1. The simple interest on a sum of money is the product of the sum of money, the number of years and the rate percentage. Write the formula to find the simple interest on Rs A for T years at R% per annum.

Solution:

Let the simple interest = I

Now,

Simple interest on sum of money = product of sum of money, number of years and rate percentage = $(A \times I \times R) / 100$

As per the data: $I = (A \times I \times R) / 100$

Therefore,

The required formula is,

$I = (A \times I \times R) / 100$

2. The volume V, of a cone is equal to one third of π times the cube of the radius. Find a formula for it.

Solution:

Let radius = r

Hence,

Cube of radius = r^3

One third of π times the cube of the radius = $(1 / 3)\ \pi r^3$

As per the data: $V = (1 / 3)\ \pi r^3$

Therefore,

The required formula is,

$V = (1 / 3)\ \pi r^3$

3. The Fahrenheit temperature, F is 32 more than nine-fifths of the centigrade temperature C. Express this relation by a formula.

Solution:

Centigrade temperature = C

Nine – fifths of the centigrade temperature = $(9 / 5)\ C$

32 more than nine – fifths of the centigrade temperature C = $(9 / 5)\ C + 32$

As per the data: $F = (9 / 5)\ C + 32$

Therefore,

The required formula is,

$F = (9 / 5)\ C + 32$

4. The arithmetic mean M of the five numbers a, b, c, d, e is equal to their sum divided by the number of quantities. Express it as a formula.

Solution:

Sum of a, b, c, d, e = (a + b + c + d + e)
Number of quantities = 5
Sum divided by the number of quantities = (a + b + c + d + e) / 5
As per the data: M = (a + b + c + d + e) / 5
Therefore,
The required formula is,
M = (a + b + c + d + e) / 5

5. Make a formula for the statement: "The reciprocal of focal length f is equal to the sum of reciprocals of the object distance u and the image distance v".
Solution:
Object distance = u
Image distance = v
Reciprocal of Object distance = (1 / u)
Reciprocal of Image distance = (1 / v)
Sum of reciprocals = (1 / u) + (1 / v)
Reciprocal of focal length = (1 / f)
As per the data: (1 / f) = (1 / u) + (1 / v)
Therefore,
The required formula for the given statement is,
(1 / f) = (1 / u) + (1 / v)

6. Make R the subject of formula $A = P\{1 + (R / 100)\}^N$
Solution:
$A = P\{1 + (R / 100)\}^N$
$(A / P) = \{1 + (R / 100)\}^N$
Taking N^{th} root both sides,
We get,
$(A / P)^{1/N} = \{1 + (R / 100)\}$
$(A / P)^{1/N} - 1 = (R / 100)$
On calculating further, we get,
$100\{(A / P)^{1/N} - 1\} = R$
Hence,
$$R = 100\left(\sqrt[N]{(AP)} - 1\right)$$

7. Make L the subject of formula T = 2π √ (L / G)
Solution:
Given
T = 2π √ (L / G)

$(T / 2\pi) = \sqrt{(L / G)}$
Squaring on both sides,
We get,
$(T / 2\pi)^2 = (L / G)$
$G (T / 2\pi)^2 = L$
We get,
$L = (GT^2 / 4\pi^2)$

8. Make a the subject of formula $S = ut + (1 / 2) at^2$
Solution:
Given
$S = ut + (1 / 2) at^2$
On further calculation, we get,
$S - ut = (1 / 2) at^2$
$2 (S - ut) = at^2$
$\{2 (S - ut)\} / t^2 = a$
Therefore,
$a = \{2 (S - ut)\} / t^2$

9. Make x the subject of formula $(x^2 / a^2) + (y^2 / b^2) = 1$
Solution:
Given
$(x^2 / a^2) + (y^2 / b^2) = 1$
On calculating further, we get,
$(x^2 / a^2) = 1 - (y^2 / b^2)$
$x^2 = a^2 \{1 - (y^2 / b^2)\}$
On taking L.C.M. we get,
$x^2 = a^2 \{(b^2 - y^2) / b^2\}$
Now,
Taking square root both sides, we get,
$x = \{\sqrt{a^2 (b^2 - y^2) / b^2}\}$
Hence,
$x = (a / b) \{\sqrt{(b^2 - y^2)}\}$

