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# GENERAL APTITUDE

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# Interest

If P = Principal, R = Rate of interest, N = Time in years, I = Interest, A = Amount

Then  **$A = P + I$**

## Simple Interest

$$\text{S.I.} = (P \times R \times N) / 100$$

Basic principal remains constant.

S.I. is good example of AP(Arithmetic Progression)

## Compound Interest

$$A = P (1 + R/100)^T$$

T = periods of compounding,

$$\text{C.I.} = A - P$$

R = rate for compounding period

Basic principal keeps on increasing as we get interest on interest.

C.I. is good example of GP(Geometric Progression)



# Interest

Q. What is the difference between the simple interest on a principal of Rs. 500 being calculated at 5% per annum for 3 years and 4% per annum for 4 years?

A.Rs. 5      B.Rs. 10      C.Rs. 20      D.Rs. 40      E. None of these

$$\begin{aligned} SI_1 &= P N_1 R_1 / 100 \\ &= \frac{500 \times 3 \times 5}{100} = \text{Rs. } 75 \end{aligned}$$

$$\begin{aligned} SI_2 &= P N_2 R_2 / 100 \\ &= \frac{500 \times 4 \times 4}{100} = \text{Rs. } 80 \end{aligned}$$

$$\text{Difference} = 80 - 75 = \text{Rs. } 5$$

**OR**

$$\begin{aligned} 500 &\Rightarrow 15\% \uparrow \Rightarrow 575 \text{ (1<sup>st</sup> case)} \\ 500 &\Rightarrow 16\% \uparrow \Rightarrow 580 \text{ (2<sup>nd</sup> case)} \\ \text{difference} &= 580 - 575 = \text{Rs. } 5 \end{aligned}$$

**Ans : A**



# Interest

Q. A man borrowed total Rs 2500 at Simple interest from two money lenders. He paid interest at 12% p.a. to one and 14% p.a. to the other. The total interest paid for the year was Rs.326. How much did he borrow at 14%?

A. Rs 1000

B. Rs 1200

C. Rs 1300

D. Rs 1500

**Soln:**

Let,  $x$  = Principal at 12%

&

$2500-x$  = Principal at 14%

$$\text{SI at Rs. } x = \frac{x \times 1 \times 12}{100} = \frac{12x}{100} = \frac{3x}{25}$$

$$\text{SI at Rs. } 2500 - x = \frac{2500 - x \times 1 \times 14}{100} = \frac{(2500 - x) \times 7}{50} = \frac{17500x - 7x}{50}$$

$$\text{SI at } x + \text{SI at } 2500 - x = 326$$

Substitute and solving the equation gives  $x = \text{Rs. } 1200$

We need Principal at  $2500 - x = 2500 - 1200 = \text{Rs. } 1300$

**Ans: C**



# Interest

Q. A sum of money placed at simple interest doubles itself in 8 years. Find the rate of interest

A. 8% p.a.

B. 10% p.a.

C. 15% p.a.

D. 12.5% p.a.

**Soln:**

Amount = Principal + Simple interest

Amount = 2P

$A = P + I$

$I = A - P$

$I = 2P - P = P$ , N=8 yrs

$I = (P \times R \times N) / 100$

$P = (P \times R \times 8) / 100$

$R = 100 / 8 = 12.5\%$

**Ans: D**



# Interest

Q. P =Rs. 2000, R =10%, N =2yrs , Find A and CI

**Soln:**

$$\begin{aligned}A &= 2000\left(1 + \frac{10}{100}\right)^2 \\&= 2000\left(\frac{110}{100}\right)^2 \\&= 2000\left(\frac{121}{100}\right) \\&= \text{Rs. } 2420\end{aligned}$$

$$\text{CI} = 2420 - 2000 = \text{Rs. } 420$$

$$2000 \xrightarrow{10\%} 2200 \xrightarrow{10\%} 2420$$

$$2000 \xrightarrow{10\%} 2200 \xrightarrow{10\%} 2420$$

$$\text{CI} = 2420 - 2000 = 420$$



# Interest

Q. P =Rs. 4000, R =20% per annum, N =6months.Find CI computed quarterly for given period.

Soln:

N =6months(2 quarterly)

rate(R) = 20 % per annum = 5 % quarterly

After every 3 months CI will be calculated.

	by <u>5%=200</u>		by <u>5%=210</u>	
4000		4200		4410

$$\begin{aligned} I &= 4410 - 4000 \\ &= \text{Rs. } 410 \end{aligned}$$



# Interest

Q. A sum of money placed at compound interest doubles in 7 years. In how many years the principal becomes-

- a. 4 times of itself
- b. 8 times of itself

Soln:

Let initial value be 100



- a. In 14yrs
- b. In 21 yrs

**OR**

100----->200 in 7 years  
200----->400 in again 7 years then,  
400----->800 in 7 years again, thus  
the time becomes= 7+7+7= 21 years.





# Interest

Q. Difference between Compound interest & simple interest on a sum placed at 8% p.a. compounded annually for 2 years is Rs 128. Find the Principal

- A. 20000
- B. 24000
- C. 26000
- D. 15000

- **Soln:**

- Let the principal be  $P = \text{Rs. } 100$ .
- time  $N = 2$  years, rate of interest  $R = 8\%$  per annum
- simple interest =  $\frac{PNR}{100} = \frac{100 \times 8 \times 2}{100} = \text{Rs. } 16$

- CI (for 2 years)

- 8%      8%
- $100 \xrightarrow{\quad} 108 \xrightarrow{\quad} 116.64$

- |     |       |       |      |
|-----|-------|-------|------|
|     | 16.64 |       |      |
| P   | SI    | CI    | Diff |
| 100 | 16    | 16.64 | 0.64 |

- $0.64 \rightarrow 100$

- $128 \rightarrow ?$

- $\frac{12800}{0.64} = \text{Rs. } 20000$



# Interest

Q. Difference between Compound interest & simple interest on a sum placed at 8% p.a. compounded annually for 2 years is Rs 128. Find the principal

- A. 20000                      B. 24000                      C. 26000                      D. 15000

- **Soln:**
- Let the principal be  $P = \text{Rs. } 100$ .
- time  $N = 2$  years, rate of interest  $R = 8\%$  per annum
- simple interest =  $\frac{PNR}{100} = \frac{100 \times 8 \times 2}{100} = \text{Rs. } 16$
- compound amount =  $P(1 + \frac{R}{100})^N$
- $= 100 \times (1 + \frac{8}{100})^2 = 100 \times (\frac{108}{100})^2 = 100 \times (\frac{11664}{10000}) = \frac{11664}{100} = 116.64$
- compound interest = compound amount – principal
- $C.I = A - P$   
 $= 116.64 - 100 = \text{Rs. } 16.64$
- the difference between the compound interest and simple interest =  $16.64 - 16.00 = \text{Rs. } 0.64$
- $0.64 \rightarrow 100$
- $128 \rightarrow ?$
- $= \frac{128 \times 100}{0.64} = 20000$
- Thus, the principal is Rs. 20000.

# Interest

- If the difference between compound and simple interest is of **two years** than,  
**Difference =  $P(R)^2/(100)^2$**   
Where P = principal amount, R = rate of interest
- If the difference between compound and simple interest is of **three years** than,  
**Difference =  $3 \times P(R)^2/(100)^2 + P (R/100)^3$ .**  
Here also, P = principal amount, R = rate of interest



# Interest

Q.A started business with Rs. 45,000 and B joined afterwards with 30,000. If the profit at the end of a year was divided in the ratio 2 : 1 respectively, then B would have joined A for business after.

A. 1 month

B. 2 months

C. 3 months

D. 4 months

**Soln:**

- Capital of A = Rs. 45,000

Capital of B = Rs. 30,000

- Ratio of P1:P2=2:1

- using formula,

- $$\frac{C_1 T_1}{C_2 T_2} = \frac{P_1}{P_2}$$

- In this type , the time period is 12 months i.e. one year

- $$\frac{45000 \times 12}{30000 \times T_2} = \frac{2}{1}$$

- T2=9

- B would join business after (12 - 9) = 3 months

- Ans: C**



# Interest(Assignment)

Q. A started a business by investing Rs. 32000. After 2 months B joined him with some investments. At the end of the year the total profit was divided in the ratio 8:5. How much capital was invested by B?

