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## GENERAL APTITUDE

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# Time & Work

- Work (Effort) = Manpower x time.
- If A can do a piece of work in x days then work done by A in one day is equal to  $1/x$  of the entire work.
- If A is twice as good a workman as B then A will take half the time taken by B to do a same piece of work.
- If number of people to do a certain work is increased (or decreased) the time taken to do the same work will decrease (or increase)
- Total work = LCM
- Efficiency =  $(\text{Total work})/(\text{Total time})$
- OR
- Total work = Efficiency x Total time



## Time & Work

Q. A, B & C can complete a certain work in 10, 12 & 15 days respectively. If all of them work together in how many days will the work get completed?

SUNBEAM



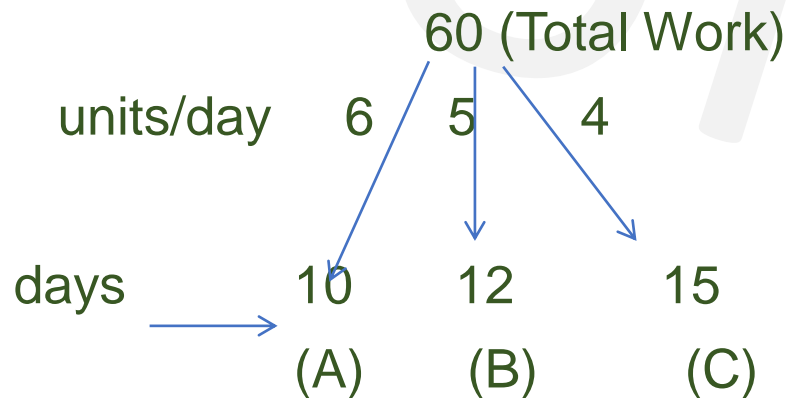
# Time & Work

Q. A, B & C can complete a certain work in 10, 12 & 15 days respectively. If all of them work together in how many days will the work get completed?

**Soln:**

We know, Total work = Days x units/day

$$\text{LCM}(10, 12, 15) = 60$$



In one day,  $A+B+C = 6+5+4 = 15$  units

So to complete TW = 60 units, days = ?

$$\text{days} = \frac{60}{15} = 4. \quad \text{So 4 days are needed to complete the work.}$$



# Time & Work

Q. Two persons A & B can complete a work in 20 & 30 days respectively. If both of them start together but A stops after 10 days then how many days will the work last?

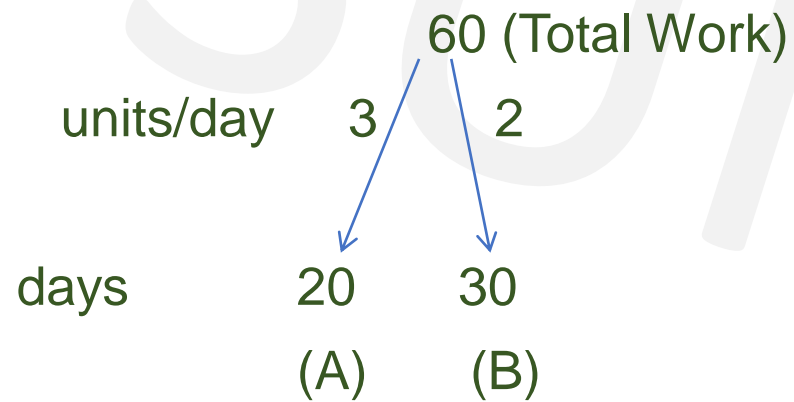
A. 7 days

B. 8 days

C. 15 days

D. 10 days

**Soln:** LCM(20,30) = 60



A after 10 days,  $3 \times 10 = 30$  units & B after 10 days =  $2 \times 10 = 20$  units

Total units = 60, Remaining units = total – A + B(after 10 days)  
 $= 60 - 50 = 10$  units

Days needed to do 10 units work =  $\frac{10}{2} = 5$  days

So Total Duration =  $10 + 5 = 15$  days

**Ans: C**



# Time & Work

Q. Two persons A & B can complete a work in 20 days , B & C can complete it in 24 days & C and A can complete it in 40 days. Find in how many days will B complete the work alone?

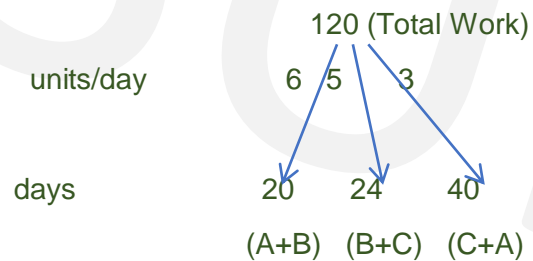
A. 30 days

B. 40 days

C. 50 days

D. 60 days

• **Soln:**  $\text{LCM}(20, 24, 40) = 120$



No of workers

↓  $2 \times (A+B+C) = 6+5+3 = 14$  i.e.  $2(A+B+C)$ 's 1 day work

$$A + B + C = 14/2 = 7$$

$$B = 7 - (A+C)$$

$$B \text{ alone} = 7 - 3 = 4 \text{ units/day}$$

$$\text{To find days needed by B} = \frac{\text{Total work}}{\text{units/day}} = \frac{120}{4} = 30 \text{ days}$$

So , 30 days are needed by B to complete the work alone.

**Ans :A**



# Time & Work

Q. A & B can do a piece of work in 20 & 16 days respectively. If they work on alternate days each starting with A in how many days was the work completed?

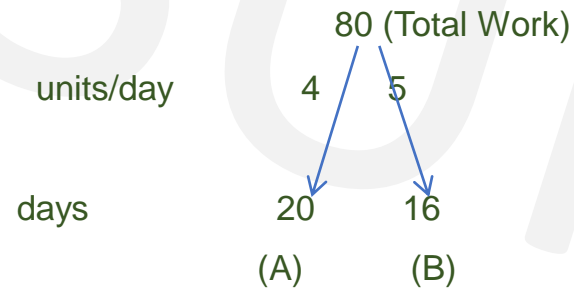
A. 19 days

B. 18 days

C. 16 days

D. 30 days

• **Soln:**  $\text{LCM}(20,16) = 80$



• Day 1, A = 4 units

• Day2, day 1 work added

•  $B = 5 + 4 = 9\text{units}$

• 9 units --- 2 days

• 80 units --- ?

•  $\text{Days} = \frac{80 \times 2}{9} = \frac{160}{9} = 17.7777 = 17.78 \text{ days}$

• **Ans B**



# Time & Work

- Efficiency = capacity to do work
- Efficiency and time are inversely proportional
- Efficiency  $\propto \frac{1}{T}$
- Efficiency and work are directly proportional
- Efficiency  $\propto W$





# Time & Work

Q. A is twice as efficient as B and completes a certain work in 12 days less than B. In how many days will both of them complete the same work?

