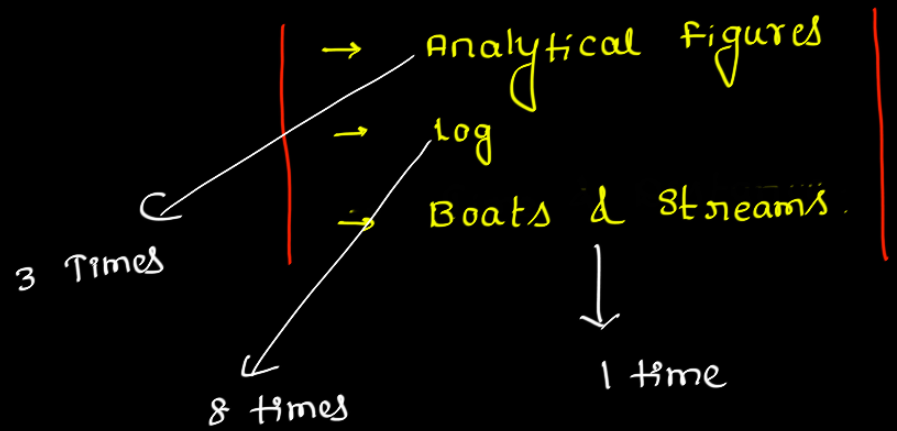

Analytical Figures
log
Boats & Streams
3 Times
8 times
1 time

Log [7-Times]

$\log 10 = 1$

$\log 1 = 0$

$\log ab = \log a + \log b$

$\log a/b = \log a - \log b$

$\log a^m = m \log a$

$\frac{\log a}{\log b} = \log_b a$

$\frac{1}{\log_b a} = \log_a b$

$\log a = \log b = \log c$

then

$a = b = c$

$\log_x a = k$

then $a = x^k$

$\log_a(\log_b(\log_c x)) = k$

then "x" = ?

$x = c^{b^{a^k}}$

$$\log_a[\log_b(\log_c x)] = k$$

$$\log_a[\log_b(\log_c x)] = k \cdot \log_a a$$

$$\log_a(\log_b(\log_c x)) = \log_a a^k$$

$$\log_b(\log_c x) = a^k$$

$$\log_b(\log_c x) = a^k \log_b b$$

$$\log_b(\log_c x) = \log_b b^{a^k}$$

$$\log_c x = b^{a^k}$$

$$x = c^{b^{a^k}}$$

$$\log[1+x] = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots$$

GATE:-

(1) $\log_{x}^{5/7} = -1/3$ Find "x" = ?

$x^{-1/3} = 5/7$

$x^{-1} = \frac{125}{343}$

then $x = \frac{343}{125}$

01. The value of $\log \tan 1^0 + \log \tan 2^0 + \log \tan 3^0 + \text{----------} + \log \tan 89^0 = ?$ **(GATE-15 ME)**

(a) 1 (b) 0

(c) 3 (d) None of these

$\tan 1 = \tan(90 - 89)$

$= \cot 89$

$\Rightarrow \log \tan 1 + \log \tan 2 + \cdots \log \tan 45 + \cdots \log 89$

$\Rightarrow \log \tan 1 \cdot \tan 2 \cdots \tan 45 \cdots \tan 89$

$\Rightarrow \log \cot 89 \cdot \cot 88 \cdots \tan 45 \cdot \cdots \tan 89$

$\Rightarrow \log \tan 45 \Rightarrow \log 1 = 0$

03. If $\log_2 [\log_3 (\log_2 x)] = 1$, then x is equal to:

(a) 0 (b) 125

(c) 128 (d) 512

$x = 2^{3^{2^1}}$

$x = 2^9 \Rightarrow 512$

04. If $a^2 + b^2 = c^2$, then $\frac{1}{\log_{c+a} b} + \frac{1}{\log_{c-a} b}$

(a) 1 (b) 2

(c) -1 (d) -2

$\frac{1}{\log_{c+a} b} + \frac{1}{\log_{c-a} b} \Rightarrow \log_b^{c+a} + \log_b^{c-a}$

$\Rightarrow \log_b^{c^2 - a^2}$

$\Rightarrow \log_b^{b^2}$

$\Rightarrow 2\log_b^b = 2(1) = 2$

10. Given that $\frac{\log P}{(y-z)} = \frac{\log Q}{(z-x)} = \frac{\log R}{(x-y)} = 10$ for $x \neq y \neq z$, what is the value of the product PQR?

(GATE)

(a) 0
(b) 1
(c) xyz
(d) 10^xyz

$$\frac{\log P}{y-z} = 10$$

$$\log P = 10(y-z)$$

$$\log Q = 10(z-x)$$

$$\log R = 10(x-y)$$

$$\log P + \log Q + \log R = 10[y-z+z-x+x-y]$$

$$\log PQR = 10[0]$$

$$\log PQR = 0$$

$$\log PQR = \log 1$$

$$PQR = 1$$

09. The value of the expression

$$\frac{1}{1+\log_w uv}+\frac{1}{1+\log_u vw}+\frac{1}{1+\log_v wu}$$ is ____.

(GATE-18)

(a) –1
(c) 1
(b) 0
(d) 3

$$\frac{1}{\log_w w + \log_w uv} + \frac{1}{\log_u u + \log_u vw} + \frac{1}{\log_v v + \log_v wu}$$

$$\Rightarrow \frac{1}{\log_w uvw} + \frac{1}{\log_u uvw} + \frac{1}{\log_v uvw}$$

$$\log_{uvw} w + \log_{uvw} u + \log_{uvw} v$$

$$\Rightarrow \log_{uvw} uvw$$

$$\Rightarrow 1$$

07. For non-negative integers, a, b, c, what would be the value of a + b + c, if log a + log b + log c = 0?

(GATE-18)

(a) 3

(b) 1

(c) 0

(d) -1

08. For integers, a, b and c, what would be the minimum and maximum values respectively of a+b+c if $\log|a| + \log|b| + \log|c| = 0$? **(GATE-18)**

(a) -3 and 3

(b) -1 and 1

(c) -1 and 3

(d) 1 and 3

$a = \pm 1$

$b = \pm 1$

$c = \pm 1$

$+3, -3$

06. If $\log(P) = (1/2)\log(Q) = (1/3)\log(R)$, then which of the following options is TRUE? **(GATE-11)**

(a) $P^2 = Q^3R^2$ (b) $Q^2 = PR$

(c) $Q^2 = R^3P$ (d) $R = P^2Q^2$

$\log P = \frac{1}{2}\log Q = \frac{1}{3}\log R$

$\log P = \log Q^{1/2} = \log R^{1/3}$

$P = Q^{1/2} = R^{1/3}$

$P = Q^{1/2} = R^{1/3} = k$ say

$P = k$

$Q^{1/2} = k$

$Q = k^2$

$R^{1/3} = k$

$R = k^3$

$Q^2 = P \cdot R$

$(k^2)^2 = k \cdot k^3$

$k^4 = k^4$

05. $\log_4 2 - \log_8 2 + \log_{16} 2 - \ldots$ to ∞ is

(a) e^2 (b) $\ln 2 + 1$

(c) $\ln 2 - 1$ (d) $1 - \ln 2$

$\log_{2^2} 2 - \log_{2^3} 2 + \log_{2^4} 2 \ldots$

$\frac{1}{2}\log_2 2 - \frac{1}{3}\log_2 2 + \frac{1}{4}\log_2 2 \ldots$

$\frac{1}{2} - \frac{1}{3} + \frac{1}{4} \ldots$

$\log(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} \ldots$

$+1 - 1 + \frac{1}{2} - \frac{1}{3} + \frac{1}{4} \ldots$

$+1 - \left[1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} \ldots\right]$

