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|---------------------------|----------------------|------------------------|----------------|
| Name of the Bundle | PROFICIENT BUNDLE V2 | Subject | APTITUDE |
| Topic | COMPOUND INTEREST | Last updated on | 19January 2024 |

1)A sum of 3000 is invested at 20% p.a compound interest(compounded annually).What is the compound interest for two years?

- a)1360 b)1200 c)1320 d)1440

Ans: c)1320

Ratio Method

P=3000

R%=20%

T=2

CI=?

CI= P*(1+rt)/100)ⁿ

Step 1: Write R% into fraction.

$$\text{Rate}\% = 20/100 = \frac{1}{5} \rightarrow \frac{\text{Compound Interest}}{\text{Principal}}$$

| | | | |
|----------------------------|-----------|----------------------|------|
| P | C A(P+CI) | P | CI |
| 5 | 6 | 25 | 11 |
| 5 | 6 | 3000 | 1320 |
| 25 36 | | Multiplying (6*6=36) | |

Difference =11. (C.I=C.A-P)



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2) If the compound interest on a certain sum of money for 2 years at 5% p.a is Rs.328, then the sum is_____

- a)3600 b)3500 c)3000 d)3,200

Ans: d)3,200

Ratio Method

P=?

R%=5%

T=2

CI=328

$$CI = P \cdot (1+r/100)^n$$

Step 1: Write R% into fraction.

$$\text{Rate}\% = 5/100 = \frac{1}{20} \longrightarrow \frac{\text{Compound Interest}}{\text{Principal}}$$

| | | | |
|-----|-----------|--|-----|
| P | C A(P+CI) | p | CI |
| 20 | 21 | 400 | 41 |
| 20 | 21 | 3200 | 328 |
| 400 | 441 | | |

Difference =41.



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3) A certain sum invested on compound interest (compounded annually) grows to 5040 in three years. If the rate of interest is 20% for the first year, 40% for the second year and 50% for the third year, then what is the sum?

- a)1210 b)2566 c)1800 d)2000

Ans: d) 2000

Ratio Method

P=?

R%=20% → For 1st year

R%=40% → For 2nd year

R%=50% → For 3rd year

T=3 Yrs

C.A=5040

CI= $P \cdot (1+r)/100)^n$

Step 1: Write R% into fraction.

Rate%=20/100= $\frac{1}{5}$ → $\frac{\text{Compound Interest}}{\text{Principal}}$

Rate%=40/100= $\frac{2}{5}$ → $\frac{\text{Compound Interest}}{\text{Principal}}$

Rate%=50/100= $\frac{1}{2}$ → $\frac{\text{Compound Interest}}{\text{Principal}}$



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| | | | |
|-------|-----------|-------------|------|
| P | C A(P+CI) | p | CA |
| 5 | 6 | 50 | 126 |
| 5 | 7 | 2000 | 5040 |
| 2 | 3 | | |
| <hr/> | | | |
| 50 | 126 | | |

4) What will be the compound interest for 3 years on Rs.5120 at the rate of 12.5% (Compounded annually)?

- a)2280 b)1960 c)2120 d)2170

Ans: d) 2170

Ratio Method

P=5120 R%=12.5% T=3 CI=?

$$CI = P \cdot \left(1 + \frac{r}{100}\right)^n$$

Step 1: Write R% into fraction.

$$\text{Rate}\% = \frac{12.5}{100} = \frac{1}{8} \longrightarrow \frac{\text{Compound Interest}}{\text{Principal}}$$

| | | | |
|-------|-----------|------|-------------|
| P | C A(P+CI) | p | CI |
| 8 | 9 | 512 | 217 |
| 8 | 9 | 5120 | 2170 |
| 8 | 9 | | |
| <hr/> | | | |
| 512 | 729 | | |

Difference = 217.



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5)The compound interest on a sum of RS.20,000 at 15% p.a for 2 2/3 year, interest compounded annually.

