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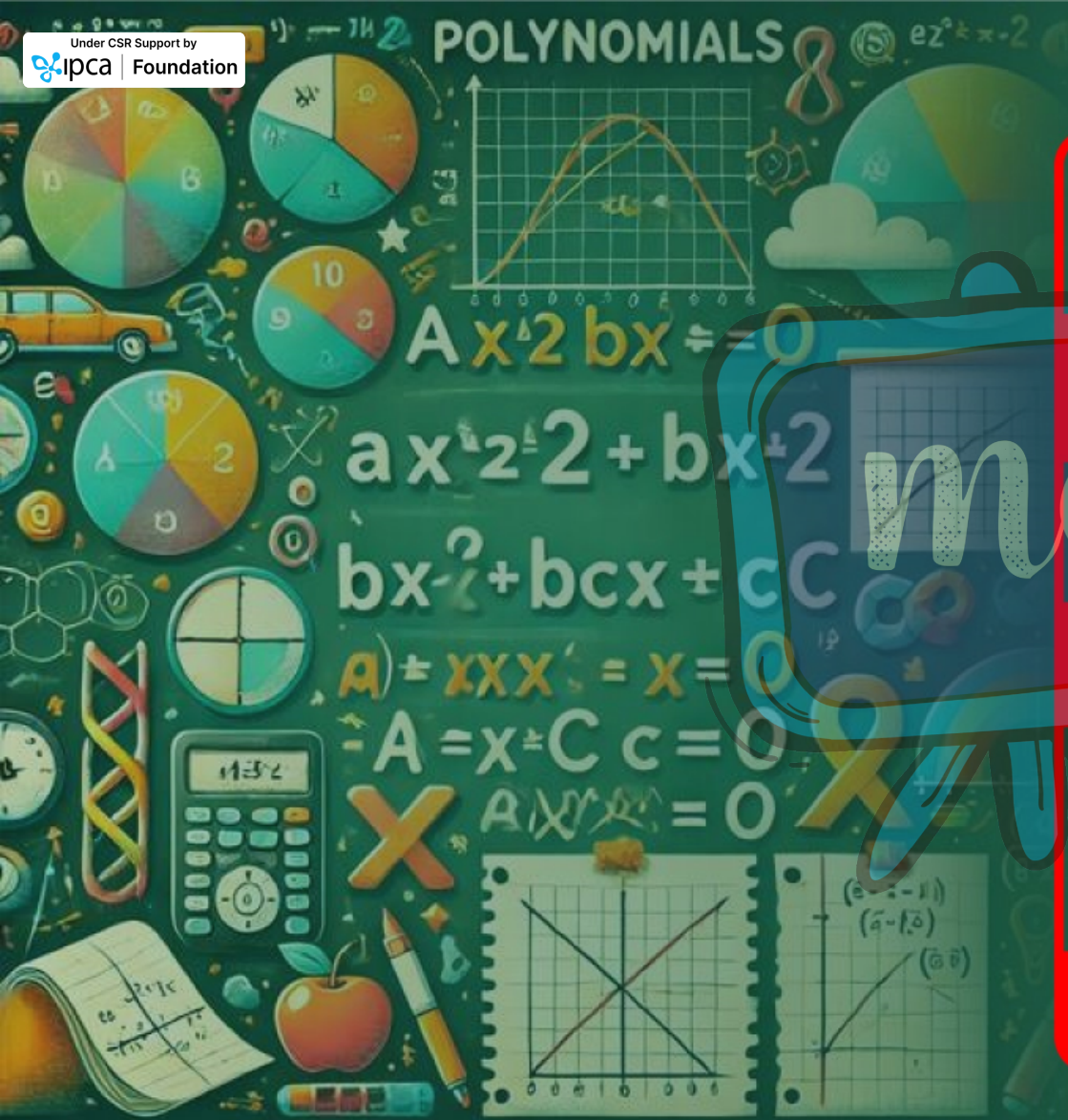

CLASS – 9

MATHS

Chapter - 2

Polynomials

Part – 18

Exercise 2.4 (Question 12–16)