$1 - \log(1+1)$

$1 - \log 2$

$\log_b a^m \Rightarrow m \log_b a$

$\log_{b^m} a = \frac{1}{m} \log_b a$

Analytical figures

→ no of Squares

→ no of Rectangle

→ no of parallelogram

→ no of Δ'les.

no of squares :-

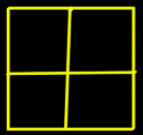
Σn^2

$\Sigma n^2 = \frac{n(n+1)(2n+1)}{6}$

$= \frac{5(6)(11)}{6}$

$= 55$

$\Sigma m \times n$

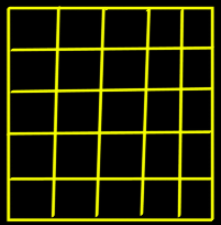


$2^2 + 1^2 + 0^2$

5

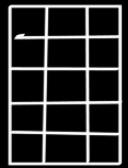
$3^2 + 2^2 + 1^2$

14



$5^2 + 4^2 + 3^2 + 2^2 + 1^2$

$\Rightarrow$ 55



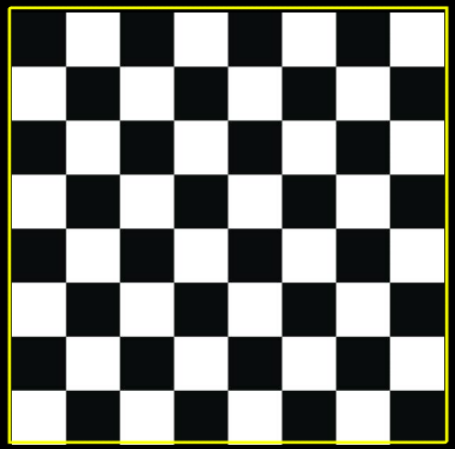
$(5 \times 3) + (4 \times 2) + (3 \times 1) + (2 \times 0)$

$15 + 8 + 3 = 26$

$(3 \times 4) + (2 \times 3) + (1 \times 2)$

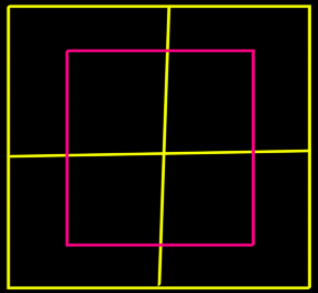
$12 + 6 + 2$

$= 20$

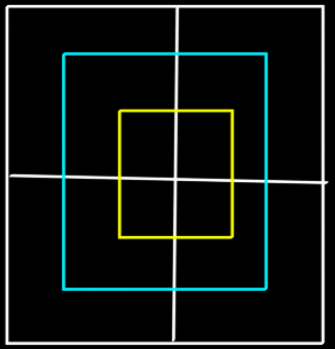


$$\sum 8^2 = 204$$

$$\frac{8(8+1)(16+1)}{6}$$



$5+5=10$



$5+5+5=15$

no of Rectangle [GATE ⇒ 2 Times]

$m_{C_2} \times n_{C_2}$

[Each & Every grid also Rectangle]

m = no of horizental lines

n = no of Vertcle lines

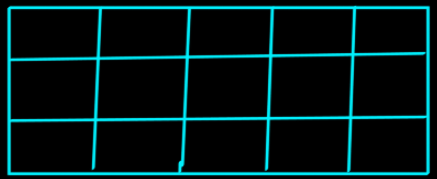
m = 3

n = 3

$3_{C_2} \times 3_{C_2}$

$= 3 \times 3$

$= 9$ //



$6_{C_2} \times 4_{C_2}$

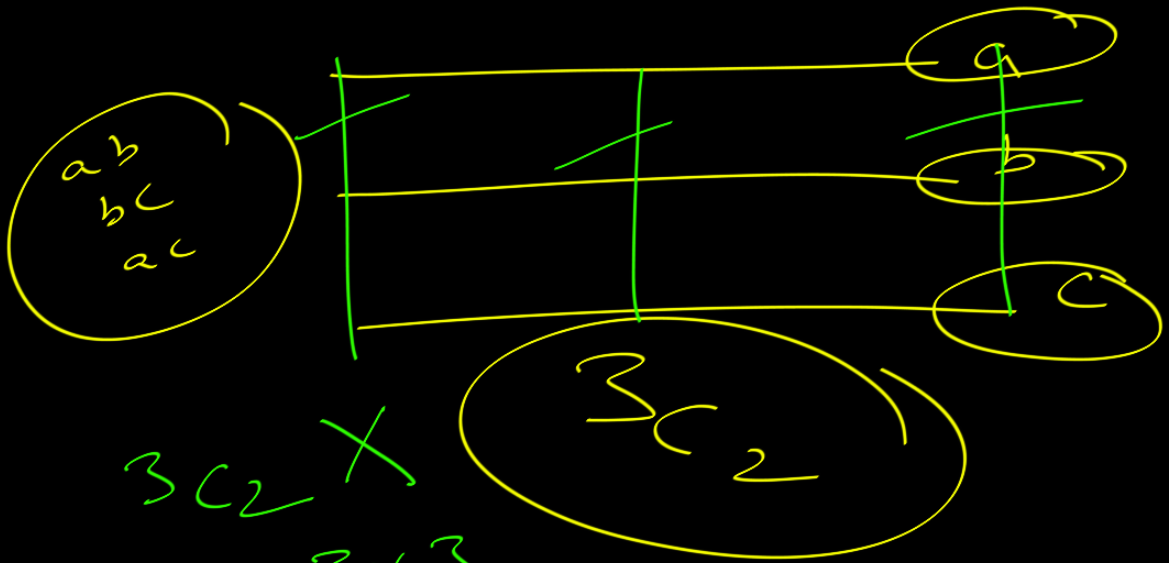
$= \frac{6 \times 5}{2 \times 1} \times \frac{4 \times 3}{2 \times 1}$

$\Rightarrow 90$

$3_{C_2} \times 5_{C_2}$

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

$\Rightarrow 30$


ab
bc
ac
a
b
c
3C2
3C2 X
= 3x3
= 9

$$^{n}C_{r} = \frac{n!}{(n-r)!\,r!}$$

$$^{n}C_{r} = {}^{n}C_{n-r}$$

$$^{n}C_{1} = n$$

$$^{n}C_{n} = 1$$

$$^{n}C_{0} = 1$$

$$^{10}C_{2} = \frac{10!}{[10-2]!\,2!}$$

(or)