A. 6 days

B. 8 days

C. 7 days

D. 3 days

Soln:

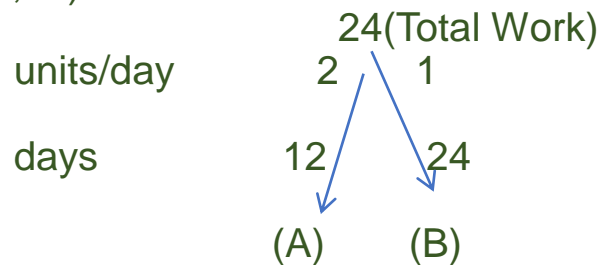
$$\begin{array}{ccc} \text{A} & & \text{B} \\ 2x & - & x \\ & & = 12 \end{array}$$

$$x = 12$$

As, Efficiency  $\propto \frac{1}{T}$

A = 12 days and B =  $2x = 2 \times 12 = 24$  days

- LCM(12,24) = 24



$$A + B = 2 + 1 = 3 \text{ units/day}$$

$$\text{Days} = \frac{\text{TW}}{\text{units/day}} = \frac{24}{3} = 8 \text{ days}$$

**Ans B**

or

Days ratio is inversely proportional to efficiency ratio.

	$\frac{A}{2}$	$\frac{B}{1}$
Eff (Ratio)	1	2
Days (Ratio)	$x-12$	$x$

**Days**

$$\begin{aligned} \rightarrow 2(x-12) &= x \\ \rightarrow x &= 24 \text{ days} \\ \rightarrow x - 12 &= 12 \text{ days} \end{aligned}$$



# Time & Work

Q. A, B & C can complete a work in 10, 12 & 15 days respectively. All three together completed the work & they are paid Rs 6000. Find the share of C

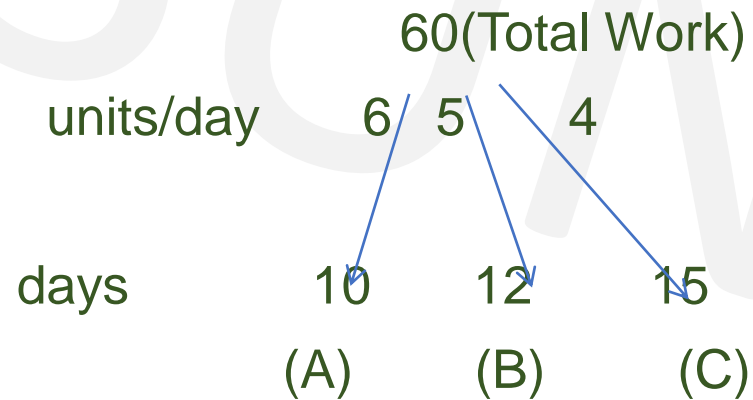
A. 3000

B. 2400

C. 2000

D. 1600

• **Soln:** LCM(10,12,15) = 60



Together,

$$(A+B+C) = 6+5+4 = 15 \text{ units/day}$$

Total paid amount to (A+B+C) = 6000

$$C = \frac{4}{15} \times 6000$$

$$= \text{Rs. } 1600$$

**Ans: D**



# Time & Work(Assignment)

Q. Two persons A & B can complete a work in 24 & 30 days respectively. If both of them start together .After how many days should B stop working so that A completes the remaining work in 6 days?

A. 7 days

B. 8 days

C. 9 days

D. 10 days

**Ans D**



# Time & Work(Assignment)

Q. Two persons A & B can complete a work in 20 days , B & C can complete it in 30 days while C & A can complete it in 24 days. Find in how many days will B complete the work alone?

A. 36 days

B. 48 days

C. 56 days

D. 64 days

**Ans B**



# Time & Work(Assignment)

**Q.** A is thrice as good a workman as B and can finish a piece of work in 60 days less than B. Find the time to complete the work if both of them work together

A. 20 days      B. 22.5 days      C. 24.5 days      D. 22 days

**Ans: B**



# Time & Work(Assignment)

Q. 2 workers A & B can finish a job in 8 days and 12 days respectively ,after the completion of work they were paid Rs.200. Find share of B.

A. Rs. 120    B. Rs. 80    C. Rs. 40    D. Rs. 60

**Ans: B**



# Work & Time(Assignment)

Q. A, B & C can do a piece of work in 12, 20, & 30 days respectively. If A is assisted everyday alternately by B & C in how many days was the work completed?

A. 6 days

B. 8 days

C. 7 days

D. 3 days

**Ans: B**



# Work & Time(Assignment)

Q. A can do a piece of work in 10 days, B in 12 days and C in 15 days. They all start work together, but A leaves 2 days later and B leaves 3 days before completion of the work. In how many days was the work completed?

A. 7 days

B. 5 days

C. 8 days

D. 10 days

**Ans: A**





# Work & Time(Assignment)

Q. Apurva can do a job in 12 days. She and Amit completed the work together and were paid Rs.54 and Rs.81 respectively. How many days are needed to complete the job together?

A. 4.8 days

B.4.2 days

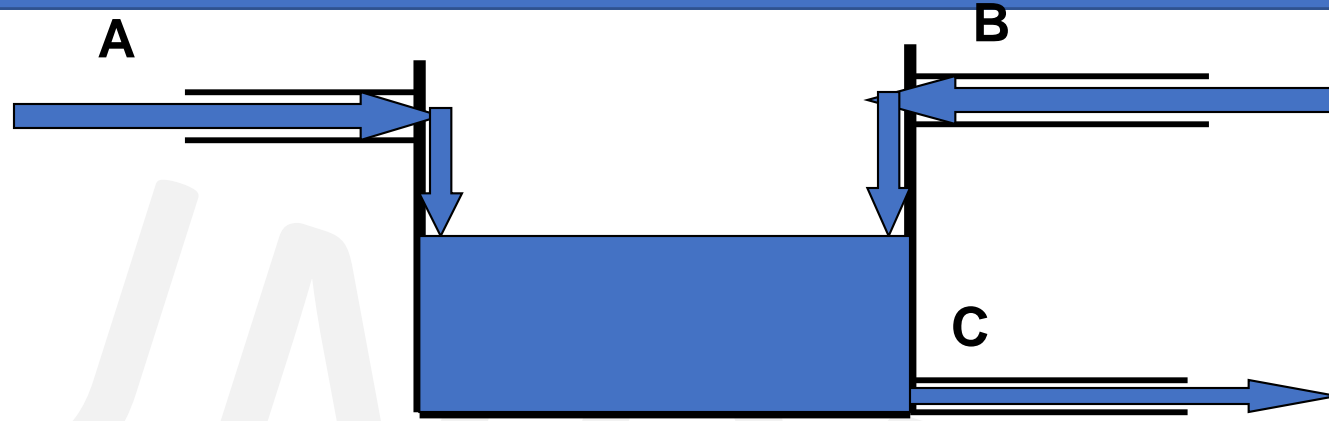
C. 4 days

D. 3.6 days

**Ans: A**



# Pipes & Cisterns



- A cistern may have inlet pipe or outlet pipe.
- Conventionally filling a tank is treated as positive work and emptying a tank as negative work.
- Net work done = (Sum of work done by inlets) – (sum of work done by outlets)

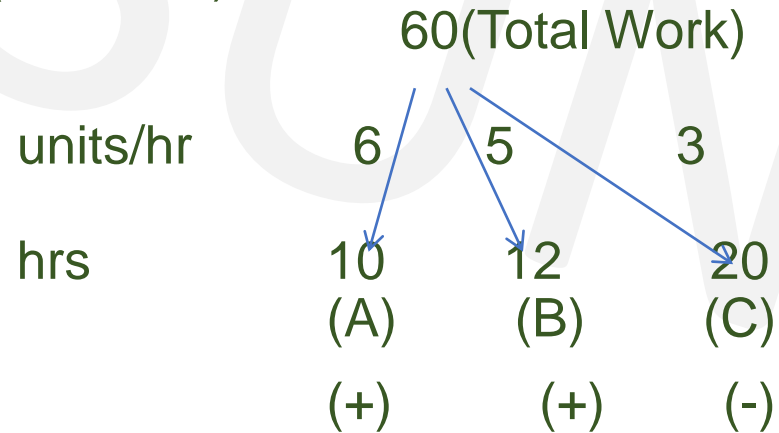


# Pipes & Cisterns

Q. Two pipes can fill the reservoir in 10 hours and 12 hours respectively. While third pipe empties full tank in 20 hours. If all the three pipes operate simultaneously , how much time will the tank be filled?