- a)9098 b)9095 c)8896 d)9000

Ans: b)9095

Solution:

P=20,000

R%=15% p.a For 1styear T=2 2/3Yrs

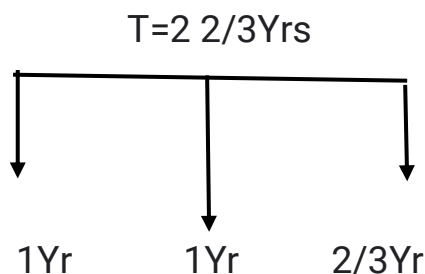
CI= P*(1+r)/100) ⁿ

Step 1: Write R% into fraction.

$$\text{Rate}\% = 15/100 = \frac{3}{20} \begin{matrix} \longrightarrow & \text{Compound Interest} \\ \longrightarrow & \text{Principal} \end{matrix}$$

$$\text{Rate}\% = 15/100 = \frac{3}{20} \begin{matrix} \longrightarrow & \text{Compound Interest} \\ \longrightarrow & \text{Principal} \end{matrix}$$

$$\text{Rate}\% = 10/100 = \frac{1}{20} \begin{matrix} \longrightarrow & \text{Compound Interest} \\ \longrightarrow & \text{Principal} \end{matrix}$$



Rate calculation for 2/3 years.

| Yr | R% |
|-----|----|
| 1 | 15 |
| 2/3 | 10 |

10%

R=15% R=15% **R=10%**



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| | | | |
|----|-----------|-------|-------------|
| P | C A(P+CI) | p | CI |
| 20 | 23 | 4000 | 1819 |
| 20 | 23 | 20000 | 9095 |
| 10 | 11 | | |

4000 5819

Difference =1819. (C.I=C.A-P)

6)A sum of Rs.1200 is invested at compound interest(Compounded half yearly).If the rate of interest is 10% p.a ,then what will be the amount after 18 months.

- a)1389.15 b)1563.25 c)1185.45 d)1295.35

Ans: a)1389.15

Solution:

P=1200 R=10%

T=18 months

R=10%

T=18 months

R% Months

Compounded Half Yearly

10 12

So, 18/6 =3

R=5%

6

Now **T=3**



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Ratio Method

$$\text{Rate}\% = 5/100 = \frac{1 \rightarrow \text{Compound Interest}}{20 \rightarrow \text{Principal}}$$

| | | | |
|-----------------|-----------------|------|----------------|
| P | C A(P+CI) | p | CA |
| 20 ³ | 21 ³ | 8000 | 9261 |
| 8000 | 9261 | 1200 | 1389.15 |

7) The compound interest on a sum of Rs.5500 at 15%p.a for 2 years, When the interest compounded 8 monthly is_____.

- a)1880 b)1820.50 c)1773.75 d)1850

Ans: b)1820.50

Solution:

P=5500

R=15%

T=2 Yrs = 24 months

CI=? Compounded 8 monthly

R=10%

T=24 months

R%

Months

Compounded 8 monthly

15

12

So, 24/8 =3

R=10%

8

Now **T=3**

$$\text{Rate}\% = 10/100 = \frac{1 \rightarrow \text{Compound Interest}}{10 \rightarrow \text{Principal}}$$



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| | | | |
|-----------------|-----------------|------|----------------|
| P | C A(P+CI) | p | CI |
| 10 ³ | 11 ³ | 1000 | 331 |
| 1000 | 1331 | 5500 | 1820.50 |

8) What is the compound interest on a sum of Rs.4096 at Rs.15% p.a for 21/2 years. If the interest is compounded 10 monthly.

- a)1726 b)1736 c)1636 d)1763

Ans: b)1736

Solution:

P=4096 R=15%

T=2 1/2Yrs = 30 months

CI=? Compounded 10 monthly

R=10%

T=30 months

R% Months

Compounded 10 monthly

15 12

So, 30/10 =3

R=12.5% 10

Now **T=3**

$$\text{Rate}\% = 12.5/100 = \frac{125}{1000} = \frac{1}{8} \rightarrow \frac{\text{Compound Interest}}{\text{Principal}}$$

| | | | |
|----------------|----------------|------|-------------|
| P | C A(P+CI) | p | CI |
| 8 ³ | 9 ³ | 512 | 217 |
| 512 | 729 | 4096 | 1736 |



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SUCCESSIVE PERCENTAGE INCREASE METHOD

Example:

$$P=1000 \quad R=3\% \quad T=2 \quad CI=?$$

For 2 Years

Let the successive increase in % be a% and b%. In that case, the total increase will be $(a + b + (ab)/100)\%$

For 2 years, The rate of interest increases successively by 3%.

