Class – IX	Topic – Expansion

Section A (2 marks)

Using the standard formulae, expand each of the following

1. $(\sqrt{2}m + \sqrt{3}m)^2$
2. $\left(2x + \frac{1}{3x}\right)^2$
3. $\left(\frac{2}{5}x + \frac{5}{6}y\right)^2$
4. $\left(\frac{1}{2}x - \frac{3}{2}y\right)^2$

Section B (3 marks)

Simplify:

5. $\left(x + \frac{1}{x}\right)^2 + \left(x - \frac{1}{x}\right)^2$ $\left[2\left(x^2 + \frac{1}{x^2}\right)\right]$
6. $\left(\frac{a}{2b} + \frac{2b}{a}\right)^2 - \left(\frac{2b}{a} - \frac{a}{2b}\right)^2$ [4]
7. $\left(\frac{a}{2b} + \frac{2b}{a}\right)^2 - \left(\frac{a}{2b} - \frac{2b}{a}\right)^2 - 4$ [0]
8. $(5a + 3b)^2 - (5a - 3b)^2 - 60ab$ [0]
9. If $(3a+4b)=16$ and $ab=4$, find the value of $(9a^2 + 16b^2)$ [248]

Change the subject of each of the following to the letter given against them.

10. $S = ut + \frac{1}{2}at^2; a$ $\left[a = \frac{2(s-ut)}{t^2}\right]$

11. $S = \frac{n}{2}[2a + (n-1)d]; d$ $\left[\frac{2(s-an)}{n(n-1)}\right]$

12. $i = \frac{n\,E}{nR + r}; n$ $\left[\frac{ir}{(E + iR)}\right]$

13. $F = \frac{9}{5}C + 32; C$ $\left[\frac{5}{9}(F - 32)\right]$

14. Make g the subject of formula:

$\frac{mv^2}{r} = T + mg$. Hence, find g, if $m = 12, v = 4, r = 2$ and $T = 2.4$ $\left[g = \left(\frac{v^2}{r} - \frac{T}{m}\right)\ \&7.8\right]$

Section D (4 marks)

15. If $x + y = \frac{7}{2}$ and $xy = \frac{5}{2}$; find:

(i) $x - y$ [3/2]

(ii) $x^2 - y^2$ [21/4]

15. If $\frac{2x}{3y} = \frac{3y}{4z}$, show that: $4x^2 + 9y^2 + 16z^2 = (2x - 3y + 4z)(2x + 3y + 4z)$

16. If $(a + 3b) = 6$, show that $a^3 + 27b^3 + 54ab = 216$

17. If $a + 2b + 3c = 0$, show that $a^3 + 8b^3 + 27c^3 = 18abc$

18. Given:

$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$ $\left[u = \left(\frac{fv}{v + f}\right)\right]$

(i) In the above formula, make u the subject.

(ii) Find the value of u when $f = 6$ and $v = 105$. [5.67]

19. Solve:

(i) Make b the subject in the formula, $x = \sqrt{\frac{a-b}{a+b}}$ $\left[\frac{-a(x^2-1)}{x^2+1}\right]$

(ii) Find the value of b when $a = 10$ and $x = \frac{1}{2}$ [6]

20. The total energy E possessed by a body of mass 'm', moving with a velocity 'v' at a height 'h' is given by:

$E = \frac{1}{2}mv^2 + mgh$ $\left[\frac{2E}{(v^2+2gh)}\right]$

(i) Make 'm' the subject of formula.

(ii) Find m, if $v = 3, g = 10, h = 5$ and $E = 109$. [2]

21. Solve:

(i) Make m the subject of the formula, $T = 2\pi\sqrt{\frac{l}{g+k}}$ $\left[\left(\frac{4\pi^2 l}{T^2} - k\right)\right]$

(ii) Find g when $\pi = 3\frac{1}{7}, l = 539, T = 44$ and $k = 1.2$ [9.8]