(Coordinate Geometry)

Assignment

1) Dist of pt (x, y) from x-axis = y-coordinate of point

So, Dist of $P(2, 3)$ from x-axis = 3

(b)

2) Dist b/w pt $A(x_1, y_1)$ & $B(x_2, y_2)$

$$= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Here $P(1,4)$
$Q(4,0)$ $= \sqrt{(4-1)^2 + (0-4)^2} = 5$ (b)

3) 3 points are said to be collinear if Area of Δ formed by 3 pts = 0

$$\Delta = \frac{1}{2}\left| x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2) \right|$$

$$0 = \frac{1}{2}\left| -5(p+2) + 1(-2-1) + 4(1-p) \right|$$

$$\Rightarrow -5p - 10 - 3 + 4 - 4p = 0$$

$$\Rightarrow -9p - 9 = 0$$

$$\Rightarrow p = -1$$ (d)

4) Dist b/w pt $P(x_1, y_1)$ & $Q(x_2, y_2)$

$$= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

A/Q $A(a+b, a-b)$ & $B(a-b, -a-b)$

Dist b/w A & B $= \sqrt{(a-b-(a+b))^2 + (-a-b-(a-b))^2}$

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

$$= \sqrt{4a^2 + 4b^2} = \boxed{2\sqrt{a^2+b^2}}$$ Ans

5) Distance b/w $(x, -1)$ & $(3, 2)$

$$= \sqrt{(3-x)^2 + (2+1)^2}$$

$$= \sqrt{9 + x^2 - 6x + 9} = \sqrt{x^2 - 6x + 18}$$

So, $x^2 - 6x + 18 = (5)^2 = 25$

$x^2 - 6x - 7 = 0$

$= x^2 - 7x + x - 7$

$= x(x-7) + 1(x-7) = (x+1)(x-7) = 0$

$\Rightarrow x = -1$ or $x = 7$

(d) 7 or -1

6) Pts given - $P(1, 1), Q(-2, 7), R(3, -3)$

Distance b/w pts —

(i) P & Q $= \sqrt{(-2-1)^2 + (7-1)^2}$

$= \sqrt{45}$

(ii) Q & R $= \sqrt{5^2 + (-10)^2} = \sqrt{125}$

(iii) P & R $= \sqrt{2^2 + (-4)^2} = \sqrt{20}$

(iv) Area of $\Delta = \frac{1}{2} | x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2) |$

$= \frac{1}{2} | 1(10) + (-2)(-4) + 3(-6) |$

$= \frac{1}{2} | 10 + 8 - 18 | = 0$

So, pts P, Q, R are collinear (b)

7) If 3 pts are collinear, area of $\Delta = 0$

So, $\Delta = \frac{1}{2} | x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2) |$

$= \frac{1}{2} | 1(-b) + 0(b-2) + a(2) |$

$= \frac{1}{2} | 2a - b | = a$

$\Rightarrow \frac{1}{2}|2a-b| = 0$

$\Rightarrow 2a = b$ (a)

8) A(2,3), B(4,k) & C(6,−3)

If these pts are collinear,
Area of Δ formed = 0

$\Rightarrow \Delta = \frac{1}{2}|x_1(y_2-y_3) + x_2(y_3-y_1) + x_3(y_1-y_2)|$

$= \frac{1}{2}|2(k+3) + 4(-6) + 6(3-k)|$

$= \frac{1}{2}|2k+6-24+18-6k|$

$= \frac{1}{2}|-4k|$

$\Rightarrow$ A/Q $\frac{1}{2}|4k| = 0$

$k = 0$ (c)

9) Dist of pt from origin $= \sqrt{x^2+y^2}$

$= \sqrt{(-3)^2+4^2} = 5$ (d)

10) Vertices of Δ = A(1,2); B(−2,3) & C(3,−4)

* $AB = \sqrt{(-3)^2+1^2} = \sqrt{10}$
* $BC = \sqrt{(-1)^2+(-7)^2} = \sqrt{50} = 5\sqrt{2}$
* $AC = \sqrt{(-4)^2+(-6)^2} = \sqrt{60} = 2\sqrt{15}$

∴ Length of sides of Δ = $\sqrt{10}, 5\sqrt{2}, 2\sqrt{15}$.