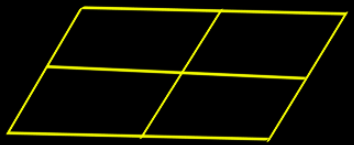
$$\frac{10 \times 9}{2 \times 1}$$

$$\frac{10 \times 9 \times 8!}{8! \times 2 \times 1} = \frac{10 \times 9}{2 \times 1}$$

$$^{7}C_{3} = \frac{7 \times 6 \times 5}{3 \times 2 \times 1}$$

no of parallelograms :-

$m_{C_2} \times n_{C_2}$

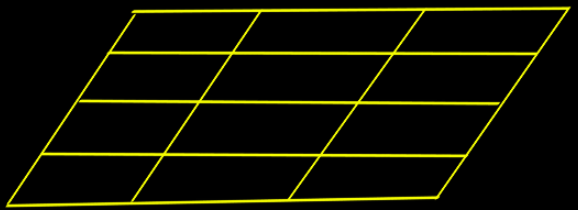


$3_{C_2} \times 3_{C_2}$

$= 3 \times 3$

$= 9$

GATE 2018



$m = 5, \quad n = 4$

$5_{C_2} \times 4_{C_2}$

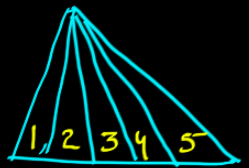
$= \frac{5 \times 4}{2 \times 1} \times \frac{4 \times 3}{2 \times 1} \Rightarrow 60$

no of Δ^{le} :-

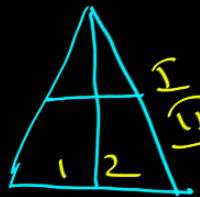
Σn

$= 1$

$1+2 = 3$

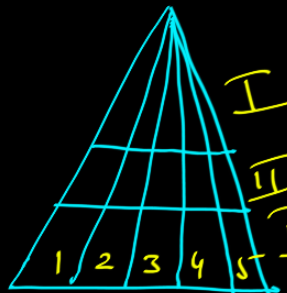


$1+2+3+4+5 = 15$

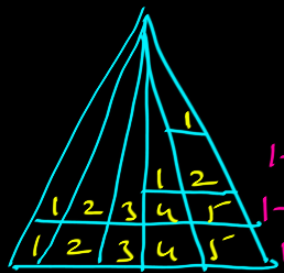


$[\Sigma n \times$ no of paths$)$

$(1+2) \times 2$



$[1+2+3+4+5] \times 3 = 45$



1

$1+2$

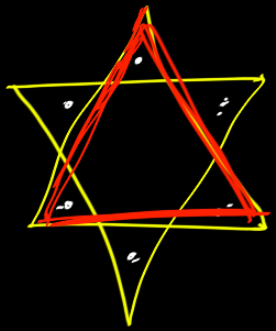
$1+2+3+4+5$

$1+2+3+4+5$

34

Based on stars:-

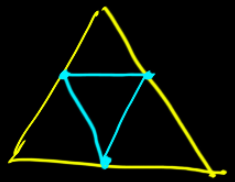
10



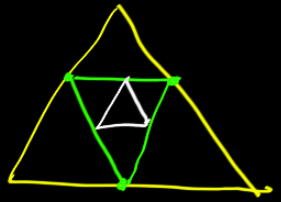
= 8

IV Join the mid point of sides

1

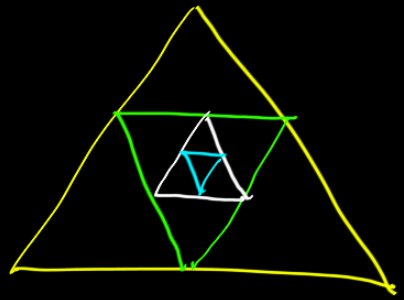


1 + 4 = 5



1 + 4 + 4

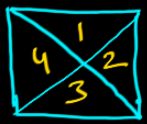
(9)



1 + 4 + 4 + 4

(13)

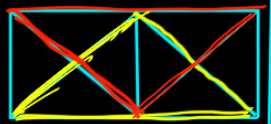
(v)



8

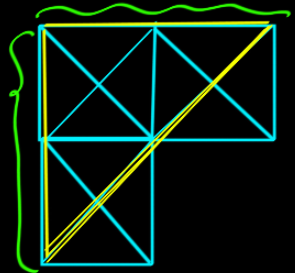
10

16



8 + 8 + 2

= 18

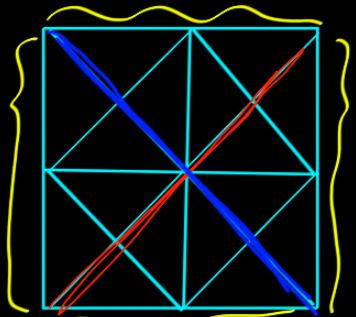


8 + 8 + 8

2 + 2

+ 1

29

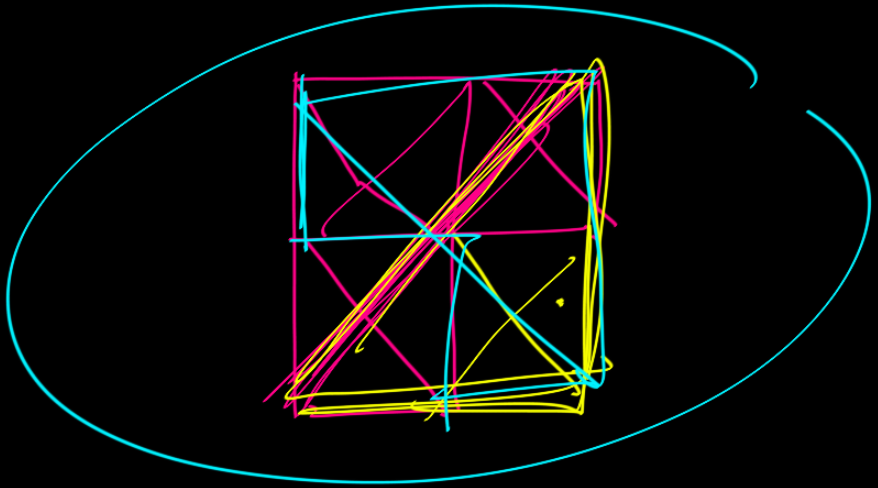


8 + 8 + 8 + 8

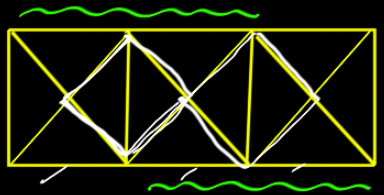
2 + 2 + 2 + 2

+ 4

44

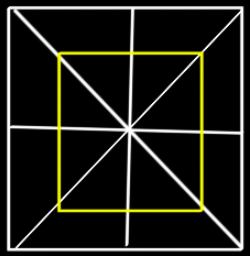


Ex:-

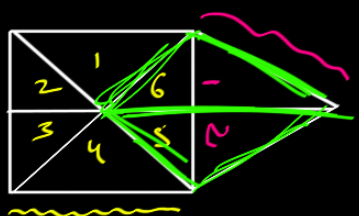


8 + 8 + 8
2 + 2
---
28 Δ'les.

How many □re => 5

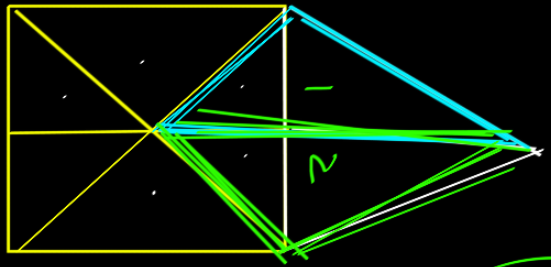


16 + 16
32 Δ'les.



12 + 3 + 2
17 Δ'les

X



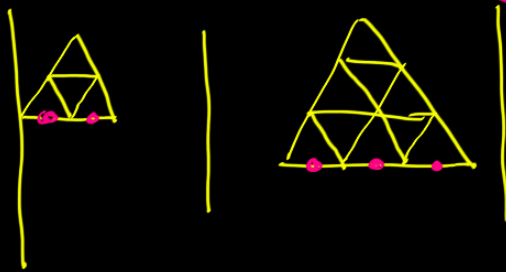
$12 + 3 + 2 = 17$

10. How many triangles are there in the given figure?

NOTE:- Symmetric Δ^{le}

base	no of Δ^{les}
1	1
2	5
3	13
4	27
5	48

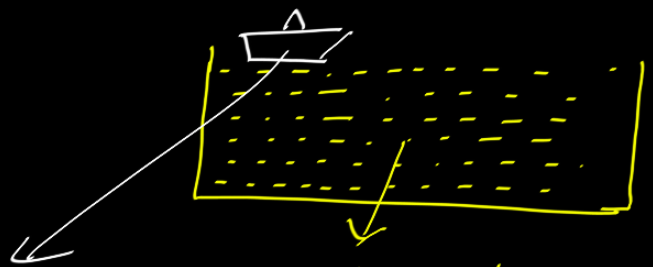
Δ
1



Boats & streams

1 – Time

PSU + STATE – 1 Quest



x km/h.

object speed in still water = x km/h

Still water

Stream

flow

current

speed = y km/h.