$$(3 + 3 + (3 * 3)/100) = 6.09\%$$

| For T=2 years | 1 ST Yr | 2 nd Yr | (%increase) R% |
|---------------|--------------------|--------------------|----------------|
| R=2% | 2% | 2% | 4.04 |
| R=3% | 3% | 3% | 6.09 |
| R=4% | 4% | 4% | 16.16 |
| R=7% | 7% | 7% | 14.49 |
| R=9% | 9% | 9% | 18.81 |
| R=11% | 11% | 11% | 23.21 |
| R=13% | 13% | 13% | 27.69 |

Hint: If R=8% T=2 Yrs , Then % increase in R

$$8 \times 2 = 16 ; 8 \times 8 = 64 \quad R = 16.64\%$$

$$R = 14\% \quad T = 2 \text{ Yrs, Then \% increase in R } 14 \times 2 = 28; 14^2 = 196$$

$$\text{Adding } 28 + 1.96 = 29.96\%$$



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9)The compound interest for two years at 12% p.a is Rs.477.What is the principal amount?

- a)1875 b)2000 c)1500 d)1650

Ans: a)1875

Solution:

P=?

R=12%

T=2Yrs

CI =477

Let the successive increase in % be a% and b%.In that case,the total increase will be $(a + b + (ab)/100)%$

For 2 years, The rate of interest increases successively by 3%.

$$(12 + 12 + (12 * 12)/100) = 25.44%$$

$$\text{Rate}\% = 25.44/100 = \frac{2544}{10000} = \frac{\text{Compound Interest}}{\text{Principal}}$$

| | |
|-------------|------|
| p | CI |
| 10000 | 2544 |
| 1875 | 477 |



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10)The compound interest on a certain sum of money at 11% for 2 years is 6963.It's simple interest (in Rs) at the same rate and for the same period is

- a)6500 **b)6600** c)6750 d)6000

Ans: b)6600

Solution:

P=? SI=?

R=11%

T=2Yrs

CI =6963

Hint: If R=11% T=2 Yrs ,Then % increase in R 11x2=22 ; 11x11=121
R=23.21%

$$\text{Rate}\% = 23.21/100 = \frac{2321}{10000} = \frac{\text{Compound Interest}}{\text{Principal}}$$

| | |
|--------------|------|
| p | CI |
| 10000 | 2321 |
| 30000 | 6963 |

P=30000 R=11% T=2Yrs. SI=? SI=PRT/100 ;(30000*11*2)/100=**6600**



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11) Ram deposited an amount of 1000 in a bank's savings account with interest 6% compounded monthly. What amount of interest will he get at the end of 24 months?

- a)123.6 b)788.98 c)246.12 d)807.56

Ans: a)123.6

Solution:

P=1000 SI=?

R=6%

T=2Yrs

CA=?

Hint: If R=6% T=2 Yrs ,Then % increase in R 6x2=12 ; 6x6=36
R=12.36%

$$\text{Rate}\% = \frac{12.36}{100} = \frac{\text{Compound Interest}}{\text{Principal}}$$

| | |
|------|--------------|
| p | CI |
| 100 | 12.36 |
| 1000 | 123.6 |



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12)The compound interest on a certain sum of money at 21% for 2 years is Rs.11602.5.It's simple interest in Rs at the same rate and for the same period is

- a)10500 b)10750 c)16000 d)12500

Ans: a)10500

Solution:

P=? SI=?

R=21%

T=2Yrs

CI=11602.5

Hint: If R=21% T=2 Yrs ,Then % increase in R $21 \times 2 = 42$; $21 \times 21 = 441$
R=46.41%

$$\text{Rate}\% = 46.41/100 = \frac{4641}{10000} = \frac{\text{Compound Interest}}{\text{Principal}}$$

| | |
|---|----|
| p | CI |
|---|----|

| | |
|-------|------|
| 10000 | 4641 |
|-------|------|

| | |
|--------------|---------|
| 25000 | 11602.5 |
|--------------|---------|

P=25000 R=21% T=2Yrs. **SI=PRT/100 ;(25000*21*2)/100=10500**



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13) A woman invests Rs.2000 at the start of each year at 5% compound interest per annum. How much will her investment be at the end of the 2nd year?

