IX Homework-8

1) The Coordinates of origin is ____
2) The Coordinates of a point lying on x-axis is of the form ____.
3) The coordinates of a point lying on y-axis is of the form ____
4) The perpendicular distance of P(4, 6) from x-axis is ____ units
5) The coordinates of a point which lies in x and y axes both is ____ (a) (x, 0) (b) (0, y) (c) (0, 0) (d) (1, 1)
6) The coordinates of a point whose abscissa is −3 and lies on x-axis is ____ (a) (0, −3) (b) (3, 0) (c) (−3, 0) (d) (−3, −3)
7) Point (−3, 5) lies in the ____ quadrant (i) I (ii) II (iii) IV (iv) V
8) Point (−10, 0) lies on ____ axis.
9) Abscissa of a point is positive in ____ and ____ quadrant.
10) If the coordinates of the points are P(−2, 3) and Q(−3, 5), then (abscissa of P − abscissa of Q) is (a) −5 (b) 1 (c) −1 (d) −2
11) Signs of abscissa and ordinates of a point in the fourth quadrant are respectively (a) (+, +) (b) (−, −) (c) (−, +) (d) (+, −)
12) The abscissa of any point on y-axis is ____
13) The ordinate of any point on x-axis is ____
14) The abscissa of any point on x-axis is ____
15) A point has ordinate 2 and abscissa 3, its coordinates are ____
16) Point (−2, −3) lies in ____.
17) The point (a, b) lies in IV quadrant. Which of a or b is greater?
18) A policeman and a thief are equidistant from a jewel box. Upon considering jewel box as origin, the position of policeman is (0, 5). If the abscissa of the position of thief is zero, then write the coordinates of the position of thief.
19) Factorise: (i) $2u^3 - 3u^2 - 17u + 30$ (ii) $8(x+y)^3 + 27(x-y)^3$ (iii) $2x^3 - xy^2 - y^3$ (iv) $25x^3y - 121xy^3$ (v) $27p^3 - \frac{1}{216} - \frac{9}{2}p^2 + \frac{1}{4}p$
20) Find the values of p and q if (a^2-1) is a factor of $pa^4 - 7a^3 + 9a^2 + qa - 10$
21) Find the values of a and b if $(x+1)$ and $(x-2)$ are factors of $x^3 + ax^2 + 2x + b$
22) Find the value of a for which $4x^4 - ax^3 + 2x^2 + 4x + 3$ is divisible by $(1-2x)$

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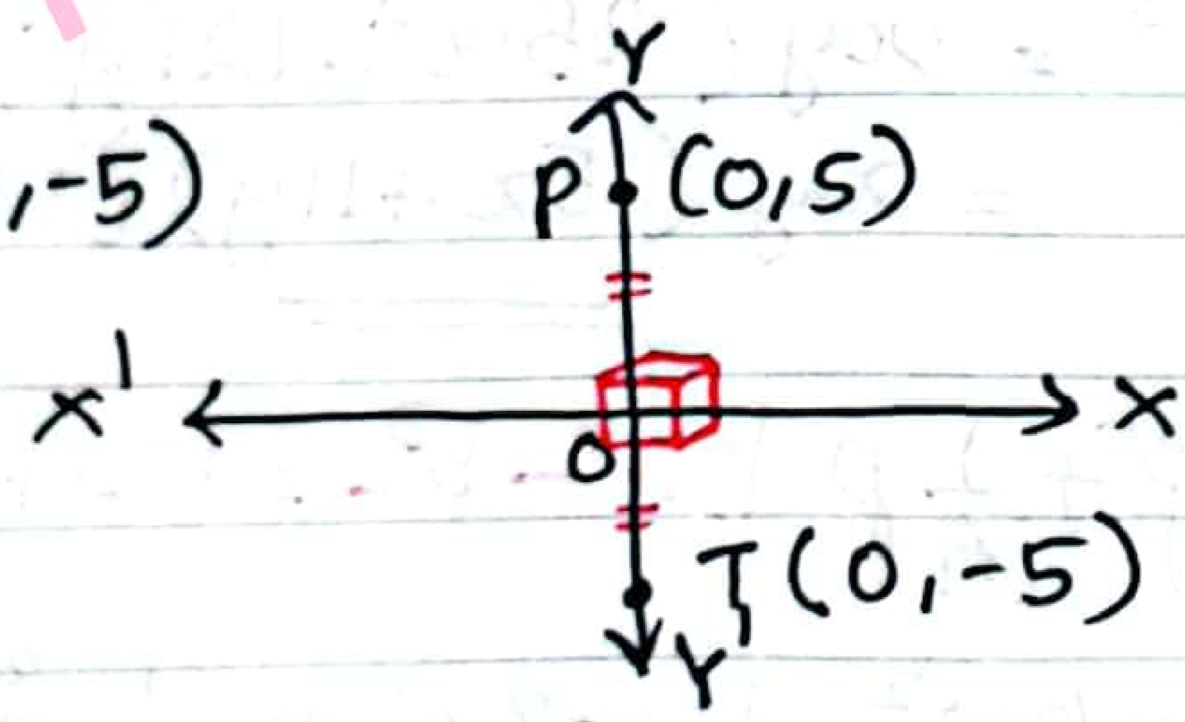
IX Homework-8 (Answers)

1) (0,0)
2) $(x,0)$
3) $(0,y)$
4) 6 units
5) (0,0) (c)
6) (−3,0) (c)
7) II quadrant (ii)
8) x-axis
9) I and IV
10) $-2-(-3) = -2+3 = 1$ (b)
11) (+,−) (d)
12) 0
13) 0
14) any real number
15) (3,2)
16) III quadrant
17) $a > b$
18) Thief at (0,−5)