DSS, USS :-

① Down stream speed = $x+y$

② upstream speed = $x-y$ kmlhr

DSS = $x+y$
USS = $x-y$

II

DSS, USS given then x & y values.

DSS = a } say
USS = b

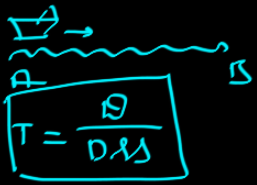
$x+y = a$
$x-y = b$

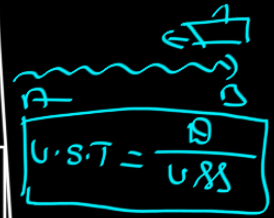
$2x = a+b$
$x = \frac{1}{2}(a+b)$

object speed in
still water (x) = $\frac{1}{2}$ (DSS + USS)
stream speed (y) = $\frac{1}{2}$ (DSS − USS)

DST, UST problems

$T = D/S$





v.v.v. Imp: [Distance, Total Travelling Dist]

Speed of Man in still water (x) km/h, and stream speed y km/h. he Travelled from A → B & B → A in T hrs.

Distance blw Two places [D] = $\frac{T(x^2-y^2)}{2x}$

Total Travelling Dist [TT-D] = 2D

$$T = t_1 + t_2$$

$$= \frac{D}{x+y} + \frac{D}{x-y}$$

$$T = D\left[\frac{x-y+x+y}{(x+y)(x-y)}\right]$$

$$T = D\left[\frac{2x}{x^2-y^2}\right)$$

$$D = \frac{T(x^2-y^2)}{2x}$$

$$D = \frac{T[D\,SS][U\,SS]}{D\,SS + U\,SS}$$

Speed of Man in still water 10 kmlh
stream speed 4 kmlh. he Travelled
from A → B and B → A in 20 hrs.
Find distance blw Two places?

$x = 10$
$y = 4$
$T = 20$

$$D = \frac{20(10^2 - 4^2)}{2(10)}$$

$$= 84$$

T.T.D = 168

Down stream speed of Man is
20 kmlh and up stream speed
of man is 16 kmlh. he Taken
36 hours for Total Journey.
Find distance blw Two places?

DS = 20
US = 16
T = 36

$$D = \frac{36(20)(16)}{20+16}$$

$$= \frac{320}{}$$

25. A man rows downstream 32 km and 14 km upstream. If he takes 6 hours to cover each distance, then the velocity (in kmph) of the current is:

(a) 1/2 (b) 1 (c) 1 ½ (d) 2

$DSS = \frac{32}{6}$ — (1)

$USS = \frac{14}{6}$ — (2)

$y = \frac{1}{2}\left[\frac{32}{6} - \frac{14}{6}\right] = \frac{1}{2}\left[\frac{18}{6}\right] = \frac{3}{2} \Rightarrow 1\frac{1}{2}$

Q (2)

DSS = 20

USS = 16

x = ?

$\frac{1}{2}(20+16)$

$= 18$

26. Speed of a boat in still water is 16 km/h. If it can travel 20 km downstream in the same time as it can travel 12 km upstream, the rate of stream is

$x = 16$ $\quad y = ?$

(a) 1 km/h (b) 2 km/h

(c) 4 km/h (d) 5 km/h

$DST = UST$

$\frac{20}{16+y} = \frac{12}{16-y}$

27. If boats rate in still water is 20 km/hr and stream rate is 10 km/hr, and it takes him 10 hrs to row to a place and back, then how for is the place?

(a) 75 kms (b) 60 kms

(c) 70 kms (d) 40 kms

$x = 20$, $y = 10$, $T = 10\text{hr}$

$D = \frac{T(x^2 - y^2)}{2x}$

$= \frac{10(20^2 - 10^2)}{2(20)}$

$\frac{10(30)}{40} = 75$

28. If boats's rate in still water is 10 km/hr and river is flowing with a certain speed, it takes him 20 hrs to row to a place and back and the length of the river is 75 kms. Then find the velocity of water?

(a) 10 km/hr (b) 15 km/hr

(c) 7 km/hr (d) 5 km/hr ✓

$x = 10$, $y = ?$, $D = 75$, $T = 20$

$75 = \frac{20(10^2 - y^2)}{2(10)}$

$75 = 100 - y^2$

$y^2 = 25$

$y = 5$

24-8-2022

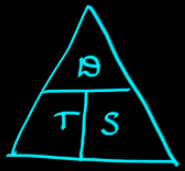
GATE-EE

- Time & Distance
- Short cuts
- DICG

Time & Distance

(5 - Times)

Code 1:- D, T, S Law :-



D = T x speed

T = D / speed

speed = D / Time

Code 2:- Avg speed :- (xxx)

A Man Travelled from A → B @ x kmlh and B → A @ y kmlh then Avg speed of Man is $\Rightarrow \boxed{\frac{2xy}{x+y} \text{ kmlh}}$ ✓

Avg speed:-

$$\text{speed} = \frac{D}{T}$$

$$\text{Avg speed} = \frac{\text{Total Distance}}{\text{Total Time}}$$

(or)

$$\frac{\text{Sum of Individual dist}}{\text{Sum of Individual Times}}$$

A $\xrightarrow{x,\ D,\ t_1}$ B $\xleftarrow{y,\ D,\ t_2}$

$$\text{Avg speed} = \frac{D+D}{t_1+t_2}$$

$$= \frac{2D}{\frac{D}{x}+\frac{D}{y}}$$

$$= \frac{2D}{D\left(\frac{1}{x}+\frac{1}{y}\right)}$$

$$= \frac{2xy}{x+y} \text{ km/h}$$

A Man Travelled From A → B @ 60 kmlh and B → A @ 90 kmlh. Find Avg Speed of Man?

$$\frac{2xy}{x+y} = \frac{2(60)90}{150}$$

$$= 72 \text{ kmlh}$$

② A Man covered 200 kms. he Travelled First 100 kms @ 25 kmlh, next 50 kms @ 10 kmlh. Remaining distance @ 50 kmlh. Find Avg Speed of Man?

(100 / 25) | 200

$$\frac{200}{\frac{100}{25} + \frac{50}{10} + \frac{50}{50}} = \frac{200}{4+5+1} = 20 \text{ kmlh}$$

A Man Travelled First 200 kms @ 40 kmlh, next 150 kms @ 30 kmlh next 100 kms @ 20 kmlh. Find Avg Speed of Man?

$$\frac{200+150+100}{\frac{200}{40} + \frac{150}{30} + \frac{100}{20}}$$

$$= \frac{450}{5+5+5} = \frac{450}{15}$$

$$= 30 \text{ kmlh}$$

Average Speed

11. A person travels 200 kms in 3 hrs, next 300 kms in 4 hrs, last 500 kms in 3 hrs. What is his average speed?

$\frac{200+300+500}{3+4+3}$

(a) 120 kmph (b) 100 kmph $\frac{1000}{10}$

(c) 80 kmph (b) 130 kmph

12. A car covers half of the journey at 36 kmph and the rest at 24 kmph? What is its average speed?

(a) 28.8 kmph

(b) 30 kmph

(c) 14 kmph

(d) 15 kmph

$\frac{2(36)24}{60}$

$\frac{72 \times 4}{10}$

28.8

13. A person divides his total route of journey into three equal parts and decides to travel the three parts at the speeds of 80 kmph, 60 kmph and 30 kmph respectively. What is the average speed during the journey?