- a)4305 b)4355 c)430 d)4305

Ans: a) 4305

Solution:

For the first Year Woman invests

P=2000 R=5% T=1Yrs CA=?

$$\text{Rate}\% = 5/100 = \frac{1}{20} = \frac{\text{Compound Interest}}{\text{Principal}}$$

| | |
|------|---|
| p | CA |
| 20 | 21 |
| 2000 | 2100 CA for 1 st year |

For the second year Woman invests 2100+2000, Now Principal =4100

P=4100 R=5% T=1Yrs

$$\text{Rate}\% = 5/100 = \frac{1}{20} = \frac{\text{Compound Interest}}{\text{Principal}}$$

| | |
|------|---|
| p | CA |
| 20 | 21 |
| 4100 | 4305 CA for 2 nd year |



| | | | |
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14) A woman invests Rs.100 at the start of each year at 5% compound interest per annum. How much will her investment be at the end of the 2nd year?

- a)215.25 b)215.5 c)215 d)215.75

Ans: a)215.25

Solution:

For the first Year Woman invests

P=100 R=5% T=1Yrs CA=?

$$\text{Rate}\% = 5/100 = \frac{1}{20} = \begin{matrix} \longrightarrow & \text{Compound Interest} \\ \longrightarrow & \text{Principal} \end{matrix}$$

p CA

20 21

100 **105** CA for 1st year

For the second year Woman invests 105+100, Now Principal =205

P=205

R=5%

T=1Yrs

$$\text{Rate}\% = 5/100 = \frac{1}{20} = \begin{matrix} \longrightarrow & \text{Compound Interest} \\ \longrightarrow & \text{Principal} \end{matrix}$$

p CA

20 21

205 **215.25** CA for 2nd year



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15) Mr. Ram borrowed Rs.8500 at 4% p.a compound interest. The compound interest compounded annually for 2 years is

- a)693.6 b)639.6 c)9139.6 d)9193.6

Ans: a)693.6

Solution:

P=8500

R=4%

T=2Yrs

CI=?

Step 1: Write R% into fraction.

$$\text{Rate}\% = 4/100 = \frac{1}{25} \longrightarrow \frac{\text{Compound Interest}}{\text{Principal}}$$

| | | | |
|-----|-----------|------|-------|
| P | C A(P+CI) | p | CI |
| 25 | 26 | 625 | 51 |
| 25 | 26 | 8500 | 693.6 |
| 625 | 676 | | |

Difference = 51. (C.I=C.A-P)



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16) There is a 40% increase in an amount in 4 years at simple interest. What will be the compound interest on Rs.6000 after 3 years at the same rate?

- a)1260 b)1986 c)19860 d)7986

Ans: b)1986

Solution:

P=6000

R=?

| | |
|----|---|
| Yr | R |
|----|---|

In S.I T=4Yrs A= 40% increase

| | |
|---|----|
| 4 | 40 |
|---|----|

SI=(PRT)/100; R is directly proportional to SI.

| | |
|---|------------|
| 1 | 10% |
|---|------------|

R=10% For 1 year,

CI=? P=6000 R=10% T=3 Yrs

Step 1: Write R% into fraction.

Rate%=10/100= $\frac{1}{10}$ $\frac{\text{Compound Interest}}{\text{Principal}}$

| | | | |
|----|-----------|------|-----|
| P | C A(P+CI) | p | CA |
| 10 | 11 | 1000 | 331 |

| | | | |
|----|----|------|-------------|
| 10 | 11 | 6000 | 1986 |
|----|----|------|-------------|

| | |
|------|------|
| 1000 | 1331 |
|------|------|

Difference =331. (C.I=C.A-P)



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17) A sum of Rs.2100 is to be paid back in 2 equal instalments. How much is each instalment if the interest is compounded annually at 10%p.a?

- a)1210 b)1240 c)1230 d)1220

Ans: a)1210

Solution:

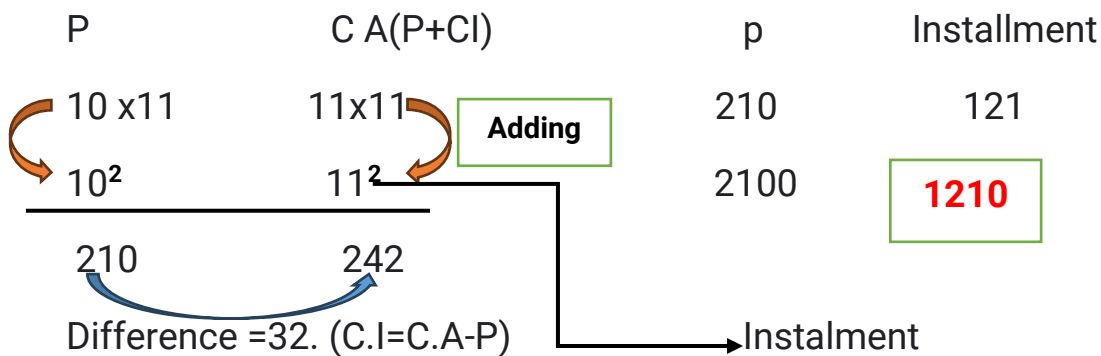
$P=6000$

$R=10\%$

No.of.installments=2

Step 1: Write R% into fraction.

Rate%=10/100= $\frac{1}{10}$ $\frac{\text{Compound Interest}}{\text{Principal}}$





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18) A loan of Rs.8925 is to be paid back in two equal half yearly instalments. How much is each if the interest is compounded half yearly at 8% per annum?

- a) 4372 b) 4654 c) 4654 d) 4732

Ans: d) 4732

Solution:

P=8925 R=8%

No. of installments=2 CI=? Compounded half yearly R=10%

R% Months

8 12

R=4%

6

Rate%=4/100= $\frac{1}{25}$ $\frac{\text{Compound Interest}}{\text{Principal}}$

P C A(P+CI) p Installment

26 x 25

26 x 26

Adding

1275

676

25²

26²

8925

4732

1275

1352

Difference = 77. (C.I=C.A-P) Instalment



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19) A sum of Rs.45500 is to be paid back in 3 equal annual instalments. How much is each instalment if the interest is compounded annually at 20% per annum.

- a) 21600 b) 21700 c) 21800 d) 21900

Ans: a) 21600

Solution:

$P=45500$ $R=20\%$

No. of installments = 3

$R=20\%$ $\text{Rate}\% = 20/100 = \frac{1}{5}$ $\frac{\text{Compound Interest}}{\text{Principal}}$

| P | C A(P+CI) | p | Installment |
|---|--|---|---|
| $\begin{array}{r} 5 \times 6^2 \\ 5^2 \times 6 \\ 5^3 \end{array}$ | $\begin{array}{r} 6 \times 6^2 \\ 6^2 \times 6 \\ 6^3 \end{array}$ | $\begin{array}{r} 455 \\ 45500 \end{array}$ | $\begin{array}{r} 216 \\ \boxed{21600} \end{array}$ |
| <div style="border: 1px solid green; padding: 2px; display: inline-block;">Adding</div> | | | |
| <hr style="width: 50%; margin-left: 0;"/> $\begin{array}{r} 455 \quad 648 \end{array}$ | | | |
| <p>Difference = 193. (C.I = C.A - P)</p> | | | <p>Instalment</p> |



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20) A sum of Rs.25520 is to be paid back in 3 equal annual instalments. How much is each instalment if the interest is compounded annually at 5% per annum.

- a) 9361 b) 9261 c) 9621 d) 9216

Ans: b) 9261

Solution:

P=25220

R=5%

No.of.installments=3

R=5% Rate%=5/100= $\frac{1}{20}$ $\frac{\text{Compound Interest}}{\text{Principal}}$

P C A(P+CI) p Installment

| | | | | |
|--------------------------------|------------------|---------------|------------|-------------|
| 20×21^2 | 21×21^2 | Adding | 25520 | 9261 |
| $20^2 \times 21$ | $21^2 \times 21$ | | 25520 | 9261 |
| 20^3 | 21^3 | | 25520 | 9261 |
| 25520 | | 27783 | | |
| Difference = 2263. (C.I=C.A-P) | | | Instalment | |



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21) A man borrowed Rs.9000 at the rate of interest 10%p.a compound interest. At the end of every year he returned Rs.3000. At the end of 3rd year how much money should he paid so that the whole sum be paid

- a) 5049 b) 5050 c) 5070 d) 5060

Ans: a) 5049

Solution

$P=9000$ $R=10\%$

T=1 Yr For 1st Yr

| | | | | |
|----|---|---------|----|-------------|
| P | C | A(P+CI) | p | CI |
| 10 | | 11 | 10 | 11 |
| | | 9000 | | 9900 |

9900-3000 Returned every year. So Now $P=6900$

T=1 Yr For 2nd Yr

| | | | | |
|----|---|---------|----|-------------|
| P | C | A(P+CI) | p | CI |
| 10 | | 11 | 10 | 11 |
| | | 6900 | | 7590 |

7590-3000 Returned every year. So Now $P=4590$

T=1 Yr For 3rd Yr

| | | | | |
|----|---|---------|----|-------------|
| P | C | A(P+CI) | p | CI |
| 10 | | 11 | 10 | 11 |
| | | 4590 | | 5049 |



| | | | |
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22) The difference between the compound interest and simple interest on Rs. x at 8% per annum for 2 years is Rs 19.20. What is the value of x?

