



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

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

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,

$$C.I. = A - P$$

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. A shopkeeper with an OD facility at 18% with a bank borrowed Rs. 15000 on Jan 8, 2011 and returned the money on June 3, 2011 so as to clear the debt. The amount that he paid was -

- A. Rs. 16080 B. Rs. 16280 C. Rs. 16400 D. None of these

Soln:

- $P = 15000$, $r = 18\%$,
- $T = 23(\text{jan}) + 28(\text{feb Nonleap}) + 31(\text{march}) + 30(\text{April}) + 31(\text{may}) + 3(\text{june}) = 146$ days
- $146/365$ days = $2/5$ years.
- $SI = 15000 \times 18 \times 2/5 \times 1/100 = 30 \times 18 \times 2 = 1080$

Amount = $P + SI$

$$= 15000 + 1080$$

$$= \text{Rs. } 16080$$

Ans: A



Interest

Q. A sum of money at simple interest amounts to Rs. 815 in 3 years and to Rs. 854 in 4 years. The sum is:

A. Rs. 650

B. Rs. 690

C. Rs. 698

D. Rs. 700

Soln:-

amount after 4 years = amount after 3 years + simple interest in one year

S.I. in one year = Rs. $(854 - 815) = \text{Rs. } 39$.

S.I. for 3 years = Rs. $(39 \times 3) = \text{Rs. } 117$.

Principal = amount - interest

Principal = $815 - 117$
= Rs. 698.

Ans: C



Interest

Q. A farmer borrowed Rs.3600 at 15% simple interest per annum. At the end of 4 years, he cleared this account by paying Rs.4000 and a donkey. The cost of the donkey is -

A. Rs. 1000

B. Rs. 1200

C. Rs. 1550

D. Rs. 1760

Soln:

SI for 4 years = Rs. $(3600 \times 0.15 \times 4) = \text{Rs. } 2160$

Amount after 4 years = Rs. $(3600 + 2160) = \text{Rs. } 5760$

Cost of donkey = Rs. $(5760 - 4000) = \text{Rs. } 1760$

Ans: D



Interest

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

Soln:

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

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

$$2000 \rightarrow 10\% = 200$$

$$10\% \quad 10\%$$

$$2000 \longrightarrow 2200 \longrightarrow 2420$$

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



Interest

Q. Simple interest on a certain sum of money for 3 years at 8% per annum is half the compound interest on Rs. 4000 for 2 years at 10% per annum. The sum placed on simple interest is:

A. Rs. 1550

B. Rs. 1650

C. Rs. 1750

D. Rs. 2000

Soln:

$$A = P \left(1 + \frac{R}{100} \right)^N = 4000 \left(1 + \frac{10}{100} \right)^2 = 4000 \times \left(\frac{11}{10} \right)^2 = 4000 \times \frac{11}{10} \times \frac{11}{10} = \text{Rs. } 4840$$

OR

$$\begin{array}{ccccc} 4000 & \xrightarrow[1^{\text{st}} \text{ yr}]{10\%} & 4400 & \xrightarrow[2^{\text{nd}} \text{ yr}]{10\%} & 4840 \end{array}$$

$$CI = A - P$$

$$CI = 4840 - 4000 = \text{Rs. } 840$$

Ans: C

$$SI = \frac{1}{2} CI$$

$$\frac{PNR}{100} = \frac{1}{2} \times 840$$

$$\frac{P \times 3 \times 8}{100} = 420$$

$$\begin{aligned} P(\text{sum}) &= \frac{420 \times 100}{3 \times 8} \\ &= \text{Rs. } 1750 \end{aligned}$$



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. 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)

- $\begin{array}{ccc} & 8\% & 8\% \\ 100 & \xrightarrow{\quad} & 108 \xrightarrow{\quad} & 116.64 \end{array}$

	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



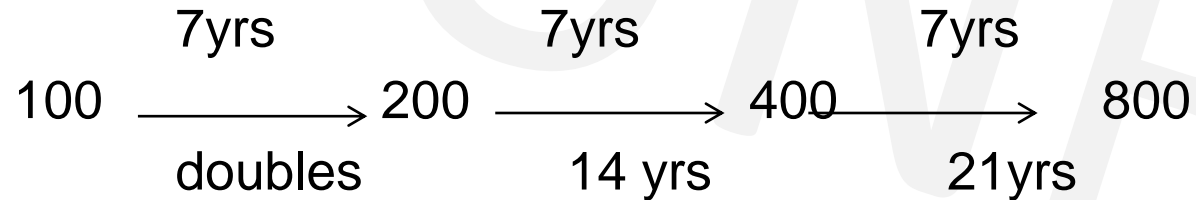
Interest(Assignment)

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(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. Find the compound interest on Rs. 15,625 for 9 months at 16% per annum compounded quarterly.