D | D | D
80 | 60 | 30

Avg Speed = $\frac{T-D}{T-T}$

$= \frac{3D}{\frac{D}{80}+\frac{D}{60}+\frac{D}{30}}$

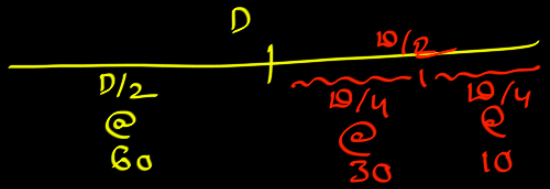
$= \frac{3\cancel{D}}{\cancel{D}\left[\frac{3+4+8}{240}\right]} = \frac{3(240)}{15} = 48$

(a) 40 kmph
(b) 45 kmph
(c) 48 kmph
(d) 49 kmph

14. A tourist covers half of his journey by train at 60 km/h, half of the remainder by bus at 30 km/h and the rest by cycle at 10 km/h. Average speed of the tourist during the journey is **(ESE-19)**

(a) 36 km/h (b) 33 km/h

(c) 24 km/h (d) 18 km/h



$$\frac{D}{\frac{D/2}{60} + \frac{D/4}{30} + \frac{D/4}{10}}$$

$$= \frac{D}{\frac{D}{120} + \frac{D}{120} + \frac{D}{40}}$$

$$= \frac{D}{D\left[\frac{1+1+3}{120}\right]} = \frac{120}{5} = 24 \text{ km/h}$$

15. A, B and C are on a trip by a car. A drives during the first hour at an average speed of 50 km/hr. B drives during the next 2 hours at an average speed of 48 km/hr. C drives for the next 3 hours at an average speed of 52 km/hr. they reached their destination after exactly 6 hours. Their mean speed was:

(a) 50 km/hr
(b) $50\frac{1}{3}$ km/hr
(c) 52 km/hr
(d) 52 km/hr

$$\frac{1[50] + 2(48] + 3(52)}{6}$$

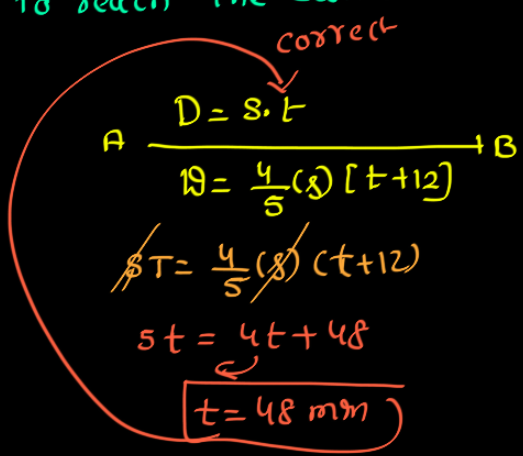
$$\frac{50 + 96 + 156}{6}$$

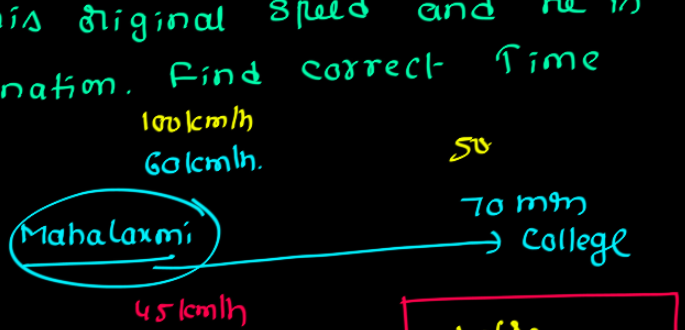
$$\Rightarrow \frac{302}{6} = \frac{151}{3}$$

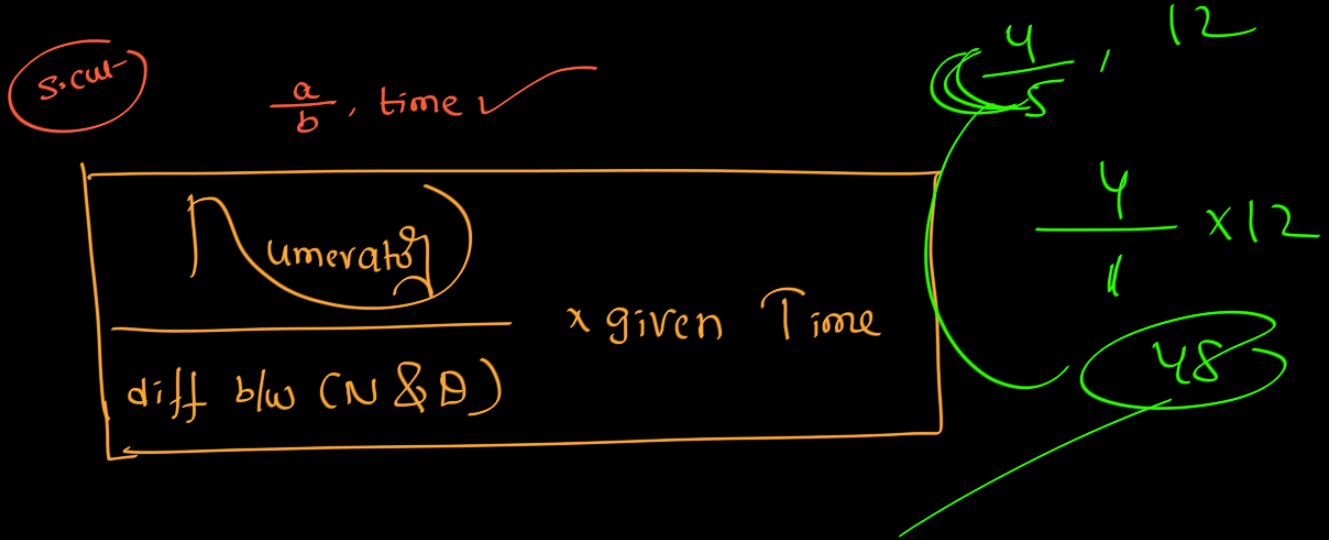
$$50\frac{1}{3}$$

Model

3:. A man using $4/5^{th}$ of his original speed and he is 12 min late to reach the destination. Find correct time to reach the destination?






S.cut-
a/b, time
Numerator
diff b/w (N & D)
x given Time
4/5, 12
4/1 x12
48

04. If I travel at 5/4 of my speed, I reach my office 6 minutes early. What is the original duration of time I take to reach office?

(a) 30 min (b) 24 min

(c) 35 min (d) None

$\frac{5}{1} \times 6 = 30$

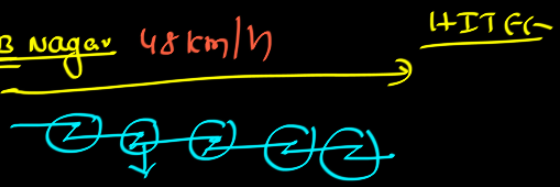
Code 4:- Without stoppages & Including stoppages :-

Without stoppages speed of Bus is 48 km/h. and including stoppages speed of Bus is 36 km/h. Find Time Taken for stoppages in 1-hour. & also find in 2-hours.?

