1, 4\}$

Column A

Std. deviation of X

Column B

Std. deviation of Y

$$\begin{array}{c} 9 \\ 1 \\ 3 \\ \hline \{5, 6, 9\} \\ 3 \end{array}$$

Both sets are equally dispersed Ans: (C)

$$\begin{array}{c} 0 \\ 1 \\ 4 \\ \hline \{0, 1, 4\} \\ 1 \end{array}$$

Magoosh - (27) List S = $\{16, 9, 23, x, 13, 16\}$

In list S, the mean = median = mode. What is the value of X?

$$\text{Here, mode} = 16 \therefore \frac{16+9+23+x+13+16}{6} = 16 \quad \text{or, } x+77=96 \therefore x=19$$

Magoosh - 28) List A: $\{x, x, x, y, y, y, 3x+y, x-y\}$

If the median of list A is 10 and $0 < x < y$, what is the range of list A?

$$\text{Now, } A = \{x-y, x, x, x, y, y, y, 3x+y\}$$

$$\therefore \frac{x+y}{2} = 10$$

$$\therefore x+y = 10 \times 2$$

$$\text{Range} = 3x+y - x+y$$

$$= 2x+2y$$

$$= 20 \times 2$$

$$= 40$$

Magoosh - 29) Ten students wrote a test, and the distribution of scores is shown on the frequency table. If the average of the score is 62, what is the value of x ?

Score Number of students

40	1
55	2
70	3
x	4

Ans: 65

Median - 30) In a certain class, 41 students took a test and their mean = median = 81. Two additional students take the test on the next day and get 47 and 83. What can we say about the new mean and median?

Mean < 81 and median = 81

Magoosh-31) There are 10 employees in an office, not counting the office manager. The table shows how many employees have 0, 1, 2, 3 pets. If the manager is also included in the table, the average number of pets per person would equal to the median no. of pets per person. How many pets does the office manager have?

No. of pets No. of employees

0	2
1	3
2	2
3	3

$$\text{Here the median is } \frac{1+2}{2} = 1.5, \text{ mean} = \frac{16}{10} = 1.6$$

If the manager is also included, the median would be 1 or 2

$$\text{when mean} = 3, \text{ total pets} = 11 \text{ where employees have pets} = 2+3+2+ \\ = 16,$$

not possible.

$$\therefore \text{median} = \text{mean} = 2, \text{ total pets} = 22 = 16 + x \therefore x = 6$$

Ans: 6

Magoosh-32) Positive integers a, b, c, d, e are such that $a < b < c < d < e$. If the average of the 5 numbers is 6 and $d - b = 3$, then what can be the possible greatest range?

$$a+b+c+d+e = 6 \times 5 = 30$$

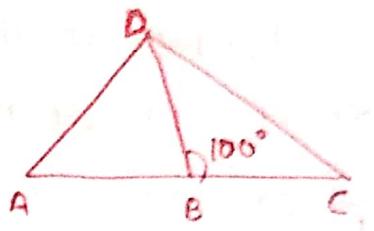
We have to maximize e and minimize the others to get max^m range.

$$\text{Now, } d - b = 3 \therefore d = b + 3$$

$$\text{if, } a = 1, b = 2, c = 3, d = 5 \text{ then, } e = 19$$

$$\text{and range max} = 19 - 1 = 18$$

Magoosh #33

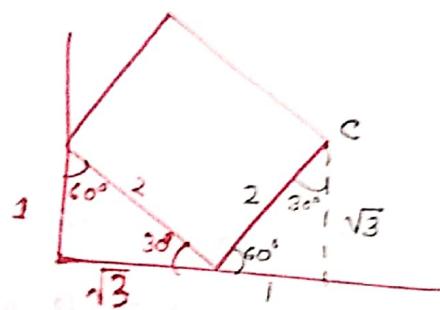


Column A Column B

$$AB+AD \quad DC+BC$$

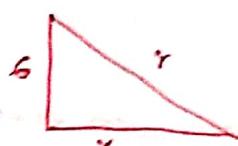
Ans: (D)

Magoosh #34 If ABCD is a square, what are the coordinates of C?



∴ coordinates of C $(1+\sqrt{3}, \sqrt{3})$

Magoosh #35 A right triangle has legs of 6 and x , and a hypotenuse of r . If $5r=5x+9$, what is the value of $r+x$?



$$\text{Here, } r^2 = 6^2 + x^2$$

$$\text{or, } r^2 - x^2 = 36$$

$$\text{or, } (r+x)(r-x) = 36$$

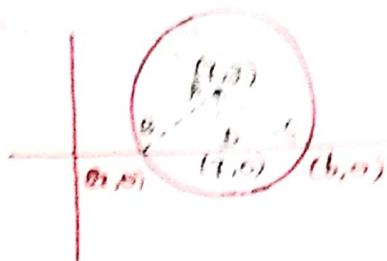
$$\text{or, } \frac{9}{5}(r+x) = 36$$

$$\therefore r+x = \frac{36 \times 5}{9} = 20$$

$$5r = 5x + 9$$

$$\therefore r-x = \frac{9}{5}$$

Magoosh (36) In the standard XY plane, points have a positive b and center (a, c). The intersection X axis at (a, 0) and (b, 0) meet at the value of $a + b$.



$$AB = AC$$

$$\text{or, } AB^2 = AC^2$$

$$\text{or, } (a-a)^2 + (3-0)^2 = (a-b)^2 + (3-0)^2$$

$$\text{or, } (3-a)^2 = (a-b)^2$$

$$\text{or, } 9-a^2 = a^2 - 2ab + b^2$$

$$\therefore 9-a^2 = b^2 - 2ab$$

$$\text{or, } a+b = 3$$

answer: $AB = AC$ [$\because AD \perp BC$]

$$\text{or, } 9-a^2 = b^2 - 2ab$$

$$\text{or, } 9-a^2 = b^2$$

Magoosh (37) Three cube shape aquariums that are 5" on each side are filled with water to capacity. All of the water from those 3 aquariums is to be transferred into a larger cube aquarium so that it could be filled at least 50% of its total capacity without overflowing.

What could be the length of the aquarium in inches?

6.9 8.9 9.5

$$\text{Ans: } 5^3 \times 3 = 275$$

half fill ≥ 275

$$\text{Volume } \geq 275 \times 2 = 550$$

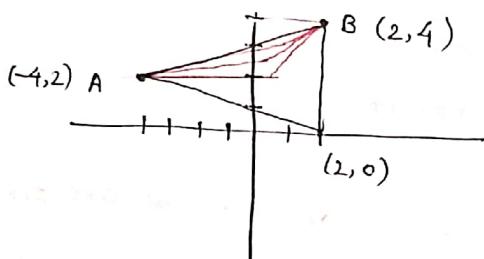
$$6.9^3 \times 7^3 = 343 < 550 \times 100$$

9.5^3 is between 9^3 and $10^3 \Rightarrow 729$ and 1000 but 550 is closer to $9^3 \times 8.4^3$ is between 8^3 and 9^3 ✓

Ans: only 8.9

Magoosh ⑧ Point A (-4, 2) and Point B (2, 4) lie in the XY coordinate plane. If point C lies in the 1st quadrant and contains the coordinates (p, q) where $p < 2$ and $q < 4$, which of the following could be the area of $\triangle ABC$?

- 1.1 3.9 11.9



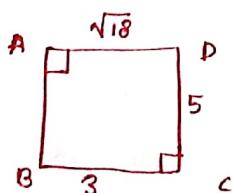
max^m area would be occur when C less than (2, 0)

for which $\frac{1}{2} \times 6 \times 4 = 12$

smaller area will be nearly zero(0)

Ans: A, B, C.

