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IX Homework - 6

1) Find the coordinates of the point
   (i) which lies on X and Y-axes both
   (ii) whose ordinate is -4 and which lies on Y-axis
   (iii) whose abscissa is 5 and which lies on X-axis

2) The points (other than origin) for which abscissa is equal to the ordinate will lie in
   (a) I quadrant only (b) I and II quadrants
   (c) I and III quadrants (d) II and IV quadrants

3) Without plotting the points, indicate the quadrant in which they will lie, if
   (i) ordinate is 5 and abscissa is -3
   (ii) abscissa is -5 and ordinate is -3
   (iii) abscissa is -5 and ordinate is 3
   (iv) ordinate is 5 and abscissa is 3

4) In which quadrant or on which axis each of the following points lie?
   $(-3, 5)$, $(4, -1)$, $(2, 0)$, $(2, 2)$, $(-3, -6)$

5) Simplify: $(2x - 5y)^3 - (2x + 5y)^3$

6) Multiply using proper identity:-
   $(x^2 + 4y^2 + z^2 + 2xy + xz - 2yz)$ by $(-z + x - 2y)$

7) If a, b, c are non-zero and $a+b+c=0$, then prove that $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab} =$

8) If $a+b+c = 5$ and $ab+bc+ca = 10$, then prove that
   $a^3 + b^3 + c^3 - 3abc = -25$

9) If $x+y = 12$ and $xy = 27$, find the value of $x^3 + y^3$

10) Without actually calculating the cubes, find $(0.2)^3 - (0.3)^3 + (0.1)^3$

11) Factorise: $2\sqrt{2}a^3 + 8b^3 - 27c^3 + 18\sqrt{2}abc$

12) Factorise: (i) $1 + 64x^3$ (ii) $a^3 - 2\sqrt{2}b^3$

13) Find the product using identity:-
   (i) $\left(\frac{x}{2} + 2y\right)\left(\frac{x^2}{4} - xy + 4y^2\right)$ (ii) $(x^2 - 1)(x^4 + x^2 + 1)$

14) If $a+b+c = 9$ and $ab+bc+ca = 26$, find $a^2 + b^2 + c^2$

15) Evaluate using identity: $(999)^2$.

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IX H.W-6 (Answers)

1) (i) (0,0)
(ii) (0,-4)
(iii) (5,0)

2) I and III quadrants (c)

3) (i) (-3,5) ⇒ II quadrant
(ii) (-5,-3) ⇒ III quadrant
(iii) (-5,3) ⇒ II quadrant
(iv) (3,5) ⇒ I quadrant

4) (-3,5) ⇒ II quadrant
(4,-1) ⇒ IV quadrant
(2,0) ⇒ x-axis
(2,2) ⇒ I quadrant
(-3,-6) ⇒ III quadrant

5) $(2x-5y)^3-(2x+5y)^3$

$a^3-b^3=(a-b)^3+3ab(a-b)$; $a=2x-5y$, $b=2x+5y$

$=(2x-5y-2x-5y)^3+3(2x-5y)(2x+5y)(2x-5y-2x-5y)$

$=(-10y)^3+3(4x^2-25y^2)x-10y$

$=-1000y^3-30y(4x^2-25y^2)$

$=-1000y^3-120x^2y+750y^3$

$=-250y^3-120x^2y$

6) $(a+b+c)(a^2+b^2+c^2-ab-bc-ca)=a^3+b^3+c^3-3abc$

$(x-2y-z)(x^2+(-2y)^2+(-z)^2-x(-2y)-(-2y)(-z)-(-z)x)$

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

$=x^3-8y^3-z^3-6xyz$

7) If $a+b+c=0$, then $a^3+b^3+c^3=3abc$

LHS, $\frac{a^2}{bc}\times\frac{a}{a}+\frac{b^2}{ca}\times\frac{b}{b}+\frac{c^2}{ab}\times\frac{c}{c}=\frac{a^3+b^3+c^3}{abc}=\frac{3abc}{abc}=3$, RHS

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8) $(a+b+c)^2 = a^2+b^2+c^2+2(ab+bc+ca)$

$(5)^2 = a^2+b^2+c^2+2\times10$

$\therefore a^2+b^2+c^2 = 25-20 = 5 \longrightarrow (1)$

$a^3+b^3+c^3-3abc = (a+b+c)[a^2+b^2+c^2-(ab+bc+ca)]$

$\Rightarrow a^3+b^3+c^3-3abc = 5[5-10]$

$= 5\times-5$

$= -25$

9) $x^3+y^3 = (x+y)^3-3xy(x+y)$

$= (12)^3-3\times27\times12$

$= 1728-972 = 756$

10) If $a+b+c=0$, then $a^3+b^3+c^3 = 3abc$

checking :- $0.2-0.3+0.1 = -0.1+0.1 = 0$

$\therefore (0.2)^3+(-0.3)^3+(0.1)^3 = 3\times0.2\times-0.3\times0.1$

$= -0.018$

11) $a^3+b^3+c^3-3abc = (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$

$2\sqrt{2}a^3+8b^3-27c^3+18\sqrt{2}abc$

$= (\sqrt{2}a)^3+(2b)^3+(-3c)^3-3\times\sqrt{2}a\times2b\times-3c$

$= (\sqrt{2}a+2b-3c)(2a^2+4b^2+9c^2-2\sqrt{2}ab+6bc+3\sqrt{2}ac)$

12) (i) $1+64x^3 = (1)^3+(4x)^3$

$a^3+b^3 = (a+b)(a^2-ab+b^2)$

$= (1+4x)(1-4x+16x^2)$

(ii) $a^3-2\sqrt{2}b^3 = (a)^3-(\sqrt{2}b)^3$

$a^3-b^3 = (a-b)(a^2+ab+b^2)$

$= (a-\sqrt{2}b)(a^2+2b^2+\sqrt{2}ab)$

13) (i) $(a+b)(a^2-ab+b^2) = a^3+b^3$

$\left(\frac{x}{2}+2y\right)\left(\left(\frac{x}{2}\right)^2-\frac{x}{2}\times2y+(2y)^2\right) = \left(\frac{x}{2}\right)^3+(2y)^3 = \frac{x^3}{8}+8y^3$

(ii) $(x^2-1)(x^4+x^2+1)$

$(a-b)(a^2+ab+b^2) = a^3-b^3$

$= (x^2-1)((x^2)^2 + x^2 \times 1 + (1)^2)$

$= (x^2)^3 - (1)^3$

$= \underline{x^6-1}$

14) $(a+b+c)^2 = a^2+b^2+c^2+2(ab+bc+ca)$

$(9)^2 = a^2+b^2+c^2+2\times 26$

$\therefore a^2+b^2+c^2 = 81-52$

$= \underline{29}$

15) $(999)^2 = (1000-1)^2$

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

$= (1000)^2 - 2\times 1000\times 1 + (1)^2$

$= 1000000 - 2000 + 1$

$= \underline{998001}$