48 km ⟶ 60 min
36 km ⟶ 60 min
12 km ⟶ ?

48 km ⟶ 60
12 km ⟶ x ?

$\frac{60 \times 12}{48} = 15$



for 2 hrs = 2 x 15
= 30 min

S.cube

$$\frac{\text{Diff}}{\text{Max speed}} \times 60$$ → for 1hr only

$\frac{12}{48} \times 60$ 15 min

$2 \times 15 = 30$

06. The average speed for an entire journey is 60 kmph without considering the stoppages. When the stoppages are considered the average speed becomes 48 kmph. How many minutes per hour on an average were the stoppages?

(a) 10 mins (b) 12 mins

(c) 16 mins (d) none of these

$\frac{12}{60} \times 68$

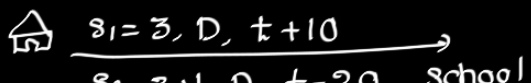
Code 5:-

Diff of Times :- CT = T1 ~ T2)

t1	t2	T
L	L	Diff
B	B	Diff
L	B	Sum
B	L	Sum

A boy going to schoolnfrom his home@3km/hr and he is 10 min late to reach the school. next day he increase the speed by 1 km /hr then he is 20 early to reach the scool. find distance between two places?

$D = s(t)$



$D = \frac{3[t+10]}{60}$ (1st day A → B)

$D = \frac{4[t-20]}{60}$ (2nd A → B)

$\frac{3[t+10]}{60} = \frac{4(t-20)}{60}$

$3t + 30 = 4t - 80$

$t = 110$

$D = \frac{3(110+10)}{60}$

$= 6\ km$

$T_1 \sim T_2 = T$

$$\frac{D}{3} - \frac{D}{4} = \frac{(0+20)}{60}$$

$$D\left[\frac{4-3}{12}\right] = \frac{30}{60}$$

$$D = 6\text{ km}$$

A student travels from house to college. If he walks with 3 km/hr, he reaches to the college 5 min late. If he walks with 4 km/hr, he reaches to the college 10 min early. What is the distance from house to college?

$T_1 \sim T_2 = T$

$\frac{D}{3} - \frac{D}{4} = \frac{5+10}{60}$

$D\left[\frac{4-3}{3(4)}\right] = \frac{15}{60}$

$D = 3$ kms

(a) 2 kms

(b) 4 kms

(c) 3 kms

(d) 5 kms

08. A car starts from A and B travelling 20 km an hour. $1\frac{1}{2}$ hours later another car starts from A and travelling at the rate of 30 km an hour reaches B $2\frac{1}{2}$ hours before the first car. Find the distance from A to B.

$T_1 \sim T_2 = T$

$\frac{D}{20} - \frac{D}{30} = 1\frac{1}{2} + 2\frac{1}{2}$

$D\left[\frac{30-20}{20 \times 30}\right] = 4$ hrs

(a) 280 km (b) 260 km

(c) 240 km (d) none of these

$D\left[\frac{10}{600}\right] = 4$

$D = 240$ km

16. A Train requires 7 seconds to pass a pole while it requires 25 seconds to cross a stationary train which is 378 m long. Find the speed of the train.

(a) 75.6 kmph (b) 75.4 kmph

(c) 76.2 kmph (d) 21 kmph

$$7 = \frac{L(T)}{S(T)} \quad \text{— (1)}$$

$$25 = \frac{L(T)+378}{S(T)} \quad \text{— (2)}$$

(2) / (1)

$$\frac{25}{7} = \frac{L(T)+378}{L(T)}$$

$$25x = 7x + 378(7)$$

$$18x = 378(7)$$

$$x = 147$$

21. Two cars starts from A and B and travel towards each other at the speed of 50 kmph and 60 kmph respectively. At the time of their meeting the second car has travelled 120 km more than the first, the distance between A and B is:?

(a) 600 kms (b) 1320 kms

(c) 720 kms (d) 3120 kms

For 1 hr =

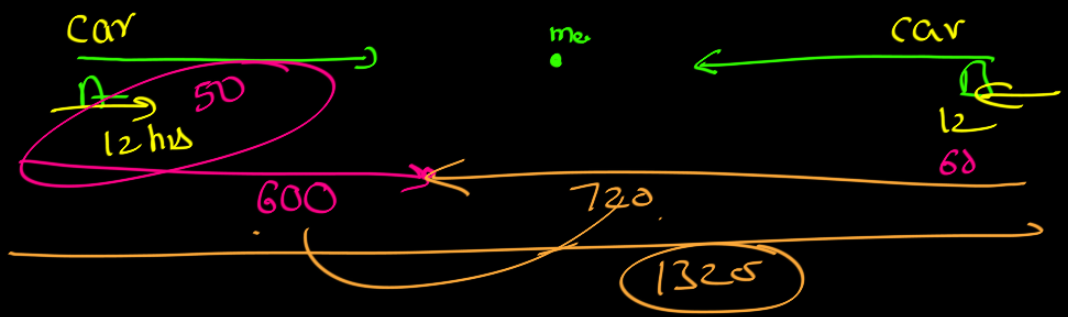
50, 60

10

1 hr = 10 km mode

? = 120 km

$\frac{120}{10}$ = 12 hr




10 km — 1hr
Divya
50 km/h
50
Mahalaxmi
40 km/h
40

Square roots for surds: [4- Times]

$\sqrt{5+2\sqrt{6}} = \sqrt{3}+\sqrt{2}$ (or $\sqrt{x}+\sqrt{y}$ say.)

$5+2\sqrt{6} = x+y+2\sqrt{xy}$

$x+y = 5$ — (1)

$xy = 6$ — (2)