A. Rs. 30,000      B. Rs. 28000      C. Rs. 24000      D. Rs. 19000

- Soln:
- using formula,
- $\frac{C_1 T_1}{C_2 T_2} = \frac{P_1}{P_2}$
- $\frac{32000 \times 12}{C_2 \times 10} = \frac{8}{5}$
- $C_2 = \text{Rs. } 24000$

**Ans: C**



# Interest(Assignment)

Q. When annual compounding is done, a sum amounts to Rs 5000 in 6 years and 7200 in 8 years.  
What is the int rate?

- A. 10%                      B. 15%                      C. 20%                      D. 25%

## Soln

Let P be the principal & R the int rate

$$\rightarrow 5000 = P(1+R/100)^6 \dots\dots(1)$$

$$\rightarrow 7200 = P(1+R/100)^8 \dots\dots(2)$$

$$\rightarrow 36/25 = (1+R/100)^2$$

$\rightarrow$  Taking square roots of both sides

$$\rightarrow 1+R/100 = 6/5$$

$$\rightarrow R/100 = 1/5$$

$$\rightarrow R = 20\%$$

**Ans: C**



# Interest(Assignment)

Q. A sum fetched a total simple interest of Rs.7056 at the rate of 8 percent per year in 7 years. What is the sum?

A. Rs 12600

B) Rs 15120

C) Rs 10080

D) Rs 7560

**Ans : A**



# Interest(Assignment)

Q. A sum of money placed at compound interest doubles itself in 4 years. In how many years will it amount to 8 times?

- A. 9 years                      B. 8 years                      C. 27 years                      D. 12 years

**Ans: D**





# Interest(Assignment)

Q. Difference between Compound interest & simple interest on a sum placed at 20% per annum compounded annually for 2 years is Rs. 72. Find the sum.

- A. Rs. 2400      B. Rs. 8400      C. Rs. 1800      D. Rs. 900

**Ans : C**



# Interest(Assignment)

Q. What is the simple interest on a sum of Rs. 700 if the rate of interest for the first 3 years is 8% per annum and for the last 2 years is 7.5% per annum?

A.Rs. 269.5   B.Rs. 283   C.Rs. 273   D.Rs. 280   E. None of these

**Ans: C**



# Interest(Assignment)

Q. Rs.2100 is lent at compound interest of 5% per annum for 2 years. Find the amount after two years.

- A.Rs. 2300      B.Rs. 2315.25      C.Rs. 2310      D.Rs. 2320      E. None of these

• **Soln:**

- $A = P ( 1 + R/100 )^T$

- $A = 2100(1+5/100)^2$

- $A = 2100 \times [105/100]^2$

- $A = \frac{2100 \times 11025}{10000}$

- Amount, A=Rs.2315.25

- **Ans : B**



# Interest(Assignment)

Q.A certain sum of money amounts to Rs. 704 in two years and Rs 800 in 5 years. Find the Principal.

- A. Rs. 640      B. Rs. 600      C. Rs. 550      D. Rs.450

• **Ans: A**



# Interest(Assignment)

Q. A started a business by investing Rs. 32000. After 4 months B joined him with some investments. At the end of the year the total profit was divided in the ratio 6:5. How much capital was invested by B?

A. Rs. 30,000

B. Rs. 28000


C. Rs. 40000

D. Rs. 19000

**Ans: C**



# 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**”.
- 01/01/001 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 ← 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





# Calendar

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



# Calendar

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



# Calendar

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

**Soln:**

Completed till 1946

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

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,

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

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

For date ,

$$\frac{15}{7} = 1 \text{ (remainder)}$$



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

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)

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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

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

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

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

- 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 5th 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. 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**