Vikas Saini

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$(a-b)^2 = a^2+b^2-2ab$

12. Verify that

$$x^3+y^3+z^3-3xyz = \frac{1}{2}(x+y+z)\left[(x-y)^2+(y-z)^2+(z-x)^2\right]$$

By taking R.H.S

$$= \frac{1}{2}(x+y+z)\left[(x-y)^2+(y-z)^2+(z-x)^2\right]$$

$$= \frac{1}{2}(x+y+z)\left[x^2+y^2-2xy+y^2+z^2-2yz+z^2+x^2-2xz\right]$$

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$$= \frac{1}{2}(x+y+z)\left[2x^2+2y^2+2z^2-2xy-2yz-2zx\right]$$

$$= \frac{1}{2}(x+y+z)\,2\left[x^2+y^2+z^2-xy-yz-zx\right]$$

$$= \frac{1}{2}\times 2(x+y+z)\left[x^2+y^2+z^2-xy-yz-zx\right]$$

$$= (x+y+z)\left[x^2+y^2+z^2-xy-yz-zx\right]$$

$\therefore a^3+b^3+c^3-3a\times b\times c = (a+b+c)\left(a^2+b^2+c^2-a\times b-b\times c-c\times a\right)$

$= x^3+y^3+z^3-3xyz$

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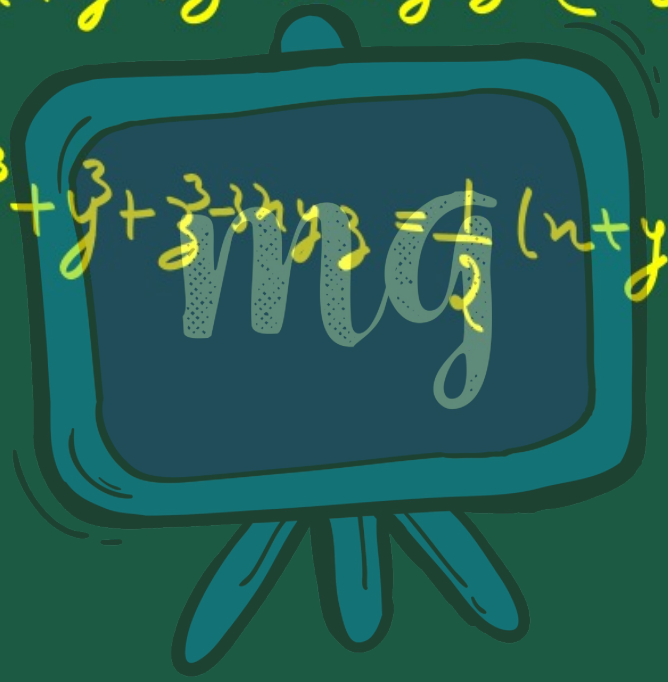
$$x^3+y^3+z^3-3xyz=(x+y+z)\left(x^2+y^2+z^2-xy-yz-zx\right)$$

$$x^3+y^3+z^3-3xyz=\frac{1}{2}(x+y+z)\left((x-y)^2+(y-z)^2+(z-x)^2\right)$$



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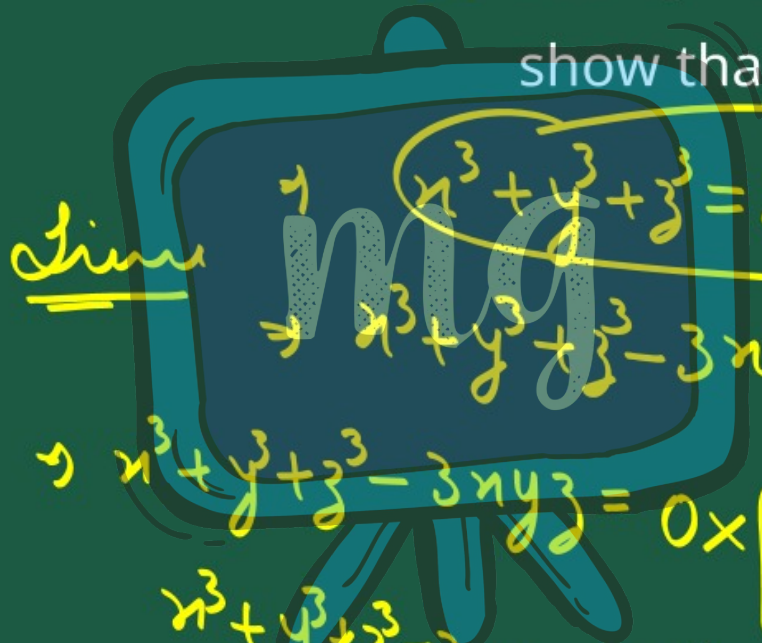
13. If $x + y + z = 0$,

show that $x^3 + y^3 + z^3 = 3xyz$.