**Soln:**

- $\text{LCM}(10, 12, 20) = 60$



$$A+B = 6 + 5 = 11$$

As, C empties the tank so,  $11 - 3 = 8$  units/hr

Quantity filled in 1 hour if all the pipes are opened together

$$\text{Time to fill} = \frac{\text{TW}}{\text{units/hr}} = \frac{60}{8} = 15/2 \text{ hrs}$$



# Pipes & Cisterns

Q. Two pipes A and B can fill a tank in 24 minutes and 32 minutes respectively. If both the pipes are opened simultaneously, after how much time should B be closed so that the tank is full in 18 minutes

A . 2 min

B. 4 min

C. 6 min

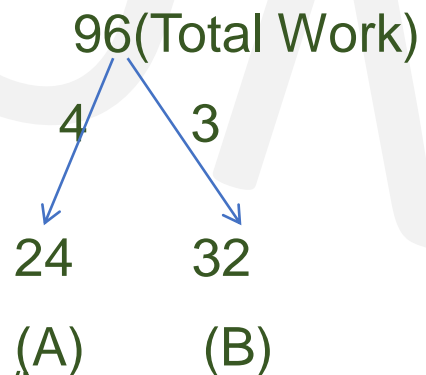
D.8 min

**Soln:**

$$\text{LCM}(24,32) = 96$$

units/hr

hrs



$$\text{WD} = \text{time} \times \text{units/hr}$$

Work done by A alone =  $18 \times 4 = 72$  units

Remaining work = Total units – work done by A =  $96 - 72 = 24$  units

B should be closed after  $= \frac{24}{3} = 8$  mins.

**Ans : D**



# Pipes & Cisterns

Q. 12 buckets of water fill a tank when the capacity of each bucket is 13.5 litres. How many buckets will be needed to fill the same tank, if the capacity of each bucket is 9 litres?

A. 8

B. 15

C. 16

D. 18

**Ans: D**

Capacity of the tank =  $(12 \times 13.5)$  litre  
= 162 litres

Capacity of each bucket = 9 litres

Number of buckets needed =  $162 / 9$   
= 18 buckets



# Pipes & Cisterns

Q. Bucket P has thrice the capacity as bucket Q. It takes 60 turns for bucket P to fill the empty tank. How many turns it will take for both P and Q, having each turn together to fill the tank?

- A. 30                      B. 40                      C. 45                      D. 90

**Soln-**

$$P = 3Q$$

60 turns of P = capacity of tank

$$60P = \text{capacity of tank}$$

$$60(3Q) = \text{capacity of tank}$$

$$180Q = \text{capacity of tank}$$

P+Q work together.

Amount of water poured together = P + Q

$$= 3Q + Q = 4Q$$

$$\text{Number of turns} = 180Q/4Q = 45 \text{ turns}$$

**Ans: C**



# Pipes & Cisterns(Assignment)

Q. There are 3 pipes attached to a tank A, B & C. A alone can fill the tank in 60 min, B can fill the tank in 45 min & C can empty the full tank in 30 min. If all three pipes are opened together in how much time will the tank be full?

A. 5 hrs

B. 4 hrs

C. 3 hrs

D. 2 hrs

**Ans: C**



# Pipes & Cisterns(Assignment)

Q. A pump can fill a tank with water in 2 hours. Because of a leak, it took  $2\frac{1}{3}$  hours to fill the tank. The leak can drain all the water of the tank in:

A.  $4\frac{1}{3}$  hours

B. 7 hours

C. 8 hours

D. 14 hours

• **Soln :**

• Work done =  $\frac{XY}{Y-X}$  where, X = number of hrs to fill tank , Y = number of hrs to fill tank with leakage

•  $2\frac{1}{3} = \frac{7}{3}$

• Work done =  $\frac{2 \times \frac{7}{3}}{\frac{7}{3} - 2} = \frac{\frac{14}{3}}{\frac{1}{3}} = 14$

• Leak will empty the tank in 14 hours

• **Ans: D**





# Pipes & Cisterns(Assignment)

Q. Two pipes A and B can fill a cistern in  $37\frac{1}{2}$  minutes and 45 minutes respectively. Both pipes are opened. The cistern will be filled in just half an hour, if B is turned off after:

A. 5 mins

B. 9 mins

C. 10 mins

D. 15 mins

**Ans : B**



# Pipes and Cisterns(Assignment)

Q. Two pipes A & B can fill the cistern in 20 min & 25 min respectively. Both are opened together but at the end of 5 min B is turned off. How much total time will the cistern take to fill up?

- A. 5 min      B. 10 min      C. 12 min      D. 16 min

**Ans: D**



# Pipes and Cisterns(Assignment)

Q. Two pipes A and B can fill a tank in 36 minutes and 45 minutes respectively. Another pipe C can empty the tank in 30 minutes. First A and B are opened. After 7 minutes, C is also opened. The tank is filled up in

- A. 39 minutes      B. 46 minutes      C. 40 minutes      D. 45 minutes

**Ans: B**



# Pipes and Cisterns(Assignment)

Q. Two pipes A and B can fill a tank in 15 minutes and 20 minutes respectively. Both the pipes are opened together but after 4 minutes, pipe A is turned off. What is the total time required to fill the tank?

- A. 10 min. 20 sec.
- B. 11 min. 45 sec.
- C. 12 min. 30 sec.
- D. 14 min. 40 sec.

**Ans: D**



# Chain Rule

- In earlier problems the rate of doing work of each person or pipe varied.
- In chain rule problems all entities are of the same efficiency or work capacity.
- The entities may be men, women, tractors, engines, pumps, horses, lawn mowers etc.
- Work Done = No. of Men x Days x Hrs/day
- $W = M \times D \times H$
- $W_1 = M_1 \times D_1 \times H_1$ ,  $W_2 = M_2 \times D_2 \times H_2$
- $$\frac{W_1}{W_2} = \frac{M_1 \times D_1 \times H_1}{M_2 \times D_2 \times H_2}$$



# Chain Rule

Q. 18 men working for 5 hours per day can complete a job in 8 days. How many men working for 8 hours a day for 6 days will be required?

A. 24

B. 15

C. 16

D. 17

Men x Days x Hrs/day = Work Done

## Case 1

$18 \times 8 \times 5 = 720 \text{ man-hrs}$

## Case 2

$M \times 6 \times 8 = 720 \text{ man-hrs}$

$M \times 6 \times 8 = 18 \times 8 \times 5$

$M = 15$

**Ans B**



# Chain Rule

Q. 20 men or 40 women working for 9 hours a day can finish a work in 80 days. In how many days will 10 men & 10 women working together for 12 hours a day finish the work?