Magoosh ⑨

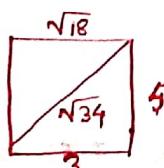


Column A

Length of AB

Column B

4 ft long

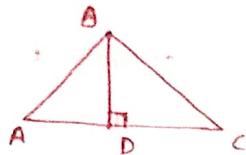


$$AB^2 + BC^2 = 34$$

∴ AB = 4

Ans: C

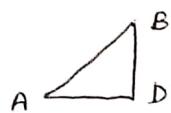
Magoosh 40



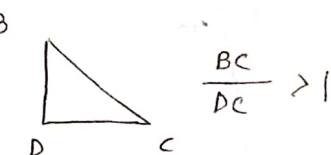
Column A Column B

$$\frac{BD}{AB}$$

$$\frac{BC}{DC}$$



$$\frac{BD}{AB} < 1$$

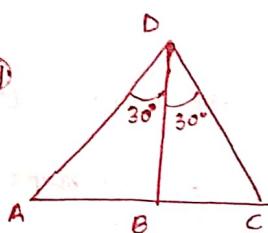


$$\frac{BC}{DC} > 1$$

so, $B > A$

Ans: (B)

Magoosh 41

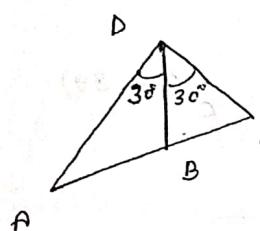


Column A Column B

$$AB$$

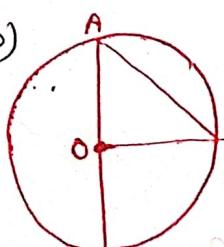
$$BC$$

if, $BD \perp AC$, then $AB = BC$



Here, $AB > BC$

so, (D)



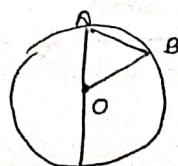
Column A Column B

$$AO$$

$$AB$$

Magoosh 42

$\therefore OA \perp OB$ এবলেনই,

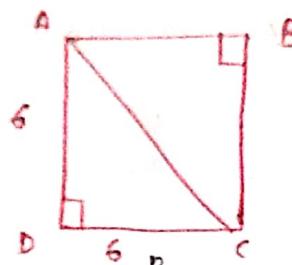


এখনও ২টোগুণ, এভেজ, $AB > AO$.

if, $OA \perp OB$, $\angle OBA = \angle OAB = 45^\circ$; $AB > AO$

Ans: (D)

Magoosh 43

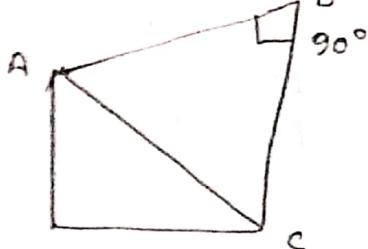


column A

AB

column B

BC



Here, $AB > BC$,

So, (D)

Magoosh 44 In the coordinate line L passes above the points $(50, 70)$, $(100, 89)$ but below the point $(80, 84)$. What can be the slope of line L?

- (A) 0 (B) $\frac{1}{2}$ (C) $\frac{1}{4}$ (D) $\frac{2}{5}$ (E) $\frac{6}{7}$

The slope will be less than AB

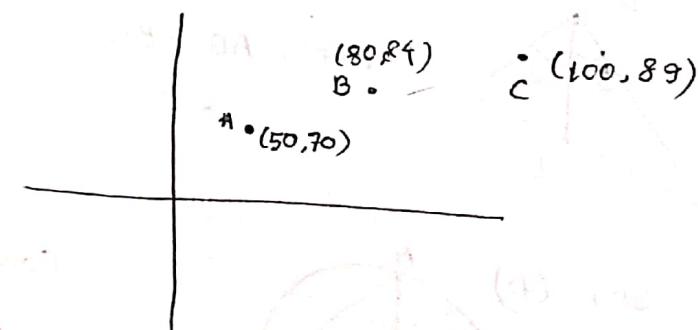
$$\text{slope of } AB = \frac{19}{30}$$

Ans: (C) or (D)

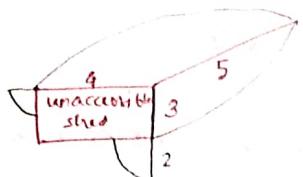
slope \geq AC

$$\text{slope of } AC = \frac{19}{50} \approx \frac{2}{5}$$

Ans: $\frac{2}{5}$ (D)

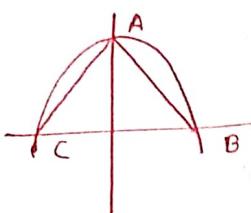


Magoosh 45) A cow is tethered to the corner of a rectangular shed. If the length of the rope is 5, what is the maximum area accessible for the cow?



$$\text{Total} = \frac{3}{4} \times \pi \times 5^2 + \frac{1}{4} \pi \times 1^2 + \frac{1}{4} \pi \times 2^2 \\ = 20\pi$$

Magoosh 46)

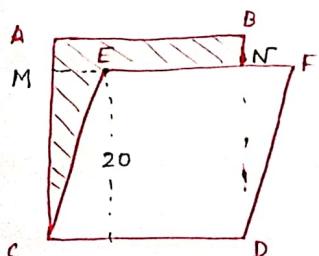


The figure shows the graph of the equation

$$y = k - x^2. \text{ If } \Delta ABC = \frac{1}{8}, k = ?$$

$$\text{Ans: } k = \frac{1}{4}$$

Magoosh 47) If ABCD is a square with an area of 625 and CEFD is a rhombus with an area of 500, then the area of the shaded region is —



$$\text{Now, each side of square} = \sqrt{625} = 25.$$

$$\text{Area of Rhombus} = 25 \times h = 500$$

$$\therefore h = 20$$

$$\text{Each side of Rhombus} = CD = CE = 25$$

$$ME = \sqrt{25^2 - 20^2} = 5$$

$$\text{Area of } \triangle CME = \frac{1}{2} \times 5 \times 20 = 50$$

$$\text{Area of } ABNM = 25 \times (25 - 20) = 125$$

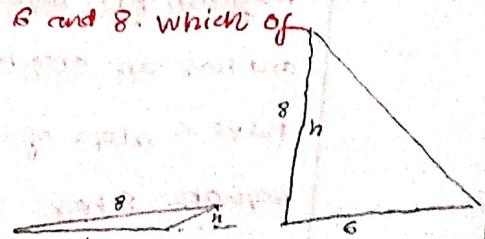
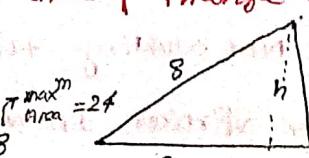
$$\text{Total shaded region area} = 175$$

Magoosh 48) Two sides of a triangle have lengths 6 and 8. Which of the following can be the area of triangle?

- (I) 2 (II) 12 (III) 24

\max^m value of h can be 8

\min^m value of h can be 0 (zero)



$$\text{Or, } \frac{1}{2} \times 8 \times 6 \times \sin\theta$$

max^m area can be occur when $\sin\theta = 1 \rightarrow \text{Area} = 24$

min^m " " " " , $\sin\theta = 0 \rightarrow \text{Area} = 0$

Magoosh-49) Triangle ABC has sides x, \sqrt{x}, x^2 , where x is an integer. What is the area of ABC?

If, $x=1$, $x=\sqrt{x}=x^2=1$, equilateral triangle.

If, $x=2$, $\sqrt{x}=\sqrt{2}$, $x^2=4$

Now, $2+\sqrt{2} < 4$, which is not possible.

$$\Delta ABC = \frac{\sqrt{3}}{4} \times 1^2 = \frac{\sqrt{3}}{4}$$

Magoosh-50) The hypotenuse of a right triangle is 16, "longer than the length of shorter leg". If the area of the triangle is 120ft^2 , what is the length of hypotenuse in ft?

- (A) 26 (B) 32 (C) 40 (D) 64 (E) 80

If, hypotenuse length is 26', then,

shorter leg = 10'

$$\text{longer leg length} = \sqrt{26^2 - 10^2} = 24$$

$$\text{then area} = \frac{1}{2} \times 24 \times 10 = 120\text{ft}^2$$

So, (A)

Magoosh-51) Square S (not shown) has one vertex at $(1, 3)$ and has an area of 25; one pair of the sides of square S have a slope of $\frac{3}{4}$. Not counting the vertex at $(1, 3)$, square S has 3 other vertices. In which quadrant could any other vertex of square S fall?

Note that points on the X and Y axis are not in any quadrants.

