For class-IX & X formula (S. Kumar)

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Algebraic Identities

1) $(a+b)^2 = a^2+b^2+2ab$
2) $(a-b)^2 = a^2+b^2-2ab$.
3) $a^2-b^2 = (a+b)(a-b)$
4) $(a+b+c)^2 = a^2+b^2+c^2+2(ab+bc+ca)$
5) $(a+b)^3 = a^3+b^3+3ab(a+b)$
6) $(a-b)^3 = a^3-b^3-3ab(a-b)$
7) $a^3+b^3 = (a+b)(a^2-ab+b^2)$
8) $a^3-b^3 = (a-b)(a^2+ab+b^2)$
9) $a^3+b^3+c^3 = 3abc$. When $a+b+c=0$.
10) $a^3+b^3+c^3-3abc = (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$

Laws of rational Exponents

i) $a^m \times a^n = a^{m+n}$
(ii) $a^m \div a^n = a^{m-n}$
(iii) $(a^m)^n = a^{mn}$.
(iv) $a^{-n} = \frac{1}{a^n}$
(v) $a^{m/n} = (a^m)^{1/n} = \left(a^{\frac{1}{n}}\right)^m$ i.e $a^{m/n} = \sqrt[n]{a^m} = \left(\sqrt[n]{a}\right)^m$.
(vi) $(ab)^m = a^m b^m$
(vii) $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$. Where a, b are positive real no. and m, n are rational no.

Class — IX.

1) Simplify : (i) $175 \times 175 + 2 \times 175 \times 25 + 25 \times 25$.

(ii) $\dfrac{7.83 \times 7.83 - 1.17 \times 1.17}{6.66}$

2) If $x^2 + \frac{1}{x^2} = 66$ find the value of $x - \frac{1}{x}$.

3) If $x^2 + \frac{1}{x^2} = 79$ find the value of $x + \frac{1}{x}$.

4) If $9x^2 + 25y^2 = 181$ and $xy = -6$ find the value of $3x + 5y$.

5) Simplify :- (i) $(a+b+c)^2 + (a-b+c)^2$

(ii) $(a+b+c)^2 + (a-b+c)^2 + (a+b-c)^2$

6) If $a^2+b^2+c^2 = 16$ and $ab+bc+ca = 10$ find the value of $(a+b+c)$.

7) ~~Simplify the exponents:~~ Show that :

i) $\left(\dfrac{x^b}{x^c}\right)^a \left(\dfrac{x^c}{x^a}\right)^b \left(\dfrac{x^a}{x^b}\right)^c = 1$.

(ii) $\left(\dfrac{x^a}{x^b}\right)^{1/ab} \left(\dfrac{x^b}{x^c}\right)^{1/bc} \left(\dfrac{x^c}{x^a}\right)^{1/ac} = 1$.

(iii) $\left(\dfrac{x^a}{x^b}\right)^{a^2+ab+b^2} \cdot \left(\dfrac{x^b}{x^c}\right)^{b^2+bc+c^2} \cdot \left(\dfrac{x^c}{x^a}\right)^{c^2+ca+a^2} = 1$.

(iv) $\dfrac{x^{a(b-c)}}{x^{b(a-c)}} \div \left(\dfrac{x^b}{x^a}\right)^c = 1$.

(V) If $a^x = b$, $b^y = c$ and $c^z = a$ Prove that $xyz = 1$.