Given $x^3+y^3+z^3 = 3xyz$ if $x+y+z=0$

$\Rightarrow x^3+y^3+z^3-3xyz = (x+y+z)$

$\Rightarrow x^3+y^3+z^3-3xyz = 0 \times \left[(x^2+y^2+z^2-xy-yz-zx)\right]$

$x^3+y^3+z^3-3xyz = 0$

$x^3+y^3+z^3 = 0+3xyz = 3xyz$

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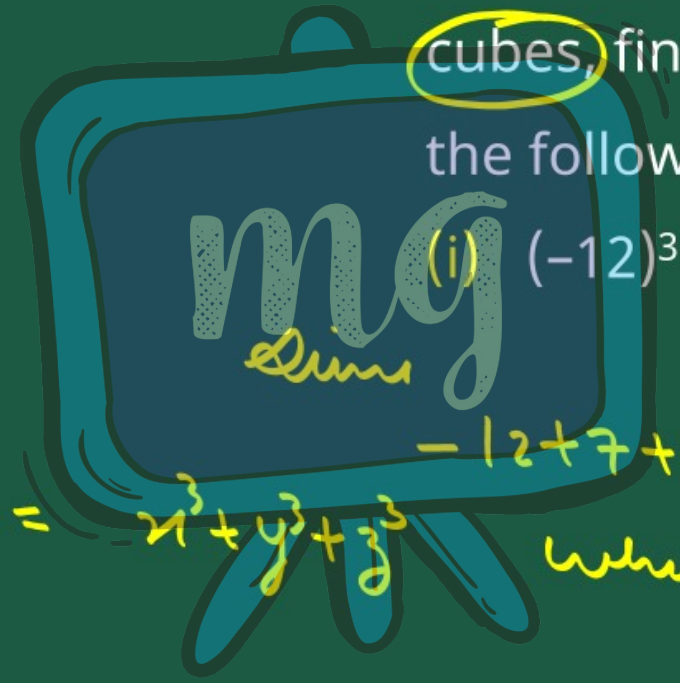
14. Without actually calculating the cubes, find the value of each of the following:

(i) $(-12)^3 + (7)^3 + (5)^3$



Sum $= x^3 + y^3 + z^3$

$-12+7+5=0$

where $x=-12$, $y=7$, $z=5$

$x+y+z=0$

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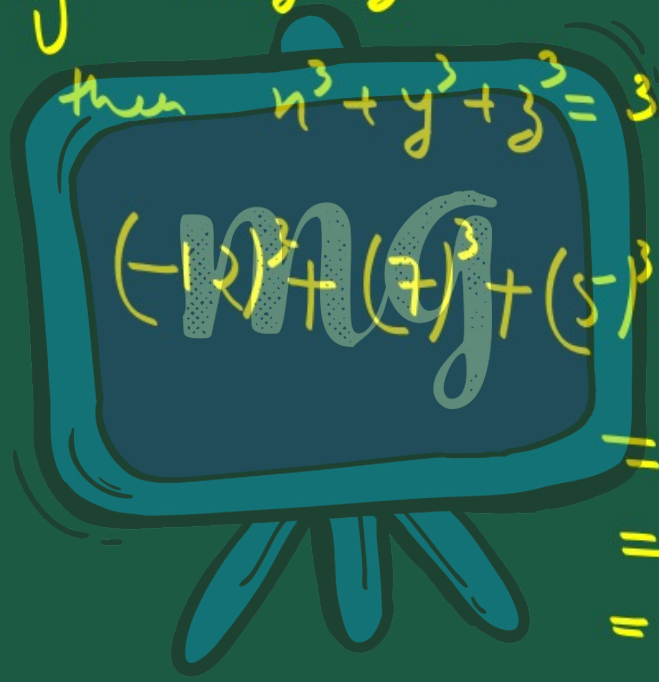