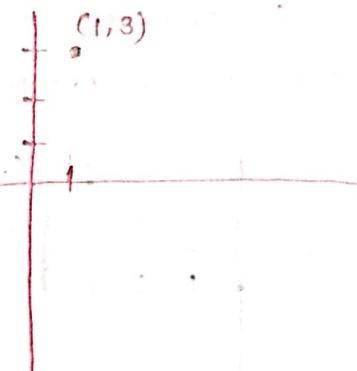
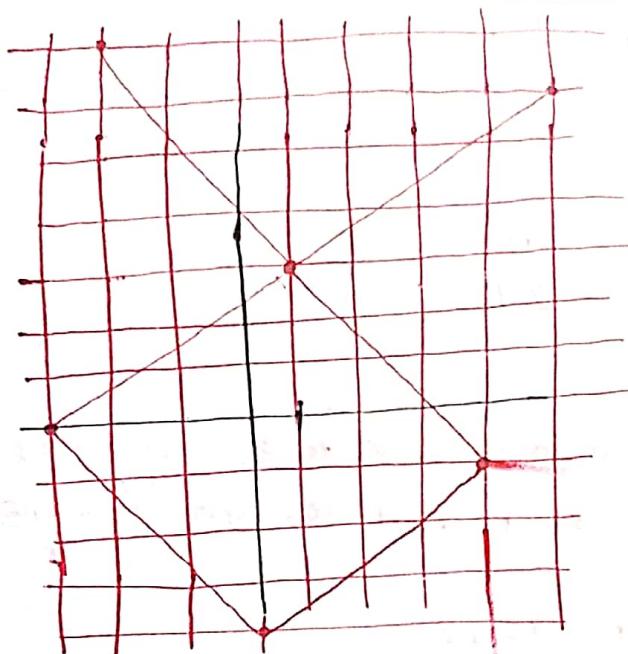
Indicate all such quadrants.

I

II

III

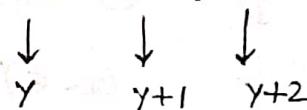
IV



If the slope is $\frac{3}{4}$
the \perp slope is $-\frac{4}{3}$

so, answer will be I, II, IV.

Mayoash (52) The right triangle $\triangle ABC$ has side length $10-x$, $9-x$, $8-x$. There is only one possible value of x ? Which is true?



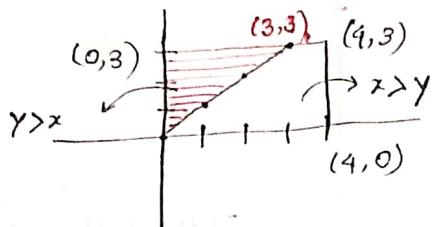
- (A) x is not an integer
- (B) The perimeter must be greater than 10
- (C) $\triangle ABC$ is isosceles
- (D) $\triangle ABC$ area can't be determined
- (E) None of the statements is true

if, $y=3$, $y+1=4$, then $y+2=5$

perimeter = $12 > 10$

Ans: (B)

Magoosh 53) In the coordinate plane, rectangular region R has vertices $(0,0)$, $(0,3)$, $(4,0)$, $(4,3)$. If a point is region R is randomly selected, what is the probability that the point's y coordinate is greater than its x coordinate?



$$\text{Probability} = \frac{\frac{1}{2} \times 3 \times 3}{4 \times 3} = \frac{9}{24} = \frac{3}{8}.$$

Magoosh 54) $\triangle DEF$ has two sides equal to 3. What is following taken alone, would be sufficient to find the area of $\triangle DEF$?

- The ratio of DE to EF = $1 : \sqrt{2}$
- The sum of $\angle DEF$ and $\angle EFD$ is 135°
- The sum of $\angle DEF$ and $\angle FDE$ is 90°

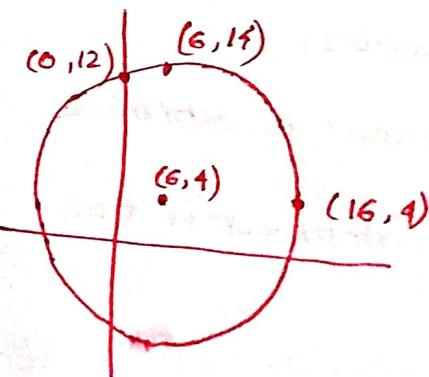
Magoosh 55) Region Q, shown here is defined by,

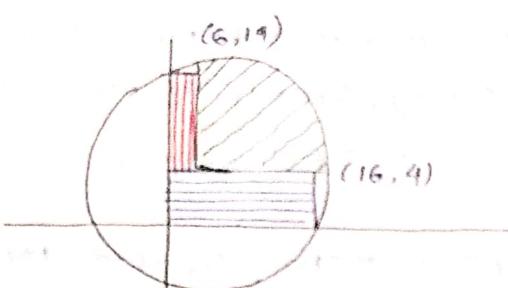
$$(x-6)^2 + (y-4)^2 \leq 100$$

$$x \geq 0, y \geq 0.$$

What is the approx. area of Region Q in sq. units?

- between 75 and 125
- between 125 and 175
- between 175 and 225
- between 225 and 275
- between 275 and 325





$$\text{Black region} = \frac{1}{4} \times \pi \times 10^2 = 25\pi = 79$$

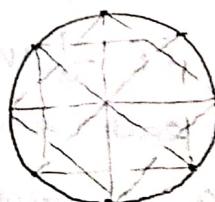
$$\text{Blue region} = 4 \times 15 = 60 \text{ Approx}$$

$$\text{Red region} = (121) \times 6 = 48$$

more than 187

(175 - 225) Ans:

Galvanized ① Eight points are equally spaced on a circle. If 4 points are chosen at random, what is the probability that a square would be formed?



$$\frac{2}{8C_4} = \frac{1}{35} \text{ (Ans)}$$

Galvanized ② An experiment has three possible outcomes, I, J, K and the probabilities are 0.25, 0.35 and 0.40 respectively. If the experiment is performed twice and outcomes are independent, what is the probability that K won't be an outcome either time?

$$\text{Ans: } (1-0.4)(1-0.4) = 0.36$$

Givenize ③ When it was found that 150 more tickets for the school play were sold than the seating capacity of the auditorium, it was decided to have two performances.

If the total no. people attended equal to total number of tickets sold and if the auditorium is $\frac{2}{3}$ rd full for each performance, what is the seating capacity of the auditorium?

$$\text{Here, } x+150 = \frac{2}{3}x \times 2$$

$$\text{or, } \frac{1}{3}x = 150$$

$$\therefore x = 450$$

Givenize ④ A developer has land that has x ft. of lake frontage. The land is to be subdivided into lots, each of which is to have either 80 ft. or 100 ft. of lake frontage. If $\frac{1}{9}$ th of the lots are to have 80 ft. of frontage each and the remaining 40 lots are to have 100 ft. of frontage each, what is the value of x ?

$\frac{1}{9}$ th of lots have 80 ft. of frontage.

$$\frac{8}{9} \text{ th of lots} = 40$$

$$\therefore \frac{1}{9} \text{ th of lots} = 5$$

$$\begin{aligned} \text{Total} &= 40 \times 100 + 5 \times 80 \\ &= 4800 \text{ ft.} \end{aligned}$$

Magoosh-56) For which values of x $(x^2-10x+25)(x^2-13x+40) < 10$ is true?

3 4 5 6 7 8 9 10

$$(x^2-10x+25)(x^2-13x+40) < 10$$

$$\therefore (x-5)^2(x-5)(x+8) < 10$$

$$\therefore (x-5)^3(x+8) < 10$$

options 7 8

Magoosh 57) Which of the following are divisors of 1.2×10^{10} ?

2¹¹ 75 5¹⁰ 18 36 3⁹

Now, $\boxed{1.2 \times 10^{10}}$ can be written as $1 \cdot 2 \times 2^{10} \times 5^{10}$

$$\text{if it is divisor} \rightarrow 1 \cdot 2 \times 10 \times 10^9$$

$$= 12 \times 10^9$$

$$= 2 \times 2 \times 3 \times 2^9 \times 5^9$$

$$= 2^{11} \times 3 \times 5^9$$

Magoosh 58) For numbers p, q, r , $(pxqxr) < 0$ and $\frac{(pqr)^2}{r} < 0$.

Column A Column B

pxq

0

$$\text{Here, } \frac{(pqr)^2}{r} < 0 \therefore r < 0.$$

$\therefore p$ and q both must be positive

or both must be negative

Magoosh-59) $3 < |y| < 7$

Column A	Column B
$y^2 + 5$	50

Answer: (D)

Magoosh (60) If j is a positive odd integer less than 10, and k is an even integer such that $50 \leq k \leq 100$, then which of the following could be the value of $j^2 + k$?