A. 60 days      B. 70 days      C. 80 days      D. 90 days

Men x Days x Hrs/day = Work Done

Also 20 Men = 40 Women  $\rightarrow$  1M = 2 W (convert to one unit i.e. women or children)

20 men ---- 40 women

1men ----- ? (2women)

## Case 1

40W x 80 x 9 = work

## Case 2

(20W + 10W) x D x 12 = work

30W x D x 12 = 40W x 80 x 9

D = 80 days

**Ans C**



# Chain Rule

Q. 8 men or 12 women or 16 children working for 8 hours a day can finish a work in 52 days. In how many days will 1 man & 1 woman & 1 child working together for 8 hours a day finish the work?

- A. 180 days                      B. 192 days                      C. 216 days                      D. 164 days

- **Men x Days x Hrs/day = Work Done**

- Also 8 Men = 16 children  $\rightarrow 1M = 2C$

- And 12 Women = 16 children  $\rightarrow 1W = \frac{4}{3}C$

- **Case 1**

- $16C \times 52 \times 8 = \text{work}$

- **Case 2**

- $(2C + \frac{4}{3}C + C) \times D \times 8 = \text{work}$

- $(2C + \frac{4}{3}C + C) \times D \times 8 = 16C \times 52 \times 8$

- $\frac{13C}{3} \times D \times 8 = 16C \times 52 \times 8$

- $D = 192 \text{ days}$

**Ans: B**





# Chain Rule

Q. 12 men and 16 boys can do a piece of work in 5 days. 13 men and 24 boys can do it in 4 days. The ratio of the daily work done by a man and a boy is –

A. 2 : 1

B. 3 : 1

C. 3 : 2

D. 5 : 4

**Soln:**

$$W = M \times D$$

and

$$W = M \times D$$

$$\begin{aligned} W &= (12m + 16b) \times 5 \\ &= 60m + 80b \end{aligned}$$

$$\begin{aligned} W &= (13m + 24b) \times 4 \\ &= 52m + 96b \end{aligned}$$

As , work done is same, equating both sides ,we get,

$$60m + 80b = 52m + 96b$$

$$60m - 52m = 96b - 80b$$

$$8m = 16b$$

$$m = 2b \quad m : b = 2 : 1$$

**Ans: A**



## Chain Rule(Assignment)

Q. 12 men & 18 women working together for 9 hours a day finish the work in 150 days.  
30 men & 15 women working together for 10 hours a day finish the work in 81 days. In how many days will 12 men & 12 women working together for 12 hours a day finish the work?

A. 115 days    B. 120 days    C. 130 days    D. 135 days

**Ans: D**



# Chain Rule(Assignment)

Q. 24 workers working 8 hours a day can construct a wall in 5 days. In how many days can 45 workers working 4 hours a day construct 3 such walls?

- A. 18 days      B. 16 days      C. 4 days      D. 7 days

**Ans : B**



# Chain Rule(Assignment)

Q. 24 workers working 5 hours a day can construct a bungalow in 8 days. In how many days can 40 workers working 8 hours a day construct 2 such bungalows?

A. 3 days

B. 6 days

C. 4 days

D. 8 days

**Ans : B**



# Chain Rule(Assignment)

Q. 32 painters working 5 hours a day can paint a building in 10 days. In how many days can 40 workers working 6 hours a day paint 3 such buildings?

A. 10 days

B. 16 days

C. 20 days

D. 28 days

**Ans : C**



# Chain Rule(Assignment)

Q. 8 men or 12 women can construct a wall in 33 days . In how many days can 10men and 21 women construct the wall.

A. 10 days

B. 11 days

C. 22 days

D. 15 days

**Ans : B**



# Chain Rule(Assignment)

Q.36 men working for 12 hours a day can build a wall 45 mt long, 52 mt high & 63 mt broad in 91 days. In how many days will 80 men working for 9 hours a day build a wall 50 mt long, 72 mt high & 30 mt broad ?

A. 24 days

B. 35 days

C. 40 days

D. 47 days

Men x Days x Hrs/day

= Work Done (Volume of Wall)

## Case 1

$$36 \times 91 \times 12$$

$$= 45 \times 52 \times 63$$

## Case 2

$$80 \times D \times 9$$

$$36 \times 91 \times 12$$

$$= \frac{50 \times 72 \times 30}{45 \times 52 \times 63}$$

$$45 \times 52 \times 63$$

D

=

40 days

**Ans C**



# Chain Rule(Assignment)

Q. 12 men or 18 women can construct a wall in 33 days . In how many days can 20men and 24 women construct the wall.

A. 10 days

B. 11 days

C. 22 days

D. 15 days

**Ans : B**





# Chain Rule(Assignment)

Q. 12 men can do a piece of work in 24 days. How many days are needed to complete the work, if 8 men do this work ?

- A. 28 days
- B. 36 days
- C. 48 days
- D. 52 days

**Ans: B**



# Probability

- How likely an event is supposed to happen.
- Probability =  $\frac{\text{Favourable outcome}}{\text{Total number of outcomes}}$
- AND → multiply(x) e.g:- 1 green and 1 blue ball in a box
- OR → Add (+) e.g:- 1 red or 1 blue ball in a box
- 1 bag has 3 balls, what is the probability of you picking up 2 balls?

$$\bullet 3C_2 = \frac{3 \times 2}{1 \times 2} = 3$$

Total no. of balls  
the bag contains

Out of which how many balls  
We need to choose  
(tells number of times 3 has to be reduced)

$$\text{Probability} = \frac{\text{Favourable outcome}}{\text{Total number of outcomes}}$$



# Points to Remember

- The **probability** of an event will not be less **than** 0.
- This is because 0 is impossible (sure that something will not happen).
- The **probability** of an event will not be **more than 1**. This is because **1** is certain that something will happen.
- The probability of an event is **a number** describing the chance that the event will happen.
- An event that is certain to happen has a probability of 1.
- An event that cannot possibly happen has a probability of 0.
- If there is a chance that an event will happen, then its probability is between 0 & 1.



# Probability

- **Atleast** – min to max
- Eg:- 2 bags out of 3



min



max

So various probabilities to be done is 2 and 3

- **Atmost** - max to min
- Eg:- 1 bag has 3 balls out of which probability to pick up 2 balls



atmost 2 → max 2, 1, 0 (min)



# Probability

Q. A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?

A. 10/21      B. 11/21      C. 2/7      D. 5/7

• Soln-

- Total balls =  $2+3+2=7$  balls in the bag
- None = blue (neglect whichever color is written after none)
- Draw = 2 balls

• Probability =  $\frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{2R \text{ or } (1R \text{ and } 1G) \text{ or } 2G}{7C_2} = \frac{2C_2 + (2C_1 \times 3C_1) + 3C_2}{7C_2} = \frac{10}{21}$

**Ans : A**



# Probability

Q. In a box, there are 8 red, 7 blue and 6 green balls. One ball is picked up randomly. What is the probability that it is neither red nor green?