$(x-y)^2 = (x+y)^2 - 4xy$

$= 5^2 - 4(6)$

$= 25-24$

$= 1$

$x-y = 1$

$x+y = 5$

$x-y = 1$

$2x = 6$

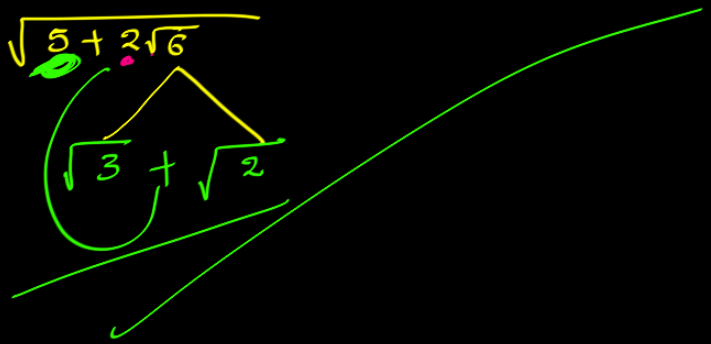
$x = 3$

$y = 2$

+ Ans

Sol:-

$$\sqrt{5+2\sqrt{6}}$$



$\sqrt{8-2\sqrt{15}}$

$\sqrt{5}-\sqrt{3}$

$\sqrt{14+6\sqrt{5}}$

2,3

$\sqrt{14+2\sqrt{45}}$

$\sqrt{9}+\sqrt{5}$

$\sqrt{7+\sqrt{40}}$

$\sqrt{7+\sqrt{4\cdot10}}$

$\sqrt{7+2\sqrt{10}}$

$\sqrt{5}+\sqrt{2}$

$\sqrt{11+2\sqrt{30}}$

$\sqrt{6}+\sqrt{5}$

$\sqrt{5+\sqrt{21}}$

$\sqrt{\frac{2}{2}(5+\sqrt{21})}$

$\frac{1}{\sqrt{2}}\sqrt{10+2\sqrt{21}}$

$\sqrt{7}+\sqrt{3}$

$\therefore \frac{\sqrt{7}+\sqrt{3}}{\sqrt{2}}$

$[a+b]^2 = a^2+b^2+2ab$

$[a-b]^2 = a^2+b^2-2ab$

$a^2-b^2 = [a+b][a-b]$

$(a+b)^3 = a^3+b^3+3ab(a+b)$

$(a-b)^3 = a^3-b^3-3ab(a-b)$

$a^3+b^3 \Rightarrow [a+b][a^2-ab+b^2]$

$a^3-b^3 \Rightarrow [a-b][a^2+ab+b^2]$

$(a+b+c)^2 = a^2+b^2+c^2+2ab+2bc+2ac.$

$z+\frac{1}{z}=10$, Find $z^2+\frac{1}{z^2}=$

$\left(z+\frac{1}{z}\right)^2-2$

$= 10^2-2$

$= 98$

$x-\frac{1}{x}=5$, $x^2+\frac{1}{x^2}=?$

$\left(x-\frac{1}{x}\right)^2+2$

$= 5^2+2$

$= 27$

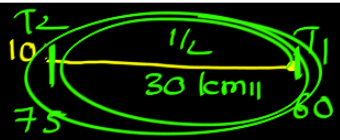
23. Two trains for Mumbai leave Delhi at 10 am and 10.30 am and travel at the speeds of 60 kmph and 75 kmph respectively. How many kilometers from Delhi will the two trains be together.

(a) 250 km (b) 200 km

(c) 150 km (d) 100 km

$\frac{30}{75-60} = \frac{30}{15}$

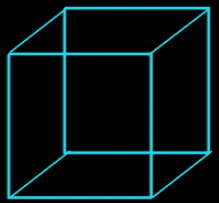
$= 2\ hy$

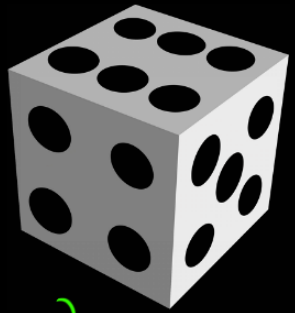


DICE

→ DICE Representation with cube.

↓

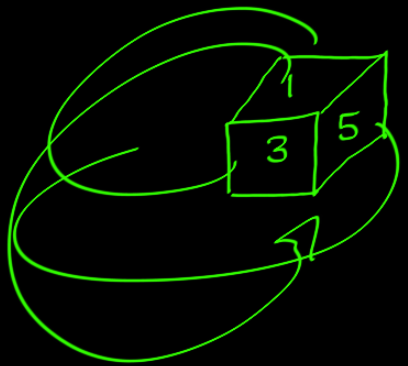




→ cube having - 6 surfaces. (1,2,3,4,5,6)

→ If A dice is rolled, then visibility = 3 faces only

We had only 1 - DICE, but Every Time we are discussing about Views only



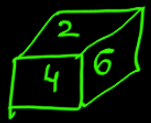
What is opposite Surface?

Standard dice

→ Adjacent surfaces sum, does not Equal to (7). then opposite surfaces sum should be "7"

→ Such Type of dice is called standard dice.

Ex:



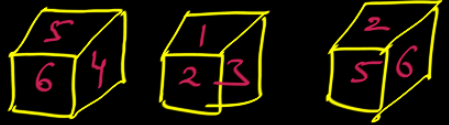
2 - 5
4 - 3
6 - 1

General DICE

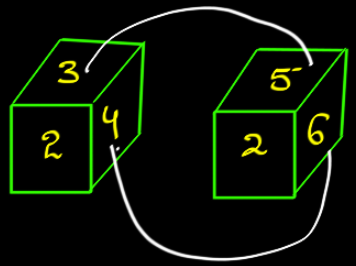
→ One of the Adjacent surfaces sum view is 7 Such Type of dice is called General dice.

→ 

→ 

→ 

F8] Identify the opposite surface of General DICE



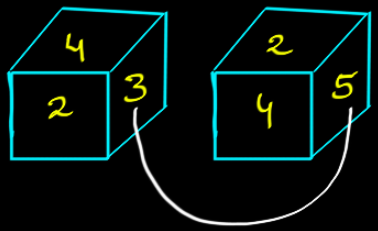
We have 1- common number and also same surface, then corresponding numbers are called opposite surfaces. and also remaining number is called opposite of common number.

3 - 5

4 - 6

2 - 1

II



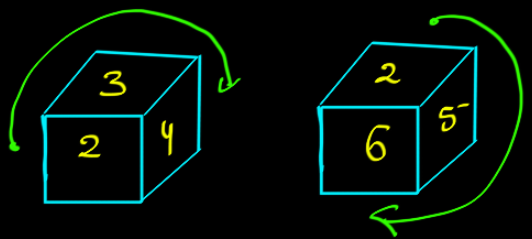
3-5

we have two common numbers then remaining corresponding numbers are called opposite surfaces.

(iii) we had one-common number but different surfaces.

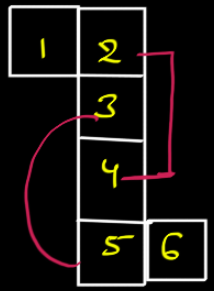
then
From the common number we have to write the numbers as clock wise direction.

then
corresponding numbers are called opposite surfaces.

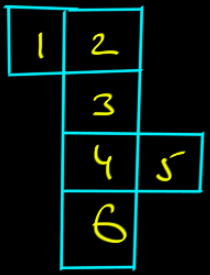


2 → 3, 4
2 → 5, 6

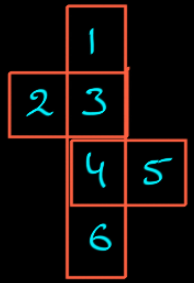
unfolded DICE given, we want To fold the DICE :



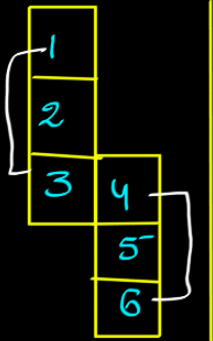
2 - 4
3 - 5
1 - 6



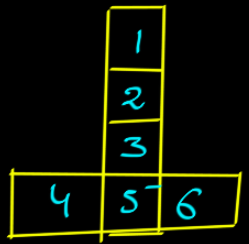
2 - 4
3 - 6
1 - 5



1 - 4
3 - 6
2 - 5

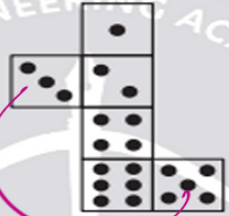


1 - 3
4 - 6
2 - 5



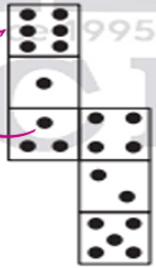
1 - 3
4 - 6
2 - 5

09. When the following figure is folded to form a cube, how many dots would lie opposite the face bearing five dots?



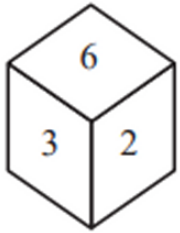
(a) 1 (b) 2 (c) 3 (d) 6

10. How many dots lie opposite the face having three dots, when the given figure is folded to form a cube?

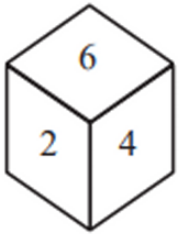


(a) 2 (b) 4 (c) 5 (d) 6

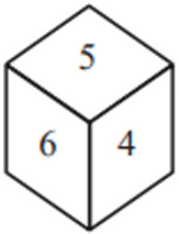
01. Which number is on the face opposite 6 ?