- [A] 57 [B] 80 [C] 85 [D] 99 [E] 100 [F] 159 [G] 195

$$j^2 + k = \text{odd} + \text{even} = \text{odd}$$

Ans: [A], [C], [D], [F]

Magoosh (61) n is a positive integer, and k is the product of all integers from 3 to n inclusive. If k is a multiple of 1440, then the smallest possible value of n is —

- (A) 8 (B) 12 (C) 16 (D) 28 (E) 24

$$\text{Now, } 1440 = 2 \times 2 \times 2 \times 2 \times 3^2 \times 2 \times 5$$

$$= 2^5 \times 3^2 \times 5$$

$$k = 2^5 \times 3^2 \times 5 \times N$$

$$k = 1 \times 2 \times 3 \times 4 \times 5 \times 6 \dots \times n$$

8
↓
3

$$= 1 \times 2 \times 3 \times (2^2) \times 5 \times (2 \times 3) \times 7 \times (2 \times 2 \times 2)$$

$$= 2^5 \times 3^2 \times 5 \times 7 \times 2^2$$

$$\text{then, } N = \frac{2^5 \times 3^2 \times 5 \times 7 \times 2^2}{2^5 \times 3^2 \times 5} = 28 \text{ (integer)}$$

$$\text{so, } n = 8 \text{ (A)}$$

Magoosh (62) If $\frac{axb\times c}{14}$ equals an integer and $\frac{b\times c}{4}$ equals an integer, what is the greatest value of 'a'?

If, $b=4$, $c=14$, $\frac{ax4\times 14}{14}$ then 'a' can be 1.

Ans: 1

Magoosh (63) In the above addition A, B, C, D, E, F and G represents the digits 0, 1, 2, 3, 4, 5, 6. If each variable has a different value and $E \neq 0$ then $G = ?$

$$\begin{array}{r} A \ B \\ + C \ D \\ \hline E \ F \ G \end{array}$$

Here, E must be 1, the F must be 0.
then A and C must be 6 and 4.
B and D must be 3 and 2

$$So, G = 3+2 = 5$$

Magoosh (64) For positive integers P, Q, R, $1 \leq P < Q < 15$. P is odd, Q is even and $P+Q=R$, which of the following could be the value of $P+Q+R$?

[A] 6 [B] 11 [C] 15 [D] 18 [E] 20

[F] 37 [G] 46 [H] 58

$$Now, P+Q = \text{odd} + \text{even} = \text{odd} = R$$

$$(P+Q) + R = \text{odd} + \text{odd} = \text{even} = 2R = 2 \times \text{odd no.}$$

for 6, $R=3$, then $P=1, Q=2$ ✓

for 18, $R=9$ then $P=3, Q=6$ ✓

for 46, $R=23$ then, $P=11, Q=12$ ✓

$\underbrace{\text{divisible by 2}}_{\rightarrow [B], [C], [F]}$

$\text{not divisible by 4} \rightarrow [E]$,

Ans: [A], [D], [G]

Magoosh (65) For positive numbers p and q ,

$$\frac{p-q}{p+q} = \frac{2}{3}$$

Column A	Column B
$p+q$	5

Ans: (D)

Magoosh (66) If x and y are integers and $w = x^2y + x + 3y$,

which of the following statements must be true?

- if w is even, then x must be even
- if x is odd, then w must be odd
- if y is odd, then w must be odd
- if w is odd, then y must be odd

$$x \quad y \quad w = x^2y + x + 3y$$

$$E=2 \quad E=4 \quad 16 + 2 + 12 = 30; w \text{ is even}$$

$$E=2 \quad O=1 \quad 4 + 2 + 3 = 9; w \text{ is odd}$$

$$O=1 \quad E=2 \quad 24 + 1 + 6 = 31; w \text{ is odd}$$

$$O=1 \quad O=3 \quad 3 + 1 + 9 = 13; w \text{ is odd}$$

So, (A), (B), (C)

Galvanize (5) The probability that an arrow fired from a point will hit the target is $\frac{1}{4}$. If three such arrows are fired simultaneously towards the target. What is the probability that the target will be hit?

$$P(\text{hit}) = 1 - P(\text{not hit})$$

$$= 1 - \frac{3}{4} \times \frac{3}{4} \times \frac{3}{4}$$

$$= \frac{37}{64}$$

Galvanize (6) An anti aircraft gun can take a maximum of four shots at an enemy plane moving away from them. The probability of hitting the plane at the first, second, third and fourth shots are 0.4, 0.3, 0.2, 0.1 respectively.

What is the probability that the plane is hit when all the four shots are fired?

$$P(\text{hit}) = 1 - P(\text{not hit})$$

$$= 1 - 0.6 \times 0.7 \times 0.8 \times 0.9$$

$$= 0.6976$$

Galvanize (7) Suppose there are 5 scratch card. Among them, 3 cards have no prize, 2 cards have identical prize. If you scratch these 2 cards before the other three, you can win the prize. What is the probability of winning?

$$\text{Ans: } \frac{2 \times 1 \times 3 \times 2 \times 1}{5 \times 4 \times 3 \times 2 \times 1} = \frac{1}{10}$$

Q8) A bag contains 10 balls numbered from 0 to 9. The balls are such that the person picking a ball out of the bag is equally likely to pick anyone of them. A person picked a ball and replaced it in the bag after noting the number. He repeated the process 2 more times. What is the probability that the ball picked first is numbered higher than the ball picked second and the ball picked second is numbered higher than the ball picked third?

Firstly, the picked 3 balls are distinct.

Let, First ball a , second ball b and third ball c are picked.

Now, any of the event can happen,

$$a > b > c \rightarrow \text{This can happen} = \frac{1}{6} \times 10 \times 9 \times 8$$

~~$b > c > a$~~ ~~$c > a > b$~~ ~~$c > b > a$~~

$$c > a > b$$

$$a > c > b$$

$$b > a > c$$

$$c > b > a$$

$$P(a > b > c) = \frac{\frac{1}{6} \times 10 \times 9 \times 8}{10 \times 10 \times 10}$$

$$= \frac{9 \times 8}{6 \times 9 \times 8 \times 6 \times 10 \times 10}$$

$$= 0.12$$

Q) The probability that a student passes in Quantitative, Physics and Chemistry are denoted by P , M , C respectively. A student has a 75% chance of passing at least one, a 50% chance of passing in at least 2 and 40% chance of passing in exactly two?

which is true?

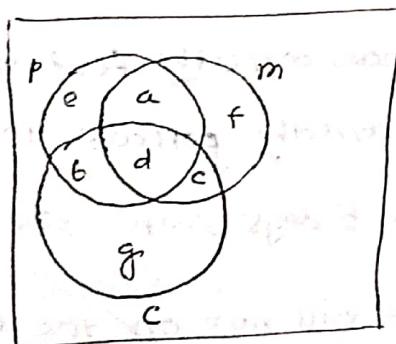
$$(1) P+M+C = \frac{19}{20}$$

$$(2) P+M+C = \frac{27}{20}$$

$$(3) PMC = \frac{0.1}{10}$$

$$(4) PMC = \frac{1}{4}$$

(5) None of these.



$$\sum \text{Total circle} = 75\% = a+b+c+d+e+f+g$$

$$a+b+c+d = 50\%$$

$$a+b+c = 40\%$$

$$\therefore d = 10\%$$

$$\therefore e+f+g = 25\% - \frac{50}{2} = 25\%$$

$$\therefore P = d + \frac{2}{3}(a+b+c) + \frac{1}{3}(e+f+g)$$

$$M = d + \frac{2}{3}(a+b+c) + \frac{1}{3}(e+f+g)$$

$$C = d + \frac{2}{3}(a+b+c) + \frac{1}{3}(e+f+g)$$

$$\therefore P+M+C = 3d + 2(a+b+c) + (e+f+g)$$

$$= 30\% + 80\% + 25\%$$

$$= 135\% = \frac{135}{100} = \frac{27}{20}$$

Galvanize (10) There is a certain game whose rules are as follows:

You pick a number from 1 to 6 and the operator rolls three dice.

If the number you pick, comes in any of the dice you win.

What is the probability of winning?

$$\text{Required probability of losing} = \frac{5}{6} \times \frac{5}{6} \times \frac{5}{6}$$

$$\text{Probability of winning} = 1 - \frac{125}{216}$$

$$= \frac{91}{216}$$

Galvanize (11) Marie is getting married tomorrow.

Unfortunately, the weatherman has predicted rain for tomorrow.

When it actually rains, the weatherman correctly forecast 90% of the time. When it doesn't rain, he incorrectly forecast 10% of the time.

In recent years, it has rained only 5 days each year.

What is the probability that it will rain on the day of Marie's wedding?