A.  $\frac{1}{3}$       B.  $\frac{3}{4}$       C.  $\frac{7}{19}$       D.  $\frac{8}{21}$       E.  $\frac{9}{21}$

**Soln:**

- Total balls =  $8+7+6 = 21$  balls in the box
- Neither red nor green means only blue
- Draw = 1 ball

- Probability =  $\frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{1 \text{ blue out of total } 7}{21C_1} = \frac{7C_1}{21C_1} = \frac{7}{21} = \frac{1}{3}$

**Ans: A**



# Probability

Q. What is the probability of getting a sum 5 from two throws of a dice?

- A.  $1/9$                       B.  $1/8$                       C.  $1/7$                       D.  $1/6$

**Soln-**

**Dice = 6 faces = 6 possibilities**

So in two throws of dice, total possibilities =  $6 \times 6 = 36$

Sum = 5, so favourable outcomes are -  $\{ (1,4), (4,1), (2,3), (3,2) \}$

$$\text{Probability} = \frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{4}{36} = \frac{1}{9}$$

**Ans : A**



# Probability

Q. Three unbiased coins are tossed. What is the probability of getting utmost two heads?

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

• **Soln-**

- Total possibilities = {TTT, TTH, THT, HTT, THH, HTH, HHT, HHH}
- Event of getting utmost 2 heads = max 2H or 1H or 0H
- Possibility of getting 2 H = {TTH, THT, HTT, THH, HTH, HHT}
- Probability =  $\frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{7}{8}$

**Ans: D**





# Probability

Q. In a class, there are 15 boys and 10 girls. Three students are selected at random. The probability that 1 girl and 2 boys are selected, is:

A. 21/46

B. 25/117

C. 1/50

D. 3/25

**Soln:**

- Total students = 15 + 10 = 25 students in a class
- Draw = 3 students

$$\text{Probability} = \frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{{}^{10}C_1 \times {}^{15}C_2}{{}^{25}C_3} = \frac{21}{46}$$

**Ans : A**



# Probability

- A Standard deck of playing cards consist of 52 cards, among them there are 4 subgroups/suits –
- The four suits with there names , symbols and color –

1. The suit of Hearts



13 cards

2. The suit of Diamonds



13 cards

3. The suit of Clubs



13 cards

4. The suit of Spades



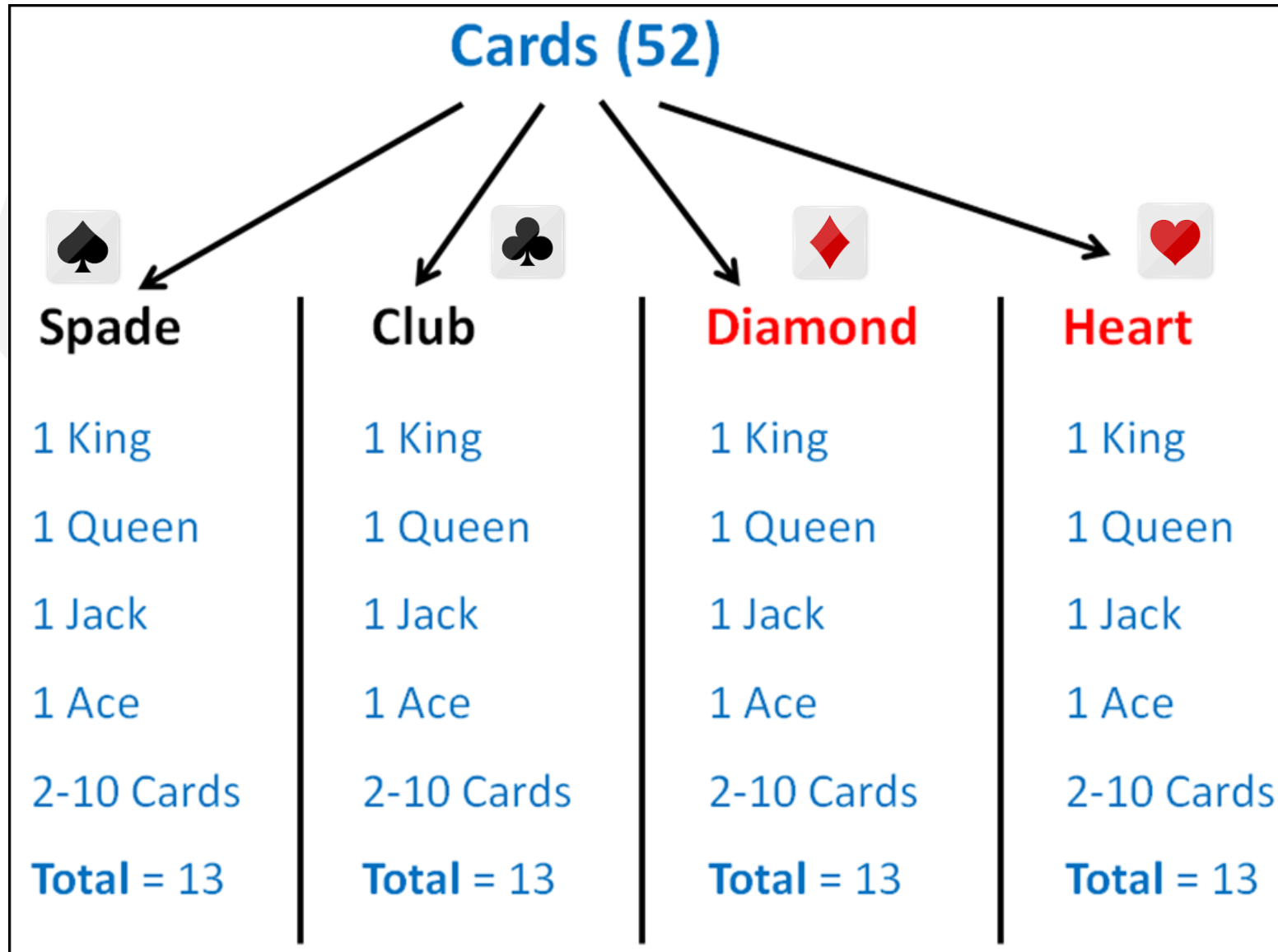
13 cards

26 red cards

26 black cards

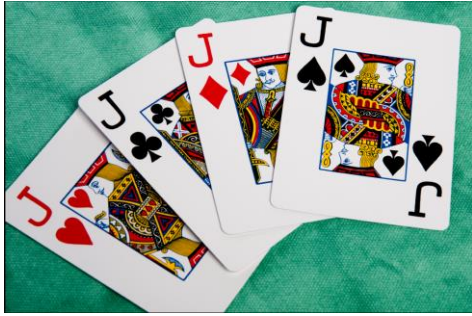


# Probability

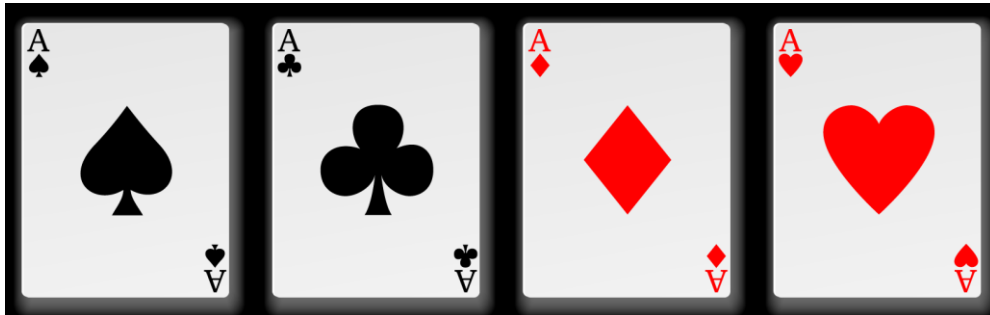


# Probability

- King, Queen and Jack (or Knaves) are **face cards**. So, there are **12 face cards** in the deck of 52 playing cards.
- **Jokers** are not normally considered to be **face cards**



- **Aces**
- There are 4 Aces in every deck, 1 of every suit.



