Q. Trace the curve $y^2(2a-x)=x^3$

Sol:- Given, $y^2(2a-x)=x^3$ ——— (1)

1) Symmetry:- y=even, then:- x-axis is symmetry line
($\because y^2 \to$ even)

2) Origin:- $f(0,0) = 0^2(2a-0) = 0^3$
$= 0$

∴ Curve is passing through origin

3) Tangent at origin:-

∵ The curve is passing through origin, tangent at origin exists

$y^2(2a-x)=x^3$
$\Rightarrow 2ay^2 - xy^2 = x^3$
$\Rightarrow 0$

→ Lowest degree = 2 ($2ay^2$)

∴ Eq^n of tangent $\Rightarrow 2ay^2 = 0$
$\Rightarrow \boxed{y^2 = 0}$

∴ We know, tangent at origin, $y = 0$

4) Intersection on coordinate axes:- ∴ Curve intersects at $(0,0)$

- At x-axis, $y=0$ (1) $\Rightarrow x^3 = 0 \Rightarrow \boxed{x=0}$
- At y-axis, $x=0$ (1) $\Rightarrow y^2(2a-x)=0 \Rightarrow \boxed{y=0}$

5) Asymptotes:- $y^2(2a-x)=x^3$
$2ay^2 - xy^2 - x^3 = 0$

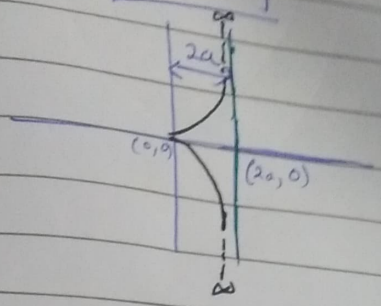
Highest degree = 2 [for y] Highest degree = 2 [for x]

- Coefficient of highest degree $(-x^3) = -1 \neq 0$
- Coefficient of highest degree $(2ay^2 - xy^2) = 2a - x = 0$
$\Rightarrow \boxed{2a = x}$ → eq^n of asymptotes

6) Reason of Existance :-

Eq^n of asymtotes → $\boxed{2a = x}$

Graph :-



Qb. Trace the curve $xy^2 = a^2(a-x)$

Sol:- Given, $xy^2 = a^2(a-x)$ ——— ①

1) Symmetry :- y=even, then curve symmetric about x-axis

2) Origin :- $f(0,0) = 0(0)^2 = a^2(a-0)$

$\Rightarrow a^3 \neq 0$

∴ Curve is not passing through origin

3) Tangent at origin :-

∴ The curve is not passing through origin, tangent at origin doesn't exist

4) Intersection on coordinate axis :-

- At x-axis, $y = 0$ ① $\Rightarrow x(0)^2 = a^2(a-x)$ $\Rightarrow x = a$ $(a,0)$
- At y-axis, $x = 0$ ① $\Rightarrow 0 \cdot y^2 = a^2(a-0)$

$\Rightarrow y = \frac{a^2 \cdot a}{0}$ $\Rightarrow y = \infty$ No point

5) Asymptote :- $xy^2 = a^2(a-x)$

$\Rightarrow xy^2 - a^3 + a^2x = 0$

Highest power of $x = 1$ → Highest power of $y = 2$

- Coefficient of highest degree $(xy^2) = x = 0$
- Coefficient of highest degree $(a^2x) = a^2 = 0$ (not exist)

6) Reason of Existence