There may be many possible events —

(i) Weatherman predicts rain but it doesn't rain

$$= \frac{1}{10} \times \frac{360}{365}$$

(ii) Weatherman predicts rain and it rains

$$= \frac{9}{10} \times \frac{5}{360}$$

$$\text{Probability of rain} = \frac{\frac{9}{10} \times \frac{3605}{365}}{\frac{9}{10} \times \frac{5}{360} + \frac{1}{10} \times \frac{360}{365}} = 0.13$$

Generalize 12 There are 20 couples in a party. Every person greets every person except his or her spouse. People of the same sex shake hands and those of opposite sex greet each other with a namaskar.

What is the total no. of namaskar and handshakes in the party?

When a man meets a woman, there are two namaskars,

whereas a man meets another man, there is 1 handshake.

$$\text{Number of handshake} = \frac{20 \times 19}{2 \times 1} + \frac{20 \times 19}{2 \times 1} = 380$$

$$\text{Number of namaskar} = 20 \times 19 + 20 \times 19 = 760$$

$$\text{Total} = 1140$$

Generalize 13 Region R is a square in the x-y plane with vertices J = (-1, -2), K = (-1, 4), L = (5, 4), M = (5, -2). What is the probability that a randomly selected point in the region R lies below the line $3x - 5y = 10$?

$$\text{The area of the square} = 6 \times 6 = 36$$

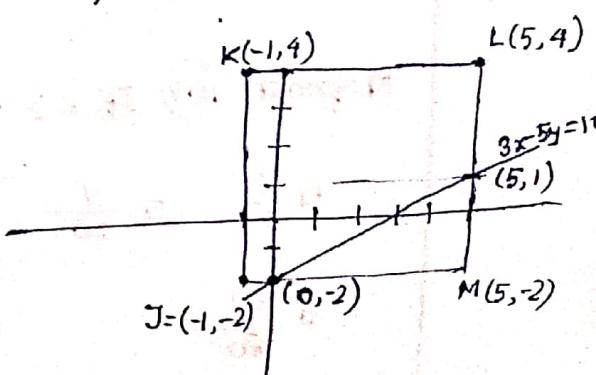
$$3x - 5y = 10$$

$$\text{if, } x=0, 5y = -10 \therefore y = -2 ; (x, y) = (0, -2)$$

$$\text{if, } x=5, 15 - 5y = 10 \therefore y = 1 ; (5, 1) = (x, y)$$

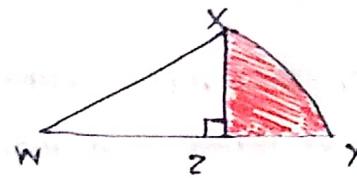
$$\text{Area below the region of line} = \frac{1}{2} \times 3 \times 5 = \frac{15}{2}$$

$$\text{Probability} = \frac{\frac{15}{2}}{36 \times 2} = \frac{5}{24}$$



Gmatcracker(14) In the diagram above, $WZ = XZ$

What is the probability, if the point selected from the shaded region?



Let, $WZ = XZ = 1$

$$\therefore WX = WY = \sqrt{1^2 + 1^2} = \sqrt{2}$$

$$\angle XWZ = 45^\circ$$

$$\text{Area of the shaded region} = \frac{\pi}{8} (\sqrt{2})^2 - \frac{1}{2} \times 1 \times 1$$

$$\text{Probability} = \frac{\frac{\pi}{4} - \frac{1}{2}}{\frac{\pi}{4}}$$

$$= \frac{\frac{\pi-2}{4}}{\frac{\pi}{4}}$$

$$= \frac{\pi-2}{\pi}$$

Magoosh-67) If $x > \frac{21}{40}$ then x could be which of the following?

- $\frac{1}{2}$, $\frac{11}{20}$, $\frac{13}{25}$, $\frac{19}{36}$, $\frac{31}{60}$, $\frac{38}{75}$,
 $\frac{41}{80}$

$$\text{Now, } \frac{11}{20} = \frac{10}{20} + \frac{1}{20}$$

$$\text{Now, } x > \frac{21}{40}$$

$$\text{Here, } \frac{1}{20} > \frac{1}{40} \quad \checkmark$$

$$\text{or, } x > \frac{20}{40} + \frac{1}{40}, \quad \frac{13}{25} = \frac{26}{50}$$

$$\therefore x > \frac{1}{2} + \frac{1}{40} = \frac{25}{50} + \frac{1}{50}, \quad \frac{1}{50} < \frac{1}{40}$$

$$\frac{19}{36} = \frac{18}{36} + \frac{1}{36} \quad , \quad \frac{1}{36} > \frac{1}{40} \quad \checkmark$$

Magoosh 68) Which of the following no. is divisible by 36?

- 1296 2160 3438 4608 5346 6144 7000 8249

36 को divisible होने के लिए 9 वाले 4 को भाग देने पर शर्त है।

1296, 4 द्वारा विभाज्य है।

$$1296 \Rightarrow 1+2+9+6=18, 9 \text{ द्वारा } 3 \text{ विभाज्य}$$

Magoosh 69) x and y are integers greater than 5

x is y percent of x^2

Column A

Column B

$$x \qquad \qquad \qquad 10$$

$$x = \frac{y}{100} \times x^2$$

$$\text{or, } 1 = \frac{xy}{100}$$

$$\therefore xy = 100$$

$$\text{so, } x=10, y=10 \text{ or } x>5, y>5$$

Magoosh 70) If k is the least positive integer that is

divisible by every integer from 1 to 8, then k = ?

$$k = 1 \times 2 \times 3 \times 2 \times 5 \times 7 \times \cancel{2}$$

↓ ↓ ↓ ↓

6 4 8

$$= 840$$

Magoosh 71 $Q = x^3 - x$

Given that x is a positive integer and $x \geq 75$,

which of the following is the remainder when Q is divided by 6?

$$Q = x(x^2 - 1)$$

$$= x(x+1)(x-1)$$

$= (x+1)x(x-1)$, always there is one no. that is divisible by 3 and one no. that is divisible by 2.

So, Q is always divisible by 6.

Remainder = 0

Magoosh 72 If x and y are positive integers, and 1 is their GCF, what is the GCF of $2x$ and $3y$?

Ans: can't be determined

Magoosh 73 If $n = 2 \times 3 \times 5 \times 7 \times 11 \times 13 \times 17$, which is true?

(A) n is divisible by 600

(B) $n+19$ is divisible by 19

(C) $\frac{n+4}{2}$ is even

$$(A) (n^2 =) \frac{2 \times 3 \times 5 \times 7 \times 11 \times 13 \times 17 \times 2 \times 3 \times 5 \times 7 \times 11 \times 13 \times 17}{(600 =) 2 \times 2 \times 3 \times 5 \times 2 \times 5}$$

$$= \frac{(7 \times 11 \times 13 \times 17)^2 \times 3}{2}$$

(A) X not divisible.

$$(B) \frac{n+19}{19}$$

$$= \frac{n}{19} + 1$$

$$= \frac{2 \times 3 \times 5 \times 7 \times 11 \times 13 \times 17}{19} + 1 \text{, not divisible } X$$

$$(C) \frac{n+4}{2} = \frac{n}{2} + 2 = \frac{2 \times 3 \times 5 \times 7 \times 11 \times 13 \times 17}{2} + 2$$

$$= \text{odd} + 2$$

$$= \text{odd } X$$

work is correct.

Magesh(74) If A, B, C represent different digit in the multiplication,

$$\text{then } A+B+C =$$

$$AA\ B$$

$$\times B$$

$$\hline CB5\ B$$

$$B \times B = B \text{ or } -B$$

$$\text{if } B=0 \text{ then, product} = 0 X$$

$$\text{if } B=1, \text{ then } AA\ 1$$

$$\hline C\ 15\ 1 \quad X$$

$$\text{if, } B=5, \text{ then } AA\ 5$$

$$\hline C\ 555$$

$$5A+- = 5 \\ 2q \text{ or}$$

$$\begin{array}{r} 776 \\ \times 6 \\ \hline 4656 \end{array}$$

$$A+B+C = 7+6+4$$

$$= 17$$

$$\text{if } B=6, \text{ then, } AA\ 6 \leftarrow 6A+3=5^6 \\ \hline 5\ 6$$

$$\text{if, } A=7, \text{ then, } \therefore A=20 \text{ or } 7$$

Magoosh (75) In the game of Doubleful, red, blue and green chips are worth 2, 3, 5 points respectively. The product of the point values of the chips is 16000. If the number of blue chips is equal to green chips, what is the number of red chips?

$$16000 = 2 \times (2 \times 2) \times (2 \times 3) \times (2 \times 2) \times \underbrace{5 \times 5 \times 5}_{3 \text{ Green chips}}$$

So there is 3 blue chips

$$= 2 \times 4 \times 4 \times 4 \times 5 \times 5 \times 5$$



1 Red chip (Answer)

Magoosh (76) How many integers from 1 to 900 inclusive have exactly 3 positive divisors?