# Probability

Q. From a pack of 52 cards, two cards are drawn together at random. What is the probability of both the cards being kings?

A. 1/15

B. 25/57

C. 35/256

D. 1/221

• **Soln-**

• **Total cards in a pack =52**

• **Total kings in a pack = 4**

• **Drawn =2**

• **Probability =  $\frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{4C_2}{52C_2} = \frac{1}{221}$**

**Ans : D**



# Probability

Q. Two dice are rolled. Find the probability of getting a sum of 8 or 11 on both the dices.

A.  $5/36$

B.  $9/36$

C.  $7/36$

D.  $11/36$

**Ans: C**

- Favorable outcomes for sum of 8 or 11 on both the dices are-
- $(2,6), (3,5), (4,4), (5,3), (6,2), (5,6), (6,5)$
- Number of favorable outcomes = 7
- Probability =  $\frac{7}{36}$



# Probability(Assignment)

A man tossed two dice. What is the probability that the total score is a prime number?

A.  $5/12$

B.  $5/14$

C.  $5/20$

D.  $5/24$

• **Soln-**

• **Dice = 6 faces = 6 possibilities**

• 2 Dice =  $6 \times 6 = 36$  possibilities

• Sum = prime number

• So favourable outcomes are -  $\{ (1,1), (1,2), (1,4), (1,6), (2,1), (2,3), (2,5), (3,2), (3,4), (4,1), (4,3), (5,2), (5,6), (6,5), (6,1) \}$

• Probability =  $\frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{15}{36} = \frac{5}{12}$

**Ans : A**



# Probability(Assignment)

Q. A brother and sister appear for an interview against two vacant posts in an office. The probability of the brother's selection is  $\frac{1}{5}$  and that of the sister's selection is  $\frac{1}{3}$ . What is the probability that one of them is selected?

A.  $\frac{1}{5}$

B.  $\frac{2}{5}$

C.  $\frac{1}{3}$

D)  $\frac{2}{3}$

**Soln: -**

(brother is selected and sister is not selected) OR (brother is not selected and sister is selected)

$$\begin{aligned}\text{Probability} &= \frac{1}{5} \times \frac{2}{3} + \frac{4}{5} \times \frac{1}{3} \\ &= \frac{6}{15}\end{aligned}$$

$$= \frac{2}{5}$$

**Ans: B**

$$\begin{aligned}\text{sister not selected} &= 1 - \text{prob. of sister selected} \\ &= 1 - \frac{1}{3} \\ &= \frac{2}{3}\end{aligned}$$

$$\begin{aligned}\text{brother not selected} &= 1 - \text{prob. of brother selected} \\ &= 1 - \frac{1}{5} \\ &= \frac{4}{5}\end{aligned}$$





# Probability(Assignment)

Q. Probability of occurrence of event A is 0.5 and that of event B is 0.2. the probability of occurrence of both A and B is 0.1. what is the probability that none of A and B occur?

A. 0.4      B. 0.5      C. 0.2      D. 0.1

**Soln:**

probability of sure event = 1

- Given  $P(A) = 0.5$  and  $P(B) = 0.2$
- $P(A \text{ or } B) = P(A \cup B) = P(A) + P(B) - P(A \cap B)$   
 $= 0.5 + 0.2 - 0.1 = 0.6$
- And  $P(\text{neither A nor B}) = P(A' \cap B') = 1 - P(A \cup B) = 1 - 0.6 = 0.4.$

**Ans: A**

- Note:  $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- This is also known as the addition theorem of probability.



# Probability(Assignment)

Q. A bag contains 4 white, 5 red and 6 blue balls. Three balls are drawn at random from the bag. The probability that all of them are red, is?

A.  $1/22$

B.  $3/22$

C.  $2/91$

D.  $2/77$

**Ans : C**



# Probability(Assignment)

Q. What is the probability of getting a sum 9 from two throws of a dice?

- A.  $1/6$                       B.  $1/8$                       C.  $1/9$                       D.  $1/12$

**Ans : C**



# Probability(Assignment)

Q. A bag contains 6 black and 8 white balls. One ball is drawn at random. What is the probability that the ball drawn is white?

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

**Ans : B**



# Probability(Assignment)

Q. A bag contains 6 blue balls, 3 white balls and 4 green balls. If two balls are drawn at random what is the possibility that they are not of the same color?

A.  $6/13$

B.  $7/13$

C.  $9/13$

D.  $10/13$

• **Ans: C**



# Probability(Assignment)

Q. One card is drawn at random from a pack of 52 cards. What is the probability that the card drawn is a face card (Jack, Queen and King only)?

A.  $1/13$

B.  $1/4$

C.  $3/13$

D.  $9/52$

**Ans: C**



# Probability(Assignment)

Q. One card is drawn at random from a pack of 52 cards. What is the probability that the card drawn is not a face card (Jack, Queen and King only)?

A.  $5/13$

B.  $10/13$

C.  $1/13$

D.  $1/26$

**Ans: B**



# Probability(Assignment)

Q. A basket contains 6 apples ,4 pears and 3 oranges. If two fruits are picked up at random, what is the probability that both are pears?

A.  $4/13$

B.  $1/13$

C.  $2/13$


D.  $3/26$

**Ans: B**





# Calendar

- In Non Leap year –
  - 365 days
  - 1 year = 52 weeks + 1 odd day(extra day)
  - 28<sup>th</sup> February
- In Leap year –
  - 366 days
  - 1 year = 52 weeks + 2 odd days
  - 29<sup>th</sup> February 
- A **century leap year** is a **year** that is exactly divisible by 400
  - **years** 1600 and 2000 were **century leap years**; (400,800,1200,1600,2000 – century leap years till date)
  - **years** 1700, 1800, and 1900 were not **century leap years**.
- To find the day of a week on a given date we use the concept of “**odd days**”.
- 01/01/0001 A.D(Anno Domini) was a Monday and 1<sup>st</sup> day of week so 1<sup>st</sup> January 0001 was a Monday.