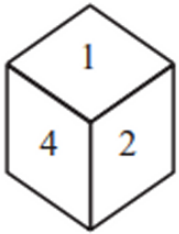
(i)



(ii)



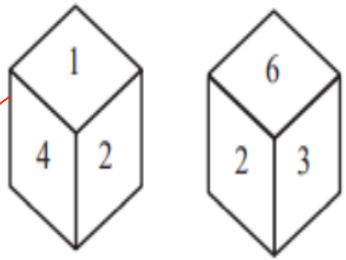
(iii)



(iv)

(a) 1 (b) 2 (c) 3 (d) 4

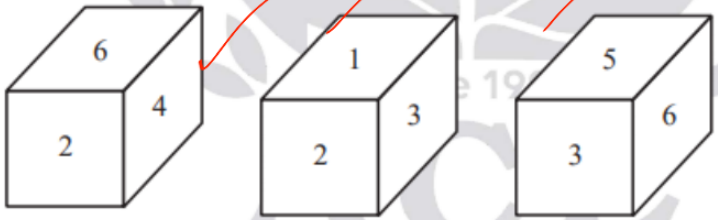
05. What will be the number at the bottom if 5 is at the top; the two positions of the dice being as given below:

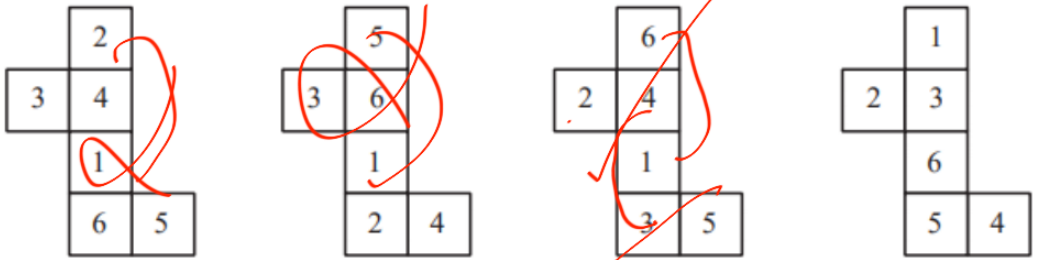


(i) (ii)

(a) 1 (b) 2 (c) 3 (d) 6

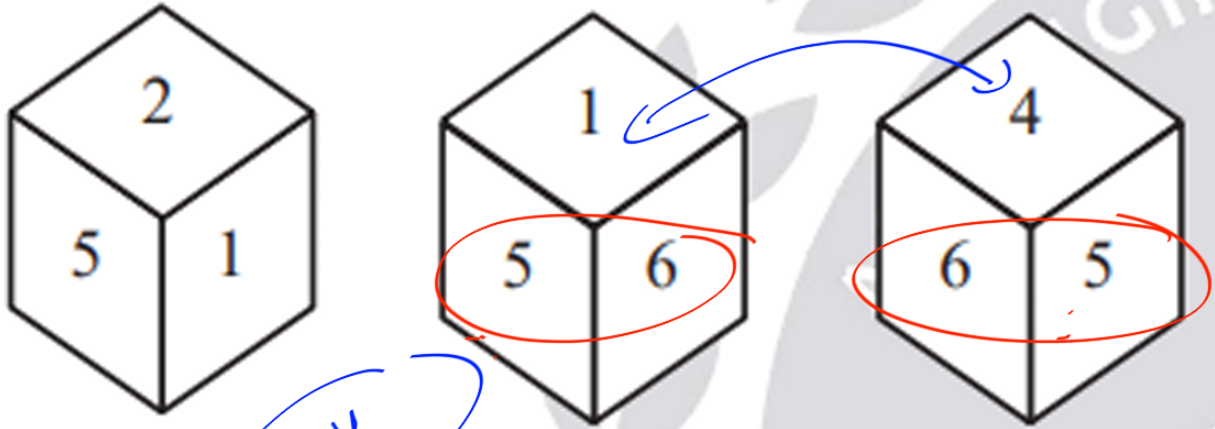
07. The six faces of a cube have been marked with numbers 1, 2, 3, 4, 5 and 6 respectively. This cube is rolled down three times. The three positions are given. Choose the figure that will be formed when the cube is unfolded.



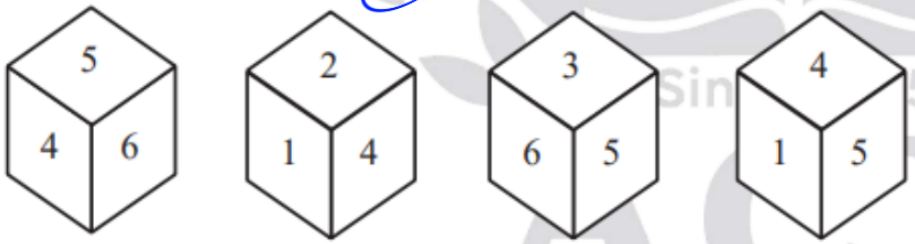


(a) (b) (c) (d)

02. Which number is on the face opposite 4?



03. Which number is opposite 3?



(i) (ii) (iii) (iv)

(a) 1 (b) 2 (c) 4 (d) 6

06. The six faces of cube as marked 1, 2, 3, 4, 5 & 6. Given below are two different view of same cube

Which face is opposite the face marked 6?

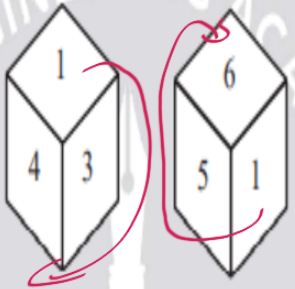
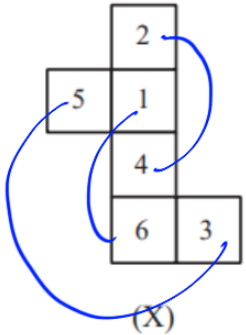


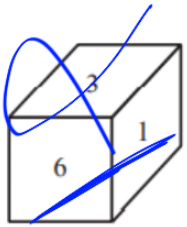
Fig (a) Fig (b)

(a) 3 (b) 4 (c) 2 (d) None of these

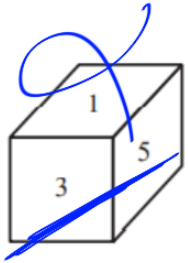
08. If x figure is folded then which of the following cube is formed?



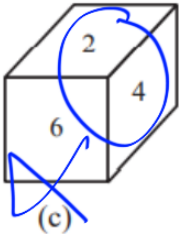
(X)



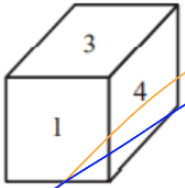
(a)



(b)

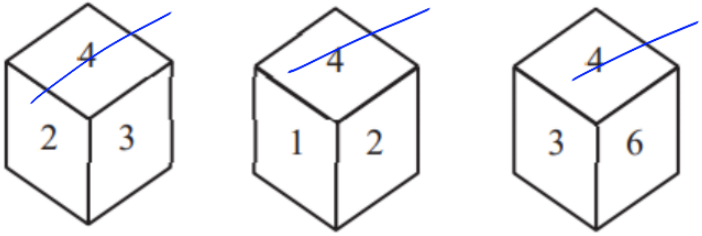


(c)



(d)

What numbers occur at the bottom face in the three positions of the same die?



(i) (ii) (iii)

(a) 6, 6, 2 (b) 5, 6, 1 (c) 5, 5, 5 (d) 6, 5, 2