10. Make a the subject of formula $S = \{a (r^n - 1)\} / (r - 1)$
Solution:
Given
$S = \{a (r^n - 1)\} / (r - 1)$
On further calculation, we get,

$S(r - 1) = a(r^n - 1)$
$\{S(r - 1)\} / (r^n - 1) = a$
Therefore,
$a = \{S(r - 1)\} / (r^n - 1)$

11. Make h the subject of the formula R = (h / 2) (a – b). Find h when R = 108, a = 16 and b = 12.
Solution:
Given
$R = (h / 2)(a - b)$
On calculating further, we get,
$2R = h(a - b)$
$h = 2R / (a - b)$
Now,
Substituting R = 108, a = 16 and b = 12,
We get,
$h = (2 \times 108) / (16 - 12)$
$h = (2 \times 108) / 4$
We get,
$h = 54$

12. Make s the subject of the formula $v^2 = u^2 + 2as$. Find s when u = 3, a = 2 and v = 5.
Solution:
Given
$v^2 = u^2 + 2as$
$v^2 - u^2 = 2as$
$s = (v^2 - u^2) / 2a$
Now,
Substituting u = 3, a = 2 and v = 5,
We get,
$s = (5^2 - 3^2) / (2 \times 2)$
$s = (25 - 9) / 4$
$s = 16 / 4$
We get,
$s = 4$

13. Make y the subject of the formula $x = (1 - y^2) / (1 + y^2)$. Find y if x = (3 / 5)
Solution:

Given
$x = (1 - y^2) / (1 + y^2)$
On further calculation, we get,
$x (1 + y^2) = 1 - y^2$
$x + xy^2 = 1 - y^2$
$xy^2 + y^2 = 1 - x$
Taking y^2 as common, we get,
$y^2 (x + 1) = 1 - x$
$y^2 = (1 - x) / (1 + x)$
$\mathbf{y} = \sqrt{(1 - x) / (1 + x)}$
Now,
Substituting $x = (3 / 5)$, we get,
$y = [\sqrt{\{1 - (3 / 5)\} / \{1 + (3 / 5)\}}]$
$y = \sqrt{(2 / 8)}$
$y = \sqrt{(1 / 4)}$
We get,
$y = (1 / 2)$

14. Make a the subject of the formula S = (n / 2) {2a + (n – 1) d}. Find a when S = 50, n = 10 and d = 2.
Solution:
Given
$S = (n / 2) \{2a + (n - 1) d\}$
On further calculation, we get,
$2S = n \{2a + (n - 1) d\}$
$(2S / n) = 2a + (n - 1) d$
$(2S / n) - (n - 1) d = 2a$
We get,
$a = (S / n) - \{(n - 1) d / 2\}$
Now,
Substituting S = 50, n = 10 and d = 2,
We get,
$a = (S / n) - \{(n - 1) d / 2\}$
$a = (50 / 10) - \{(9 \times 2) / 2\}$
$a = 5 - 9$
We get,
$a = - 4$

15. Make x the subject of the formula a = 1 – {(2b) / (cx – b)}. Find x, when a = 5, b

=12 and c = 2

Solution:

Given

$a = 1 - \{(2b) / (cx - b)\}$

On further calculation, we get,

$a - 1 = - \{(2b) / (cx - b)\}$

$(a - 1)(cx - b) + 2b = 0$

$acx - ab - cx + b + 2b = 0$

$acx - ab - cx + 3b = 0$

$acx - cx + 3b - ab = 0$

$x(ac - c) + b(3 - a) = 0$

$xc(a - 1) = - b(3 - a)$

$x = \{b(a - 3)\} / \{c(a - 1)\}$

Now,

Substituting $a = 5$, $b = 12$ and $c = 2$,

We get,

$x = \{12(5 - 3)\} / \{2(5 - 1)\}$

$x = (12 \times 2) / (2 \times 4)$

We get,

$x = 24 / 8$

$x = 3$