# Calendar

- In a century,
  - 24 leap year
  - 76 non leap years

100 years

Leap year / non leap year

$$\begin{array}{rcl} 24 \times 2 & + & 76 \times 1 \\ = \frac{48}{7} & & = \frac{76}{7} \\ \downarrow & & \downarrow \\ 6 & + & 6 \end{array}$$

remainder

$$= 12 \div 7 = 5 \leftarrow \text{remainder}$$

5 extra(odd) days in a century (100 years)

100 years = 5 odd days  $\leftarrow$  remainder

200 years =  $10 \div 7 = 3$  odd days

300 years =  $15 \div 7 = 1$  odd days

400 years = 0 odd days (as century leap year)



# Calendar

Years	No. of odd
Ordinary year	1
Leap year	2
100 years	5
200 years	3
300 years	1
400 years	0

BEAM



# Calendar

Day of week	No. of odd
Sunday	0
Monday	1
Tuesday	2
Wednesday	3
Thursday	4
Friday	5
Saturday	6

BEAM



# Calendar

S

Month		Remainder
January	$31 \div 7$	3
February	$28 \div 7$ or $29 \div 7$	0(non leap) or 1(leap)
March	$31 \div 7$	3
April	$30 \div 7$	2
May	$31 \div 7$	3
June	$30 \div 7$	2
July	$31 \div 7$	3
August	$31 \div 7$	3
September	$30 \div 7$	2
October	$31 \div 7$	3
November	$30 \div 7$	2
December	$31 \div 7$	3

M



# Calendar

Q. What was the day of the week on 15<sup>th</sup> August, 1947?

**Soln:**

Completed till 1946

$$\begin{array}{l} 1946 \\ \swarrow \quad \searrow \\ \frac{1900}{400} = 300 \quad \frac{46}{4} = 11(\text{quotient}) \\ \downarrow \quad \quad \quad \downarrow \\ 1 \text{ odd day} \quad 46 + 11 = 57 \quad \frac{57}{7} = 1(\text{remainder}) \end{array}$$

In 1946, odd days are,

$$\begin{array}{ccc} 1900 & & 46 \\ 1 & + & 1 = 2 \text{ odd days} \end{array}$$

1946    month    date

$$\text{Total odd days} = 2 + 2 + 1 = 5 \text{ odd days}$$

As per table for days of a week , 5  $\longleftrightarrow$  Friday

As month is August, go till July as per table,

$$\begin{array}{cccccc} J & F & M & A & M & J & J \\ 3 & 0 & 3 & 2 & 3 & 2 & 3 = 16 \end{array}$$

$$\text{Now, } \frac{16}{7} = 2 (\text{remainder})$$

$$\begin{array}{l} \text{For date ,} \\ \frac{15}{7} = 1 (\text{remainder}) \end{array}$$



# Calendar

For Months -

J	F	M	A	M	J	J	A	S	O	N	D
0	3	3	6	1	4	6	2	5	0	3	5

For years -

1600 – 1699	6
1700 – 1799	4
1800 – 1899	2
1900 – 1999	0
2000 – 2099	6



# Calendar

Q. What was the day of the week on 26<sup>th</sup> January, 1947?

Soln:

1. Last 2 digits of the year → 47
  2. Divide by 4 ( $47 \div 4$ ) = 11 (quotient)
  3. Take the date → 26
  4. Take the no. of month → 0 (from table)
  5. Take the no. of year → 0 (from table)
- 84

(add)
- $\frac{84}{7} = 0$  (remainder)
6. Divide by 7 →

Check table for day of the week

0 ↔ Sunday





# Calendar

Q. What was the day of the week on 29<sup>th</sup> February, 2012?

**Soln:**

1. Last 2 digits of the year → 12
2. Divide by 4 ( $12 \div 4$ ) = 03( quotient)
3. Take the date → 29
4. Take the no. of month → 03 (from table)
5. Take the no. of year → 06 (from table)

---

53 (add)

6. Divide by 7 →  $\frac{53}{7} = 4$  (remainder)

subtract 1 from remainder

In this case for all dates of **January & February** in a leap year ,  $4 - 1 = 3$

Check table for day of the week

3  $\longleftrightarrow$  Wednesday



# Calendar

It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?

A. Sunday

B. Saturday

C. Friday

D. Wednesday

**Ans: C**

On 31st December, 2005 it was Saturday.

Number of odd days from the year 2006 to the year 2009 =  $(1 + 1 + 2 + 1) = 5$  days.

On 31st December 2009, it was Thursday.

on 1st Jan, 2010 it is Friday.



# Calendar

Q. If we have preserved the calendar of 2017. Find the next immediate year in which we can reuse.

A. 2027

B. 2023

C. 2025

D. 2029

**Soln:**

$x/4$  (  $x$  = given year)

$$\frac{2017}{4} = 1 \text{ (remainder)}$$

For any year divide by 4, the possibility of remainder is 0,1,2,3

If remainder = 0  $\rightarrow x + 28$

If remainder = 1  $\rightarrow x + 6$

If remainder = 2/3  $\rightarrow x + 11$

So,  $\frac{2017}{4} = 1 \text{ (remainder)}$

$$2017 + 6 = 2023$$

**Ans: B**



# Calendar

Q. Which of the following days can never be the last day of a century?

A. Sunday    B. Monday    C. Tuesday    D. Wednesday

- **Soln:**
- The last day of century can be only
- 1 odd day(Monday)
- 3 odd days (Wednesday)
- 5 odd days ( Friday )
- 7 or 0 odd days (Sunday)
- So, century can never end in **Tuesday** , **Thursday** or **Saturday**.
- **Ans: C**



# Calendar(Assignment)

- Q. The day on 5<sup>th</sup> April of a year will be the same day on 5<sup>th</sup> of which month of the same year?
- A. 5<sup>th</sup> July                      B. 5<sup>th</sup> August                      C. 5<sup>th</sup> June                      D. 5<sup>th</sup> October
- **Ans A**
- April & July for all years have the same calendar. So, a day on any date of April will be the same day on the corresponding date in July.
- The same day will fall on 5<sup>th</sup> July of the same year.



# Calendar(Assignment)

Q. What was the day of the week on your birthdate?

Q. 13<sup>th</sup> October 2019 is a Sunday. Find the day on 13<sup>th</sup> October 1989?

A. Sunday      B. Monday      C. Friday      D. Wednesday

**Ans: C**

Q. 1<sup>st</sup> March 2006 falls on a Wednesday .What day does 1<sup>st</sup> March 2010 fall on?

A. Tuesday      B. Monday      C. Friday      D. Wednesday

**Ans: B**

Q. Today is Monday. Which day will be after 64 days?

A. Tuesday      B. Monday      C. Friday      D. Wednesday

**Ans: A**

Q. Today is Monday. After 30 days it will be?

A. Tuesday      B. Monday      C. Friday      D. Wednesday

**B. Ans: D**



# Calendar(Assignment)

Q. 15<sup>th</sup> August 1947 was a Friday. Find the day on 15<sup>th</sup> August 1977?

• Soln:

$$\begin{array}{r} 1977 \\ - 1947 \\ \hline 30 \text{ years} \end{array}$$

Leap years between 1947 to 1977

1948	1964	} 8 years
1952	1968	
1956	1972	
1960	1976	

$$30 + 8 = 38$$

total years    leap

$$\frac{38}{7} = 3 \text{ (remainder)}$$

As 15<sup>th</sup> August 1947 was a Friday ,

So, Friday + 3 days = **Monday**



# Calendar(Assignment)

Q. 4th January 2016 falls on Monday. What day of the week does 4th January 2017 lies?

A. Wednesday

B. Thursday

C. Tuesday

D. Monday

**Soln:**

Normal year = 1 odd day

Leap year = 2 odd days

Jan 4, 2016 → Monday

+ 2 (as leap year)