A. Rs. 1851

B. Rs. 1941

C. Rs. 1951

D. Rs. 1961

Ans: C



Interest(Assignment)

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

$$500 \Rightarrow 15\% \uparrow \Rightarrow 575 \text{ (1st case)}$$

$$500 \Rightarrow 16\% \uparrow \Rightarrow 580 \text{ (2nd case)}$$

$$\text{difference} = 580 - 575 = \text{Rs. } 5$$

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 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%

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

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

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

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

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

Ans: C



Interest(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. What should be the simple interest obtained on an amount of Rs 5,760 at the rate of 6% p.a. after 3 years?

- A. Rs 1036.80
- B. Rs 1666.80
- C. Rs 1336.80
- D. Rs 1063.80
- E. None of these

Ans : A



Interest(Assignment)

Q. The simple interest on Rs.1820 from March 9, 2012 to May 21, 2012 at 7.5% rate will be

- A. Rs. 22.50
- B. Rs. 27.30
- C. Rs. 28.80
- D. Rs. 29

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)² =1/2(diagonal)²
- **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 = $(s*(s-a)(s-b)(s-c))^{1/2}$, where a,b,c are the sides of a triangle & $s= \frac{1}{2}(a+b+c)$
- 3.Area of the equilateral triangle = $((3^{1/2})/4)*(side)^2$



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 = πr^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 θ is the central angle
- 4. Area of a sector = $\frac{1}{2}$ (arc x R) = $\frac{\pi R^2 \theta}{360}$.
- **VII.** 1. Area of a semi-circle = $\frac{\pi R^2}{2}$.
- 2. Circumference of a semi-circle = πR .
- where, **π** = 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** = (πrl) 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. $\left(\sqrt[n]{a}\right)^m = a^{\frac{m}{n}}$



Races

Races

- A contest of speed in running, riding, driving, sailing or rowing is called a race.
- If in a race Ram is at starting point & Shyam starts from 20 mts ahead, then it is said that Ram has given Shyam a start of 20 mts or Ram gives Shyam 20 mts.
- This means that if they start from same point Ram would beat Shyam by 20 mts.



Races

Q. In a 100 mt race A gives B a start of 25 mt & still wins by 9 sec. Find the speed of A if speed of B is 6 kmph.

A. 8 kmph

B. 9 kmph

C. 10 kmph

D. 12 kmph

Soln

!-----100 m-----!
A<---25--->B<-----75m-----> A=t-9, B=t

$$S_b = 6 \text{ kmph} = 6 \times \frac{5}{18} = \frac{5}{3} \text{ m/s}$$

$$T_b = D_b / S_b = 75 / (\frac{5}{3}) = 45 \text{ sec}$$

$$T_a = T_b - 9 = 36 \text{ sec}$$

$$\begin{aligned} S_a &= D_a / T_a \\ &= 100 / 36 \text{ m/s} \\ &= 100 / 36 \times \frac{18}{5} \\ &= 10 \text{ kmph} \end{aligned}$$

Ans C



Races(Assignment)

Q. In a 100 m race, A can beat B by 25 m and B can beat C by 4 m. In the same race, A can beat C by:

A. 21 m

B. 26 m

C. 28 m

D. 29 m

• **Soln:-**

$$A : B = 100 : 75$$

$$B : C = 100 : 96$$

$$A:C=(\frac{A}{B}\times\frac{B}{C})=(\frac{100}{75}\times\frac{100}{96})=100:72$$

A beats C by $(100-72)=28$ m.

Ans: C



Circular Motion

- Use of both relative speed & LCM
- Let S_a, S_b = speeds of two persons.

S_r = Their relative speed

Distance traveled in 1 round = circumference

Case A : Both running in Same direction

Both meet again first time when \rightarrow **Time = dist/ S_r = Circumference/ $S_a - S_b$**

Case B : Both running in opposite directions(**DistA+ DistB =Circumference**)

Both meet first time when \rightarrow **Time = Circumference/ $S_a + S_b$**

Case C : Both running in same/opposite directions

Both meet again at starting point at LCM of their Lap times.



Circular Motion(Races)

Q. Two friends P & Q start from same point at the same time on a circular track 336 meters long in opposite directions at 6 m/s & 8 m/s respectively. After how much time will they meet again at the starting point for the first time?

A. 56 sec

B. 112 sec

C. 168 sec

D. 214 sec

Ans : C

Step1 – find the time taken by each member /player to complete 1 round

Step2 – Calculate LCM(Lap time)

$$\text{LapTm(P)} = \frac{\text{Circumference}}{S_p} = \frac{336}{6} = 56 \text{ sec}$$

$$\text{LapTm(Q)} = \frac{\text{Circumference}}{S_Q} = \frac{336}{8} = 42 \text{ sec}$$

$$\text{LCM}(42,56) = 168 \text{ sec}$$



Circular Motion(Assignment)

Q. A, B & C start together running along a circular track of 500 m at 8 km/hr, 5 km/hr & 3 km/hr respectively. After how much time will all three meet again at the starting point for the first time?

A. 20 min

B. 24 min

C. 30 min

D. 36 min

Ans: C