If $x+y+z=0$

then $x^3+y^3+z^3=3\times x\times y\times z$

$(-12)^3+(7)^3+(5)^3=3\times -12\times 7\times 5$

$=3\times -12\times 35$

$=3\times -420$

$=-1260$

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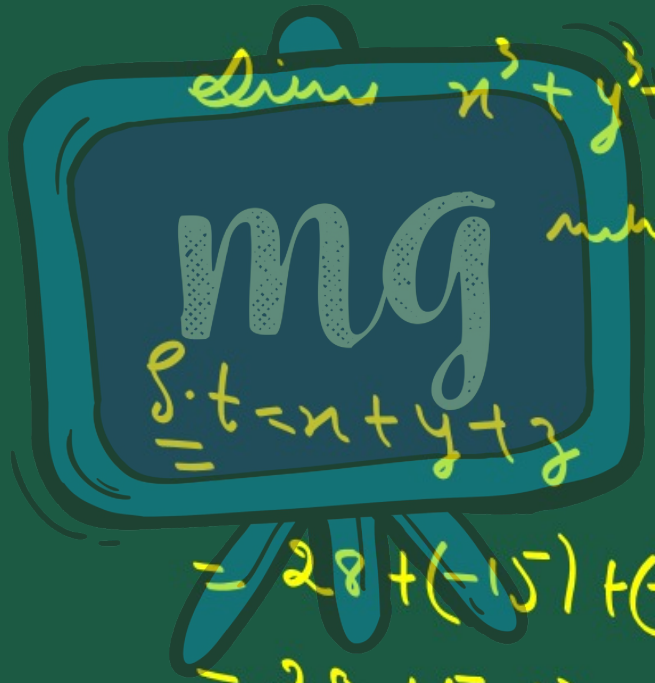
(ii) $(28)^3 + (-15)^3 + (-13)^3$



Given $x^3 + y^3 + z^3$

where $x = 28$

$y = -15$

$z = -13$

S.t $= x + y + z$

$= 28 + (-15) + (-13)$

$= 28 - 15 - 13 = 0$

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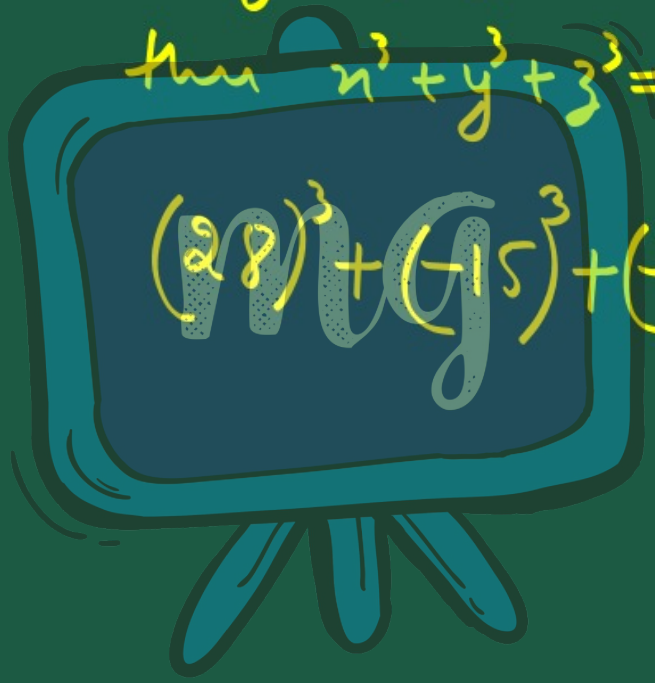
if $x+y+z=0$

then $x^3+y^3+z^3=3xyz$



$(28)^3+(-15)^3+(-13)^3 = 3\times 28\times -15\times -13$

$= 3\times 5460$

$= 16380$

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25×12

$5 \times 5 \times 3 \times 4$

15. Give possible expressions for the length and breadth of each of the following rectangles, in which their areas are given:

(i) Area : $25a^2 - 35a + 12$

Area of Rectangle = length × breadth

= l × b

$= 25a^2 - 35a + 12$

$= 25a^2 - 20a - 15a + 12$

$= 5a(5a - 4) - 3(5a - 4)$

$= (5a - 4)(5a - 3)$

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$21 \times 15 = 35 \times 12$

(ii) Area : $35y^2 + 13y - 12$

$= 35y^2 + 13y - 12$

$= 35y^2 + 28y - 15y - 12$

$= 7y(5y + 4) - 3(5y + 4)$

$= (5y + 4)(7y - 3)$

$l \times b$

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16. What are the possible expressions for the dimensions of the cuboids whose volumes are given below?

(i) Volume : $3x^2 - 12x$

volume of cuboid = $l \times b \times h$

$= 3x^2 - 12x$

$= 3(x^2 - 4x)$

$= 3 \times x \times (x - 4)$

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(ii) Volume : $12ky^2 + 8ky - 20k$



$= 12ky^2 + 8ky - 20k$

$= 4k(3y^2 + 2y - 5)$

$= 4k \times (3y^2 + 5y - 3y - 5)$

$= 4k \times [y(3y+5) - 1(3y+5)]$

$= 4k \times (3y+5) \times (y-1)$