Only the squares of integers have odd no. of positive factors.

$$(Let, 64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^6)$$

$$\therefore \text{No. of factors} = 6+1 = 7$$

3 divisor \rightarrow square of a prime no.

$$\cdot (2^2, 3^2, 5^2, 7^2, 11^2, 13^2, \cancel{15^2}, 17^2, 19^2, 23^2, 29^2)$$

Ans: 10

Galvanize 15) How many, unique quadrilaterals can be inscribed in the vertices of a Nonagon (a 9 sided figure), if points A and B, two vertices in the nonagon cannot make up the same quadrilateral?

$$\text{Number of } \text{real quadrilaterals} = 9C_4$$

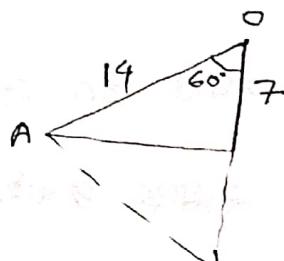
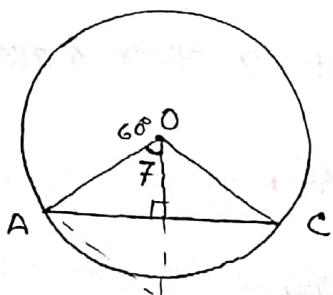
$$\text{if } A, B \text{ two vertices are included in the same quadrilateral} = 2C_2 \times 7C_2$$

$$\begin{aligned}\text{Number of quadrilaterals without } A, B \text{ vertex} \text{ included in the} \\ \text{same quadrilateral} &= 9C_4 - 7C_2 = 105.\end{aligned}$$

Or, A,B any of the two included and 3 other vertices from seven (7)

$$\text{other point} + 4 \text{ vertices excluding } A, B \text{ both} = 2C_1 \times 7C_3 + 7C_4 = 105$$

Galvanize 16) chord AC at a distance of 7 cm from the center of a circle subtends an angle of 120° at the centre. What is the area of major segment?



$$\therefore \text{Area of the major sector} = \frac{240^\circ}{360^\circ} \times \pi \times 14 \times 14$$

$$= \frac{2}{3} \times \pi \times 14 \times 14$$

$$= \frac{2}{3} \times \frac{22}{7} \times 14 \times 14$$

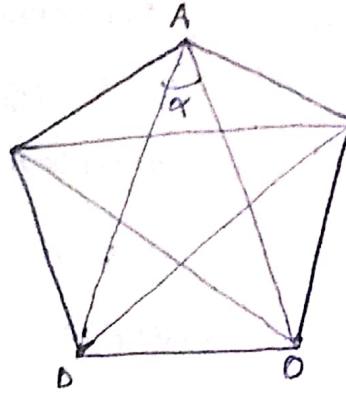
$$\text{Area of triangle} = \frac{1}{2} \times 7 \times 2 \times \sqrt{14^2 - 7^2} = \frac{1232}{3}$$

$$= \frac{1}{2} \times 7 \times 2 \times 7\sqrt{3} = 49\sqrt{3}$$

$$\therefore \text{Total} = \frac{1232}{3} + 49\sqrt{3}$$

Generalize (41)

for this regular pentagon, α = ?



Here, angle of every side = 108°

$\triangle ABC$ is isosceles thus, $\angle ABC = \angle ACB = 36^\circ$

$\triangle ABD$ is also isosceles. $\therefore \angle BAD = 36^\circ$

similarly, $\angle CAO = 36^\circ$

$$\therefore \alpha = 108^\circ - 36^\circ - 36^\circ$$

$$= 36^\circ \text{ (Ans)}$$

Magoosh 77) Kamidora 240 miles from Houston to Dallas in two segments: She kept one constant speed for the first segment and then another constant speed for the second segment.

Which of the following statement individually provides sufficient additional information to determine the average velocity of her trip from Houston to Dallas?

- [A] the total time of trip
- [B] average of two speeds of the two segments
- [C] the distance of each segment
- [D] the time spent on each segment
- [E] the speed on each segment

$$V_{avg.} = \frac{\text{Total dist.}}{\text{Total time}}$$

Ans: [A] [D]

Magoosh 78) city A and city B are connected by a straight 420 mile road. At noon, Nigel left city A, travelling toward city B, and Phyllis left city B, travelling toward city A. If Nigel travels at 49 mph and Phyllis travels at 56 mph, how many miles apart will Nigel and Phyllis be 1 hour before they meet?

$$\text{प्रतिवेदित } 56+49 = 105 \text{ km के दूरी बनाएँ।}$$

तब मात्र उन्होंने घासांडे रवाना करने से पहले 1 घण्टा बाकी रह जाएगा; लिक्कर 105 km की दूरी बनाएँ।

Magoosh 79) The Sargon corporation offers an optional stock option buy-in program to its employees. Of the employees with salaries greater than or equal to \$100,000, 85% choose to participate in their plan. Of the employees with salaries less than \$100,000, 77% choose to participate in this plan. Which of the following could be the total number of employees?

- [A] 100 [B] 200 [C] 350 [D] 460 [E] 525 [F] 640 [G] 750 [H] 880

Here,

$$\frac{85}{100} \times x \text{ or, } \frac{17}{20} \times x \rightarrow x \text{ must be divisible by 20}$$

$$\frac{77}{100} \times y \rightarrow y \text{ must be divisible by 100}$$

[A] can't be arranged according to the above way

[B] ≥ 200 can be written as, $100 + 20 \times 5$ ✓

$$[C] = x$$

$$[D] 460 = 400 + 20 \times 3$$

Similarly [F], [H]

Ans, B, D, F, H

Magoosh 80) What is the sum of all the digits of the integers from 0 to 99 inclusive?

3 in unit digit ($3, 13, 23, 33, 43, \dots, 93$) = 10

$$\begin{array}{r} 3 \text{ in tens digit } (31, 32, 33, 34, \dots) \\ \hline = 10 \end{array}$$

$$\text{Ans: } 20 \times 3 + 20 \times 2 + 20 \times 1 + 20 \times 9 + 20 \times 5 + 20 \times 6 + 20 \times 7$$

$$+ 20 \times 8 + 20 \times 9$$

$$= 20(1 + \dots + 9)$$

$$= 900$$

Manhattan 1-6

① A function is defined by $f(x) = x^2 + 4x - 5$.

What is the minimum value of $f(x)$?

Here, first determine $f(0)$ solve the function.

$$\therefore f(0) = x^2 + 4x - 5 = 0$$

$$\text{or, } x^2 + 5x - x - 5 = 0$$

$$\text{or, } (x+5)(x-1) = 0$$

$$\therefore x = -5, 1$$

So, the extreme value occurs at $\frac{1-5}{2} = -2$.

$$f(-2) = (-2)^2 + 4(-2) - 5$$

$$= 4 - 8 - 5$$

$$= -9 \quad (\text{Ans})$$

\Leftrightarrow

~~Ques.~~

Manhattan 1-6

(2)

$$x+y < 0$$

$$y-x \geq 0$$

Quantity A

y

Quantity B

0

The best way to combine two inequality is to combine by lining up the inequality symbol and add both sides.

$$x+y < 0$$

$$x-y < 0$$

$$\therefore 2x < 0 \quad \therefore x < 0$$

So, y can be less than or equal to zero(0)

Answer: D.

(3) $x^2 - 10x + 13 = k$.

if one solution is $x=4$,

what's the other solution?

(4) If $a > 0$ and $b < 0$, which of the following statements are true about the values of x that solve the equation $x^2 - ax + b = 0$?

- (1) They have opposite signs
- (2) Their sum is greater than zero
- (3) Their product equals $-b$.

