शक्तिउत्थानआश्रमलखीसरायबिहार

Class :-09(Maths)   Date:- 25.05.2021

5. Factorize:

(i) $4x^2+9y^2+16z^2+12xy-24yz-16xz$

(ii) $2x^2+y^2+8z^2-2\sqrt{2}xy+4\sqrt{2}yz-8xz$

Solution:

(i) $4x^2+9y^2+16z^2+12xy-24yz-16xz$

Using identity, $(x+y+z)^2 = x^2+y^2+z^2+2xy+2yz+2zx$

We can say that, $x^2+y^2+z^2+2xy+2yz+2zx = (x+y+z)^2$

$4x^2+9y^2+16z^2+12xy-24yz-16xz =$
$(2x)^2+(3y)^2+(-4z)^2+(2\times2x\times3y)+(2\times3y\times-4z)+(2\times-4z\times2x)$

$= (2x+3y-4z)^2$

$= (2x+3y-4z)(2x+3y-4z)$

(ii) $2x^2+y^2+8z^2-2\sqrt{2}xy+4\sqrt{2}yz-8xz$

Using identity, $(x +y+z)^2 = x^2+y^2+z^2+2xy+2yz+2zx$

We can say that, $x^2+y^2+z^2+2xy+2yz+2zx = (x+y+z)^2$

$2x^2+y^2+8z^2-2\sqrt{2}xy+4\sqrt{2}yz-8xz$

$= (-\sqrt{2}x)^2+(y)^2+(2\sqrt{2}z)^2+(2\times-\sqrt{2}x\times y)+(2\times y\times2\sqrt{2}z)+(2\times2\sqrt{2}\times-\sqrt{2}x)$

$= (-\sqrt{2}x+y+2\sqrt{2}z)^2$

$= (-\sqrt{2}x+y+2\sqrt{2}z)(-\sqrt{2}x+y+2\sqrt{2}z)$

6. Write the following cubes in expanded form:

(i) $(2x+1)^3$

(ii) $(2a-3b)^3$

(iii) $((3/2)x+1)^3$

(iv) $(x-(2/3)y)^3$

Solution:

(i) (2x+1)³

Using identity, $(x+y)^3 = x^3+y^3+3xy(x+y)$

$(2x+1)^3 = (2x)^3+1^3+(3×2x×1)(2x+1)$

$= 8x^3+1+6x(2x+1)$

$= 8x^3+12x^2+6x+1$

(ii) (2a−3b)³

Using identity, $(x−y)^3 = x^3−y^3−3xy(x−y)$

$(2a−3b)^3 = (2a)^3−(3b)^3−(3×2a×3b)(2a−3b)$

$= 8a^3−27b^3−18ab(2a−3b)$

$= 8a^3−27b^3−36a^2b+54ab^2$

(iii) ((3/2)x+1)³

Using identity, $(x+y)^3 = x^3+y^3+3xy(x+y)$

$((3/2)x+1)^3 = ((3/2)x)^3+1^3+(3×(3/2)x×1)((3/2)x+1)$

$$= \frac{27}{8}x^3+1+\frac{9}{2}x\left(\frac{3}{2}x+1\right)$$

$$= \frac{27}{8}x^3+1+\frac{27}{4}x^2+\frac{9}{2}x$$

$$= \frac{27}{8}x^3+\frac{27}{4}x^2+\frac{9}{2}x+1$$

(iv) (x−(2/3)y)³

Using identity, $(x−y)^3 = x^3−y^3−3xy(x−y)$

$$\left(x-\frac{2}{3}y\right)^3=(x)^3-\left(\frac{2}{3}y\right)^3-\left(3×x×\frac{2}{3}y\right)\left(x-\frac{2}{3}y\right)$$

$$=(x)^3-\frac{8}{27}y^3-2xy\left(x-\frac{2}{3}y\right)$$

$$=(x)^3-\frac{8}{27}y^3-2x^2y+\frac{4}{3}xy^2$$

7. Evaluate the following using suitable identities:

(i) (99)³

(ii) (102)³

(iii) (998)³

Solutions:

(i) (99)³

Solution:

We can write 99 as 100−1

Using identity, $(x-y)^3 = x^3-y^3-3xy(x-y)$

$(99)^3 = (100-1)^3$

$= (100)^3-1^3-(3\times100\times1)(100-1)$

$= 1000000 -1-300(100 - 1)$

$= 1000000-1-30000+300$

$= 970299$

(ii) (102)³

Solution:

We can write 102 as 100+2

Using identity, $(x+y)^3 = x^3+y^3+3xy(x+y)$

$(100+2)^3 = (100)^3+2^3+(3\times100\times2)(100+2)$

$= 1000000 + 8 + 600(100 + 2)$

$= 1000000 + 8 + 60000 + 1200$

$= 1061208$

(iii) (998)³

Solution:

We can write 99 as 1000−2

Using identity, $(x-y)^3 = x^3-y^3-3xy(x-y)$

$(998)^3 = (1000-2)^3$

$= (1000)^3-2^3-(3\times1000\times2)(1000-2)$

$= 1000000000-8-6000(1000- 2)$

$= 1000000000-8- 6000000+12000$

= 994011992