Jan 4, 2017 → Wednesday

**Ans: A**





# Calendar(Assignment)

Q. Wednesday falls on 5th of a month .So which day will fall 5 days after 22<sup>nd</sup> of the same month?

A. Tuesday

B. Friday

C. Thursday

D. Wednesday

**Ans: B**

5<sup>th</sup> = Wednesday

+7

12<sup>th</sup> = Wednesday

+7

19<sup>th</sup> = Wednesday

22<sup>nd</sup> = Saturday

+5

27<sup>th</sup> = Thursday

5 days after 22<sup>nd</sup> will be **Friday**



# Calendar(Assignment)

Q. What dates of May 2002 did Monday fall on?

**Soln:**

Lets take date = 1<sup>st</sup> May 2002

1. Last 2 digits of the year → 02
2. Divide by 4 ( $02 \div 4$ ) = 00( quotient)
3. Take the date → 01
4. Take the no. of month → 01 (from table)
5. Take the no. of year → 06 (from table)
- 
- 10 (add)
6. Divide by 7 →  $\frac{10}{7} = 3$  (remainder)

Check table for day of the week

3  $\longleftrightarrow$  Wednesday

1<sup>st</sup> May 2002 falls on Wednesday

1	2	3	4	5	6
W	Th	F	Sa	Su	M

↑  
first Monday

Now add 7 to it to find remaining Mondays

Dates on which Monday falls are -  
6 , 13 , 20, 27



# Calendar(Assignment)

Q. On what dates of April, 2001 did Wednesday fall?

A. 1<sup>st</sup>, 8<sup>th</sup>, 15<sup>th</sup>, 22<sup>nd</sup>, 29<sup>th</sup>

B. 2<sup>nd</sup>, 9<sup>th</sup>, 16<sup>th</sup>, 23<sup>rd</sup>, 30<sup>th</sup>

C. 3<sup>rd</sup>, 10<sup>th</sup>, 17<sup>th</sup>, 24<sup>th</sup>

D. 4<sup>th</sup>, 11<sup>th</sup>, 18<sup>th</sup>, 25<sup>th</sup>

**Ans: D**



# Calendar(Assignment)

Q. What is the day on 22 April 2222?

A. Monday

B. Tuesday

C. Saturday

D. Sunday

**Ans: A**



# Calendar(Assignment)

Which of the following is not a leap year?

- A. 700      B. 800      C. 1200      D. 2000

**Ans: A**

The century divisible by 400 is a leap year.  
The year 700 is not a leap year.



# Calendar(Assignment)

Q. Today is Monday. Which day will be on 61st day?

**Soln:**

1 week = 7 days. Taking the multiple of 7

56 - Monday	or	63 - Monday
57 - Tuesday		62 - Sunday
58 - Wednesday		61 - Saturday

59 - Thursday

60 - Friday

61 - Saturday

$56 + 5 = 61$ days		$63 - 61 = 2$ days
(add 5 days)	or	(subtract 2 days)



# Calendar(Assignment)

Q. January 1, 2007 was Monday. What day of the week lies on Jan. 1, 2008?

- A. Monday
- B. Tuesday
- C. Wednesday
- D. Sunday

**Ans: B**



# IMPORTANT FORMULAE

- **I.1.**Area of a rectangle=(length x breadth)
- Therefore length = (area/breadth) and breadth=(area/length)
- **2.**Perimeter of a rectangle = 2 x (length + breadth)
- **II.**Area of a square = (side)<sup>2</sup> =1/2(diagonal)<sup>2</sup>
- **III** Area of four walls of a room = 2\*(length + breadth)\*(height)
- **IV** 1.Area of the triangle=1/2(base\*height)
- 2. Area of a triangle = (s\*(s-a)(s-b)(s-c))<sup>(1/2)</sup>, where a,b,c are the sides of a triangle & s= ½(a+b+c)
- 3.Area of the equilateral triangle =((3<sup>1/2</sup>)/4)\*(side)<sup>2</sup>





# IMPORTANT FORMULAE

- **V.1.**Area of the parellogram =(base \*height)
- 2.Area of the rhombus= $\frac{1}{2}$ (product of the diagonals)
- 3.Area of the trapezium= $\frac{1}{2}$ (size of parallel sides)\*distance between them.
- **VI** 1.Area of a circle = $\pi r^2$ ,where r is the radius
- 2. Circumference of a circle =  $2\pi R$ .
- 3. Length of an arc =  $\frac{2\pi R\theta}{360}$  where  $\theta$  is the central angle
- 4. Area of a sector =  $(\frac{1}{2}) (\text{arc} \times R) = \frac{\pi R^2 \theta}{360}$ .
- **VII.** 1. Area of a semi-circle =  $(\pi) R^2$ .
- 2. Circumference of a semi-circle =  $(\pi) R$ .
- where,  **$\pi$**  = 3.142



# VOLUME AND SURFACE AREA – IMPORTANT FORMULAE

- **I. CUBOID**

- Let length = l, breadth = b and height = h units. Then,
- **1. Volume** = (l x b x h) cubic.units.
- **2. Surface area** =  $2(lb + bh + lh)$  sq.units.
- **3. Diagonal** =  $\sqrt{l^2 + b^2 + h^2}$  units

- **II. CUBE**

- Let each edge of a cube be of length a. Then,
- **1. Volume** =  $a^3$  cubic units.
- **2. Surface area** =  $6a^2$  sq. units.
- **3. Diagonal** =  $\sqrt{3} a$  units.

- **III. CYLINDER**

- Let radius of base = r and Height (or length) = h. Then,
- **1. Volume** = ( $\pi r^2 h$ ) cubic units.
- **2. Curved surface area** = ( $2\pi rh$ ). units.
- **3. Total surface area** =  $2\pi r (h+r)$  sq. units



# VOLUME AND SURFACE AREA – IMPORTANT FORMULAE

- **IV. CONE**

- Let radius of base =  $r$  and Height =  $h$ . Then,
- **1. Slant height,  $l = \sqrt{h^2 + r^2}$**
- **2. Volume** =  $(1/3) \pi r^2 h$  cubic units.
- **3. Curved surface area** =  $(\pi rl)$  sq. units.
- **4. Total surface area** =  $(\pi rl + \pi r^2)$  sq. units.

- **V. SPHERE**

- Let the radius of the sphere be  $r$ . Then,
- **1. Volume** =  $(4/3) \pi r^3$  cubic units.
- **2. Surface area** =  $(4 \pi r^2)$  sq. units.

- **VI. HEMISPHERE**

- Let the radius of a hemisphere be  $r$ . Then,
- **1. Volume** =  $(2/3) \pi r^3$  cubic units.
- **2. Curved surface area** =  $(2 \pi r^2)$  sq. units.
- **3. Total surface area** =  $(3 \pi r^2)$  units.



# Surds and Indices

## ○ Rules of Indices: -

- i.  $a^n * a^m = a^{m+n}$
- ii.  $\frac{a^m}{a^n} = a^{m-n}$
- iii.  $(a^n)^m = a^{mn}$
- iv.  $(ab)^n = a^n * b^n$
- v.  $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$
- vi.  $a^0 = 1$  (where  $a \neq 0$ )
- vii.  $a^{-n} = \frac{1}{a^n}$

## ○ Rules of Surds: -

- i.  $\sqrt[n]{a} = a^{\frac{1}{n}}$
- ii.  $\sqrt[n]{ab} = a^{\frac{1}{n}} * b^{\frac{1}{n}}$
- iii.  $\sqrt[n]{\frac{a}{b}} = \frac{a^{\frac{1}{n}}}{b^{\frac{1}{n}}}$
- iv.  $\left(\sqrt[n]{a}\right)^n = a$
- v.  $\left(\sqrt[n]{a}\right)^m = a^{\frac{m}{n}}$