A, B ✓

$$x^2 - 8x + 2 = 0 \quad \text{or, } x^2 + x - 2 = 0$$

$$\text{or, } x^2 - 2x - x - 2 = 0 \quad \therefore x(x+1) - 2(x+1) = 0$$

$$\therefore (x-2)(x+1) = 0 \quad \therefore x = -1, 2$$

$$\text{or, } x^2 - 2 \cdot \frac{3}{2}x + \frac{9}{4} - \frac{9}{4} - 2 = 0$$

$$\therefore \left(x - \frac{3}{2}\right)^2 = \frac{17}{4} \quad \checkmark$$

⑥ Quantity A Quantity B

$$\begin{array}{ll} x(4-x) & 6 \\ = 4x - x^2 & = 6 \\ = 0 & = 6 - 4x + x^2 \end{array}$$

Now, $x^2 - 4x + 6$

$$= x^2 - 2 \cdot 2 \cdot x + 4 + 2$$

$$= (x-2)^2 + 2$$

Always greater than 0

$\therefore B$

⑧ $s^2 + t^2 < 1 - 2st$

<u>Quantity A</u>	<u>Quantity B</u>
$1 - st$	t

$$s^2 + t^2 < 1 - 2st$$

or, $s^2 + 2st + t^2 < 1$

or, $(s+t)^2 < 1$

$\therefore s+t < 1$

or, $-(s+t) > -1$

$\therefore s+t > -1$

$\therefore -1 < s+t < 1$

$$-1 - s < t < \frac{1-s}{4s-}$$

(A)

Magoosh(81) A certain company has 200 employees, all of whom are either programmers or marketers. Among those, 20% of the programmers own pets and 23% of the marketers own pets.

column A:

The total no. of employees who own pets

column B:

43

Ans: C

Magoosh(82) If $y - 3x > 12$ and $x - y > 38$, what can be the value of x ?

Indicate all such values?

- [A] -60 [B] -30 [C] -6 [D] 4 [E] 20 [F] 40 [G] 80

$$y - 3x > 12$$

$$x - y > 38$$

inequality ~~ব্যবহার করে~~ after 2nd eqn subtract 1st eqn,

$$-2x > 50$$

$$\therefore x < -25$$

Ans: A, B

Magoosh(83) If $\frac{5x^2 + 65x + 60}{x^2 + 10x - 24} = \frac{5x+5}{x-2}$ what are the possible values of x ?

- [A] -60 [B] -12 [C] -1 [D] 1, [E] 2 [F] 5

McGraw-Hill (84) $10^x + 10^y + 10^z = n$

where x, y, z are positive integers?

Which of the following could be the number of zeroes, to the left of the decimal point, contained in n ?

$x+y$

$y-z$

z

$$10^3 + 10^2 + 10^1 = 1110$$

x, y, z can be 1, 2, 3 respectively.

If, $x=1, y=1, z=2$; then 2 or 3 are 2 zeros.

$$10^1 + 10^1 + 10^2 = 30; \text{ 1 } \text{ zero}$$

$$10^1 + 10^1 + 10^2 = 120; \text{ 1 } \text{ zero}$$

$$10^1 + 10^1 + 10^3 = 1020, \text{ 2 } \text{ zeros} \quad \checkmark$$

Manhattan 1-6

- ⑤ If $x > 0$ and \sqrt{x} and $\frac{\sqrt{x}}{x}$ are reciprocals, what can be true?

A $\sqrt{x} > \frac{\sqrt{x}}{x}$

B $\sqrt{x} < \frac{\sqrt{x}}{x}$

C $\sqrt{x} > x$

Ans: A, B, C

(6) If $P > 0$ and $P\%$ of $3P$ is $P\%$ less than P , then P equals —

$$P\% \text{ of } 3P = P - P\% \text{ of } P$$

$$\text{or, } \frac{P}{100} \times 3P = P - \frac{P}{100} \times P$$

$$\text{or, } \frac{P}{100} \times 3P = P$$

$$\text{or, } P = 25$$

Magoosh 85) If the retail price of a shirt is R dollars, and the price including sales tax is T dollars then the sales tax, as a percent, is —

Here, Sales tax = $T - R$

$$\frac{\text{Part}}{\text{Whole}} = \frac{\text{Sales tax}}{T} = \frac{\text{Percent}(r)}{100}$$

$$r = \frac{(T-R)100}{T} \quad \checkmark \text{ (Ans)}$$

Magoosh 86) If x and y are positive integers such that $x < y$.

If $6\sqrt{6} = x\sqrt{y}$ then xy could equal —

- (A) 36 (B) 48 (C) 54 (D) 96 (E) 108

Here, $y > x$, and $x\sqrt{y} = 6\sqrt{6}$

$$= 3 \times 2 \sqrt{6}$$

$$= 3\sqrt{6 \times 4} \text{ or } 2\sqrt{9 \times 6}$$

$$= 3\sqrt{24} \text{ or } 2\sqrt{54}$$

$$xy = 72 \text{ or } 108 \quad \text{Ans: (E)}$$

$$\frac{1000}{(1.06)^5}$$



পথে 1.06 টির মুক্তি \times click দ্বারা করা 200 এন্ডেড 200.

$$\text{তখন } MR \times MR = 1.06^2 \times 200 \times MR = 1.06^3 \times 200 \dots$$

প্রাপ্ত করা 200,

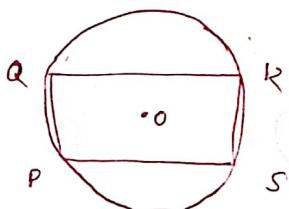
1.06^5 দ্বারা করা হচ্ছে on screen অবজেক্ট hit MC

cond hit MT

$$\text{Now, কিরণ } 1000 \div MR = (Ans)$$

Manhattan (1-G)

(9)



Here, dia. = 12

Quantity A

Quantity B

The area of PQRS rectangle . 80

Area of circle = $\pi \times 6^2 = 36\pi$ < Area of rectangle.

Now, min^m area = $12 \times 0 = 0$

max^m area can occur when, $QP = PS = 12$

$$\therefore a\sqrt{2} = 12$$

B

$$\therefore a = \frac{12}{\sqrt{2}} \quad \therefore a^2 = 72 < 80$$

- ⑩ Line M is $y = 3x + 10$. Line N is $2y = 5x - 6$. Line P has a y-intercept of 6, and the point $(6, 4)$ lies on the line.

Quantity A

The greatest angle created by the intersection of M and N

Quantity B

The greatest angle created by the intersection of M and P

$$\text{Line M} \Rightarrow y = 3x + 10$$

$$\text{Line N} \Rightarrow y = \frac{5}{2}x - 3$$

$$\text{Line P} \Rightarrow y = mx + 6$$

$$\text{or, } 4 = 6 + m + 6$$

$$\text{or, } 6m = -2$$

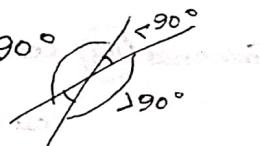
$$\text{or, } m = -\frac{1}{3}$$

So, the angle of intersection betⁿM and P = 90° (as their slope is negative)

Here, M and N are neither \perp , nor parallel.

reciprocal to each other)

the angle of intersection betⁿM and N $< 90^\circ$ or $> 90^\circ$

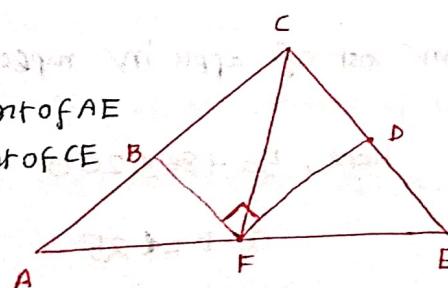


Ans: (A)

⑪

F is the midpoint of AE

D is the midpoint of CE



Which of the following statement(s) are true?

A $FD \parallel AC$

B Area of $\triangle FDE =$ Area of $\triangle CDF$

C Area of $\triangle AFB <$ Area of $\triangle DEF$

D $\angle AFB = \angle BFC$

$$E \quad \triangle ACE = BF \times AC$$

Ans: [A, B, E]

or, $\frac{x-a}{x-b} > 0$
 if $(x-a)(x-b) > 0$ and $b \geq a$ then $x > b$ and $x < a$
 if $(x-a)(x-b) < 0$ and $b \geq a$ then $a < x < b$

$$\text{or, } \frac{x-a}{x-b} < 0$$

Examine (12) Find the possible values of x that satisfy the function.

$$\frac{x^2 - 3x + 2}{x^2 - 8x + 12} > 0$$

[A] $x < 1$ and $x > 2$ where $x \neq 6$

Now, $\frac{x^2 - 3x + 2}{x^2 - 8x + 12} > 0$

[B] $x < 1$ and $x \geq 2$ where $x \neq 6$

or, $\frac{(x-2)(x-1)}{(x-6)(x-2)} > 0$

[C] $x \leq 1$ and $x > 2$ where $x \neq 6$

or, $\frac{x-1}{x-6} > 0$

[D] $x < 1$ and $x > 2$ where $x \neq 6$

so, $x > 6$ or, $x < 1$

and also $x \neq 6$

Ans: [A] (subset) (Nearest option)

Examine (13) Cost of 5 apples and 8 bananas is maximum of RS. 200.