19) (i) Let $p(u) = 2u^3 - 3u^2 - 17u + 30$

Factors of 60 are $\pm 1, \pm 2, \pm 3$ etc

$p(1) = 2 - 3 - 17 + 30 = 12 \neq 0$

$p(-1) = -2 - 3 + 17 + 30 = 42 \neq 0$

$p(2) = 16 - 12 - 34 + 30 = 0$

$\therefore (u-2)$ is a factor of $p(u)$

On dividing $p(u)$ by $(u-2)$,

$q(u) = 2u^2 + u - 15$; $r(u) = 0$

Using division algorithm,

$p(u) = (u-2)(2u^2+u-15)$

$= (u-2)[2u^2+6u-5u-15]$

$= (u-2)[2u(u+3)-5(u+3)] = \underline{\underline{(u-2)(2u-5)(u+3)}}$

S P
1 −30 < 6, −5

$$
\begin{array}{r|l}
 & 2u^2 + u - 15 \\
\hline
u-2 & 2u^3 - 3u^2 - 17u + 30 \\
 & \underset{(-)}{2u^3} \underset{(+)}{-} 4u^2 \\
\hline
 & u^2 - 17u + 30 \\
 & \underset{(-)}{u^2} \underset{(+)}{-} 2u \\
\hline
 & -15u + 30 \\
 & \underset{(+)}{-}15u \underset{(-)}{+} 30 \\
\hline
 & 0
\end{array}
$$

(ii) $8(x+y)^3+27(x-y)^3$

$= [2(x+y)]^3+[3(x-y)]^3$

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

$= [2(x+y)+3(x-y)][4(x+y)^2+9(x-y)^2-6(x+y)(x-y)]$

$= (2x+2y+3x-3y)[4x^2+4y^2+8xy+9y^2+9x^2-18xy-6x^2+6y^2]$

$= (5x-y)(7x^2+19y^2-10xy)$

(iii) $2x^3-xy^2-y^3$

$= x^3+x^3-xy^2-y^3$

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

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

$= (x-y)(x^2+xy+y^2)+x(x+y)(x-y)$

$= (x-y)[x^2+xy+y^2+x^2+xy]$

$= (x-y)[2x^2+2xy+y^2]$

(iv) $25x^3y-121xy^3 = xy(25x^2-121y^2) = xy((5x)^2-(11y)^2)$

$= xy(5x+11y)(5x-11y)$

(v) $27p^3-\frac{1}{216}-\frac{9}{2}p^2+\frac{1}{4}p$ $[a^3-b^3-3a^2b+3ab^2=(a-b)^3]$

$= (3p)^3-\left(\frac{1}{6}\right)^3-3\times(3p)^2\times\frac{1}{6}+3\times3p\times\left(\frac{1}{6}\right)^2$

$= \left(3p-\frac{1}{6}\right)^3 = \left(3p-\frac{1}{6}\right)\left(3p-\frac{1}{6}\right)\left(3p-\frac{1}{6}\right)$

20) Let $p(a) = pa^4-7a^3+9a^2+qa-10$

Since a^2-1 is a factor of $p(a)$, then $(a+1)(a-1)$ are also factors of $p(a)$

Then $\boxed{p(-1)=0}$

$\Rightarrow p+7+9-q-10=0$

$\Rightarrow p-q=-6$

$\Rightarrow p=-6+q \rightarrow (1)$

Also $\boxed{p(1)=0}$

$\Rightarrow p-7+9+q-10=0$

$\Rightarrow p+q=8$

$\Rightarrow -6+q+q=8$

$\Rightarrow 2q=14$

$\boxed{q=7}$

$p=-6+7$

$\boxed{p=1}$

21) Let $p(x) = x^3 + ax^2 + 2x + b$

$\boxed{p(-1) = 0}$

$\Rightarrow (-1)^3 + a(-1)^2 + 2(-1) + b = 0$

$\Rightarrow -1 + a - 2 + b = 0$

$\Rightarrow a + b = 3$

$b = 3 - a \rightarrow (1)$

$\boxed{p(2) = 0}$

$\Rightarrow (2)^3 + a(2)^2 + 2\times 2 + b = 0$

$\Rightarrow 8 + 4a + 4 + b = 0$

$\Rightarrow 4a + b = -12$

$\Rightarrow 4a + 3 - a = -12$

$\Rightarrow 3a = -15$

$\boxed{a = -5}$

$b = 3 - (-5) = 3 + 5$

$\boxed{b = 8}$

22) Let $p(x) = 4x^4 - ax^3 + 2x^2 + 4x + 3$

$\boxed{p\left(\frac{1}{2}\right) = 0}$

put $1 - 2x = 0$

$-2x = -1$

$2x = 1$

$x = \frac{1}{2}$

$\Rightarrow 4\times\left(\frac{1}{2}\right)^4 - a\left(\frac{1}{2}\right)^3 + 2\left(\frac{1}{2}\right)^2 + 4\times\frac{1}{2} + 3 = 0$

$\Rightarrow \cancel{4}^{1}\times\frac{1}{\cancel{16}_{4}} - \frac{a}{8} + \frac{2}{4} + 2 + 3 = 0$

$\Rightarrow \frac{1^{\times 2}}{4_{\times 2}} - \frac{a}{8} + \frac{1}{2} + 5 = 0$

$\Rightarrow \frac{2-a}{8} + \frac{11^{\times 4}}{2_{\times 4}} = 0$

$\Rightarrow \frac{2 - a + 44}{8} = 0$

$46 - a = 0$

$\boxed{a = 46}$