- a) 2500 b) 3200 c)2800 b) d)3000

Ans: d)3000

Formulae

For 2 years =====> Diff = P (R/100)²

For 3 years =====> Diff = P (R/100)² (300+R/100)

For 2 years====> **Diff = P (R/100)²**

$$19.20 = x (8/100)^2$$

$$x=3000$$

23) The difference between the compound interest and simple interest on a sum at 10% per annum for 3 years is Rs 155. The sum is _____.

- a) 5500 b) 6000 c)6600 b) d)5000

Ans: d)5000

Solution

For 3 years =====> Diff = P (R/100)² (300+R/100)

$$155 = P (10/100)^2 (300+10/100)$$

$$= P (10x10/100x100) (310/100)$$

$$1550000 = P310$$

$$P = 5000$$



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24) The difference between the compound interest and simple interest on Rs. x at 6.5% per annum for 2 years is Rs 33.80. What is the value of x?

- a) 7800 b) 7500 c) 8000 d) 8500

Ans: C) 8000

For 2 years ==> **Diff = P (R/100)²**

$$33.80 = X (6.5/100)^2$$

$$3380 = X (65/10)^2$$

$$338000 = X(65 \times 65)$$

$$X = 8000$$

25) A sum invested at compound interest (Compounded annually) amounts to Rs,750 at the end of the first year and Rs,900 at the end of second year. What is the sum?

- a) 700 b) 625 c) 600 d) 650

Ans: b) 625



Taking ratio **5** **6** **625** 750

$$\text{Diff} = 900 - 750 = 150$$

$$R = (150/750) \times 100 = \mathbf{20\%}$$

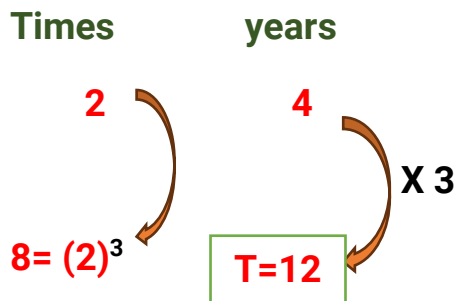


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26) A sum doubles in 4 years at a certain rate of Compound interest. In how many years does it amount to 8 times itself at the same rate?

- a) 9 years b) 12 years c) 15 years d) 6 years

Ans: b) 12





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Basic Explanation

Logic

Example1: The ratio of $P : A$ $T=2\text{Yrs}$ $R=?$

$100 : 144$

$R=?$

Taking square root $\sqrt{100} : \sqrt{144}$

$10 : 12$

CI P

2 10

$R=20\%$ 100

Example2: The ratio of $P : A$ $T=2\text{Yrs}$ $R=?$

$100 : 169$

$R=?$

Taking square root $\sqrt{100} : \sqrt{169}$

$10 : 13$

CI P

3 10

$R=30\%$ 100



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Example3: The ratio of P : A T=3Yrs R=?
1000 : 1331

R=?

Taking **cube** root $\sqrt[3]{1000} : \sqrt[3]{1331}$

10 : 11

CI P

1 10

R=10% 100

27) At what rate of interest per annum, a sum of Rs,6000 will become Rs,7986 in 3 years, if the interest is compounded annually?

- a) 10% b) 8% c) 12.5% d) 11%

Ans: a) 10%

P=6000 C.A=7986 T=3Yrs r=?

P : A

6000 7986

1000 1331

Taking **cube** root $\sqrt[3]{1000} : \sqrt[3]{1331}$

CI P

1 10

R=10% 100

$$C.A = P(1+R/100)^n$$

$$C.A \propto r$$

$$C.A = P + C.I$$

$$C.A \propto C.I$$

$$r \propto P$$