Cost of each banana is RS. 25 less than apple.

Find the maximum cost of apple in rupees.

[A] $\frac{500}{13}$

Here, $5a + 8b \leq 200$ — (i)

[B] $\frac{200}{13}$

$a - b = 25$

[C] $\frac{100}{13}$

so, $8a - 8b \leq 200$ — (ii)

Adding, $13a \leq 200 + 200$

[D] $\frac{400}{13}$

or, $a \leq \frac{400}{13}$

(D)

$b^2 - 4ac > 0$, roots are real and distinct
 $b^2 - 4ac = 0$, roots are real and equal
 $b^2 - 4ac < 0$, roots are imaginary

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\text{Sum of the roots} = -\frac{b}{a}$$

$$\text{Product of the roots} = c/a$$

Generalize 44) Find the possible values of a that satisfies both the inequalities

$$4a - 3 > 7 - a$$

$$\text{and } 2a^2 - 5a - 12 < 0$$

$$\text{Now, } 4a - 3 > 7 - a$$

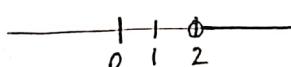
$$2a^2 - 5a - 12 < 0$$

$$\text{or, } 5a > 10$$

$$\text{or, } 2a^2 - 8a + 3a - 12 < 0$$

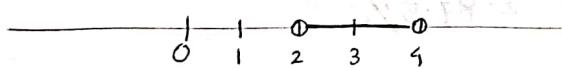
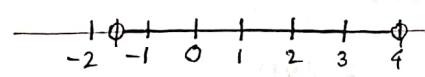
$$\therefore a > 2$$

$$\text{or, } 2a(a-4) + 3(a-4) < 0$$



$$\text{or, } (a-4)(2a - (-3)) < 0$$

$$\therefore -\frac{3}{2} < a < 4$$



∴ $2 < a < 4$ (Ans)

Generalize 45) The sum of two numbers is 12. The sum of the square of two no. is 74.

The sum of the square of two no. is 74.

Find the discriminant of the quadratic eqn formed.

$$x + y = 12 \therefore y = 12 - x$$

Discriminant:

$$x^2 + y^2 = 74$$

$$b^2 - 4ac$$

$$\text{or, } x^2 + (12-x)^2 = 74$$

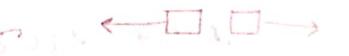
$$= 12^2 - 4 \times 35$$

$$\text{or, } x^2 + 144 - 24x + x^2 - 74 = 0$$

$$= 29$$

Shrinking and Expanding gaps

When two travellers are moving in opposite direction,
we always add speed. because the gaps are shrinking + 

or ... the gaps are expanding 

When two travellers are moving in the same direction,
we always subtract the speed.

If the faster traveller is in front, then the difference of speed is the speed
at which gap is expanding.

If the faster traveller is in behind, then the difference of speed is the
at which the gap is shrinking.

$$s = vt$$

or, Distance of gap = speed of gap at which it is shrinking or expanding X time

Magoosh 86) A car and truck are moving in the same direction on the same road.

The truck is moving at 50 mph, and the car is moving at a constant speed. At 3:00, the car is 30 miles behind the truck and at 4:30 pm, the car overtakes the truck. What is the speed of the car?

$$\text{Gap speed} = \frac{30 \text{ miles}}{1.5 \text{ hr.}} = 20 \text{ mph.}$$

$$\text{Car speed} = 50 + 20 = 70 \text{ mph.}$$

Magoosh 87) Car X and Y are travelling from A to B on the same route at constant speeds. Car X is initially behind car Y and car X's speed is 1.25 times car Y's speed.

Every day both cars go on driving. Car X passes car Y at 1:30 PM. At 3:15 PM, car X reaches B, and at that moment,

Cary is still 35 miles away from B. What is the speed of car X?

$$\text{Gap distance} = \text{Gap speed} \times \text{time}$$

$$\text{or, } 35 = \frac{7}{4} \times \text{Gap speed}$$

$$\text{or, Gap speed} = 20 \text{ mph} \checkmark$$

$$\text{or, } X - Y = 20$$

$$\text{or, } 1.25Y - Y = 20$$

$$\text{or, } Y = 80 \text{ mph} \checkmark$$

$$\text{or, } X = 1.25Y = 100 \text{ mph. (ans)}$$

Mageostik (88) Cars P and Q are approaching each other on the same highway.

Car P is moving at 49 mph and Car Q is moving at 61 mph. At 2:00 pm, they are approaching each other and 121 miles apart. Eventually, they pass each other. At what clock time are they moving away from each other and 44 miles apart?

$$\frac{\text{Gap distance}}{\text{time}} = \text{const.}$$

$$\text{or, } \frac{(61+49)\text{ mil}}{1\text{ hr.}} = \frac{121+44}{\text{time.}}$$

$$\text{or, time} = \frac{165}{110} = 1.5 \text{ hr.}$$

Clock time: 3:30

Work Questions

Add or subtract the work rate only

Growth and Decay

Mixture problems

$$\text{Conc.} = \frac{\text{amount of HCl (solute)}}{\text{total soln}}$$

Double Matrix

		Females	Males	Total
Education Level	Gender →			
	college only	20	80	100
Advanced degree	100	100	200	
Total	300	180	300	
	120			

Magcosh ⑧9) In a company of 300 employees, 120 are females. A total of 200 employees have advanced degrees, and the rest have a college degree only. If 80 employees are males with college degree only, how many are females with advanced degrees?

Magcosh ⑨0) In a certain school, there are 80 freshmen, 100 sophomores, and 220 upperclassmen, drawn from three cities: A, B, C. Sixty percent of students are from A, 30% from B and the rest from C. All the students from C are Freshmen. Half the students from B are upperclassmen and the rest are split evenly between the other two grades. How many sophomores are from A?

(9) Let S be the set of all positive integers that, when divided by 8, have a remainder of 5. What is the 76th number?

first term

increment

$$5 + 13 + 21 + \dots$$

$$5 + (76-1) \times 8$$

$$= 5 + 75 \times 8$$

$$= 5 + 600$$

$$= 605 \text{ (Ans)}$$

(10) What is the sum of all the multiples of 20 from 160 to 840 inclusive?

$$160 = 20 \times 8$$

$$840 = 20 \times 42$$

$$\text{no.'s} = 42 - 8 + 1$$

$$= 35$$

$$\text{no. of pair} = \frac{35}{2}$$

$$\text{sum of each pair} = 840 + 160 = 1000$$

$$\text{Ans: } \frac{35}{2} \times 1000$$

$$= 17500$$

$$n(n-2)(n+1)(n-1)$$

$$(n-2)(n-1)n(n+1)$$

* A set of n consecutive integers will always contain one number divisible by n .

* If n is odd, then the sum of a

set of n consecutive integers

will be divisible by n .

(9) If n is an integer greater than 50, then $(n^2 - 2n)(m+1)(n-1)$ must be divisible

by - (I) 8 ✓

(II) 12 ✓

(III) 18

Manhattan 1-6

11. The quantity $3^3 4^4 5^5 6^6 - 3^6 4^5 5^4 6^3$ will end in how many zeros?

$$(3^3 4^3 5^3 6^3) 45^3 = (3^3 4^3 5^3 6^3) 6^3 \cdot 5^3$$

$$(360)^3 \times (6^3 \cdot 5^3) = 360^3 \times 2^3 \times 3^3 \times 5^3$$

$$(360)^3 \times (20 \times 30 \times 36) = 360^3 \times 20 \times 23 \times 3^3$$

$$360^3 \times 360 \times 360 \times 3^3 = 36 \times 36 \times 36 \times 3^3 \times 10^9$$

$$36 \times 36 \times 36 \times 6 \times 10^9$$

$$\therefore 0 \text{ zeros} \rightarrow 1000$$