

TRUE DISCOUNT

If a person paid 160 Rs after 4 years, rate of interest is 15 % per year.

Rs 100 at 15% will give Rs 160. In 4 years. So, the payment of Rs. now will clear off the debt of Rs. 156 due 4 years hence. We say that:

Sum due = Rs. 160 due 4 years

Present worth (P.W.) = Rs. 100;

True Discount (T.D.) = Rs. (160 - 100) = Rs. 60 = Sum due - Present worth

TRUE DISCOUNT (T.D.) = Interest on P.W.; Amount = Present worth + True Discount

Interest	On Present worth	Amount = Present worth + True Discount
true discount	On amount	True Discount (T.D.) = Sum due - Present worth

Let rate =R% per annum and time=T years then,

1. Present worth = $100 \times \text{Amount} / 100 + (R * T) = 100 * \text{T.D.} / 100 + (R * T)$

2. T.D. = p.w. * R * T / 100 = Amount * R * T / 100 + (R * T)

3. Sum = $(S.I * T.D.) / (S.I. - T.D.)$

4. S.I. - T.D = S.I. on T.D.

5. When the sum is put at compound interest, Present worth = $\text{Amount} / [1 + R / 100]^T$

Problems with solutions

1. The true discount on Rs. 2562 due 4 months hence is Rs. 122. The rate percent is:

Solution

P.W. = Rs. (2562 - 122) = Rs. 2440.

S.I. on Rs. 2440 for 4 months is Rs. 122.

$$\text{Rate} = \left[\frac{100 \times 122}{2440 \times \frac{1}{3}} \right] \% = 15\%.$$

2. A man wants to sell his scooter. There are two offers, one at Rs. 12,000 cash and the other a credit of Rs. 12,880 to be paid after 8 months, money being at 18% per annum. Which is the better offer?

Solution

P.W. of Rs. 12,880 due 8 months hence = Rs. $\left[\frac{12880 \times 100}{100 + \left(18 \times \frac{8}{12} \right)} \right]$

$$= \text{Rs.} \left(\frac{12880 \times 100}{112} \right)$$

$$= \text{Rs.} 11500.$$

3. If Rs. 10 be allowed as true discount on a bill of Rs. 110 due at the end of a certain time, then the discount allowed on the same sum due at the end of double the time is:

Solution

S.I. on Rs. (110 - 10) for a certain time = Rs. 10.

S.I. on Rs. 100 for double the time = Rs. 20.

T.D. on Rs. 120 = Rs. (120 - 100) = Rs. 20.

T.D. on Rs. 110 = Rs. $\left(\frac{20}{120} \times 110 \right) = \text{Rs.} 18.33$

4. The true discount on a bill due 9 months hence at 16% per annum is Rs. 189. The amount of the bill is:

Solution

Let P.W. be Rs. x.

Then, S.I. on Rs. x at 16% for 9 months = Rs. 189.

$$\therefore x \times 16 \times \frac{9}{12} \times \frac{1}{100} = 189 \text{ or } x = 1575.$$

\therefore P.W. = Rs. 1575.

\therefore Sum due = P.W. + T.D. = Rs. (1575 + 189) = Rs. 1764.

5. The true discount on Rs. 1760 due after a certain time at 12% per annum is Rs. 160. The time after which it is due

Solution

P.W. = Rs. (1760 - 160) = Rs. 1600.

S.I. on Rs. 1600 at 12% is Rs. 160.

$$\text{Time} = \left(\frac{100 \times 160}{1600 \times 12} \right) = \frac{5}{6} \text{ years} = \left(\frac{5}{6} \times 12 \right) \text{Months} = 10 \text{ months.}$$