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Research Paper Mathematics

Some Interesting Topic of Graph

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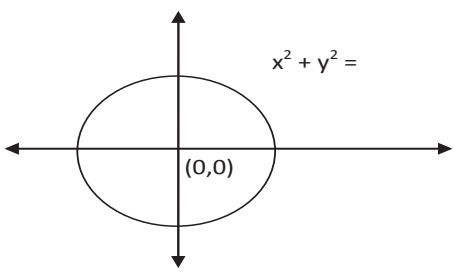
ABSTRACT

This paper contain different types of graphs its very interesting topics. Let that circle, parabola, ellipses, and hyperbola. We are discussing rutting uses of parabola. We are discussing rutting uses of ellipses. We are discussing rutting uses of hyperbola. We are also discussing various example of given in this paper.

KEYWORDS :

Circle:



(h,k) centre and r Radius has equation of circle. $(x-4)+(y-k)^2 = r^2$

Exa. (- 1 ,1) centre and 2 Radius contains then equation of circle ? here (h,k) = (- 1,1), r = 2 then $(x+1)^2 + (y-1)^2 = 2^2$

$\therefore\ x^2 + 2x + 1 + y^2 - 2y + 1 = 4$

$x^4y^2 + 2x - 2y - 2 = 0$

- Standard. Form of circle equation.

  (h,k) = (0,0) and radius = r

  then $\boxed{x^2 + y^2 = r^2}$

- General equation of circle

  $x^2 + y^2 + 2gx + 2jy + c = 0$ where centre of circle = (- g , - j) and radius $r = \sqrt{g^2 + j^2 - c}$

Example:- **Equation $X^2 + Y^2 + 6X - 10Y - 22 = 0$ is circle? If yes then find center and radius?**

Equation $X^2 + Y^2 + 6X - 10Y - 22 = 0$ to comp air general equation

6x = 2gx - 10 y = 7fg c = - 22

g = 3 f = - 5 c = - 22

$g^2 + f^2 - c = 9 + 25 + 22 = 56$

Then radius $r = \sqrt{56}$

And center (- g1 – f) = (- 3 ,5)

Example:-Find circle question where A $(x_1,y_1)$and B (X_2 , Y_2) point of end point of diametric circle.

$\overline{AB}$ Radius r = $\sqrt{\left(\frac{x1+x2}{2} - x1\right)^2 + \left(\frac{y1+y2}{2} - y1\right)^2}$ = $\sqrt{\frac{(x_1-x_2)^2+(y_1-y_2)^2}{2}}$

$\therefore$ Circle's equation.

$$\left(x - \frac{x_1+x_2}{2}\right)^2 + \left(y - \frac{y_1+y_2}{2}\right)^2 = \frac{(x_1-x_2)^2+(y^1-y^2)^2}{4}$$

(=)

$$x^2 + y^2 - (x_1+y_2)x - (y_1+y_2)y + \frac{(y_1+y_2)^2+(y_1-y_2)^2-(x_1-x_2)^2-(y_1-y_2)^2}{4} = 0$$

(=)

$$x^2 + y^2 - (x_1+y_2)x - (y_1+y_2)y + x_1x_2 + y_1y_2 = 0$$

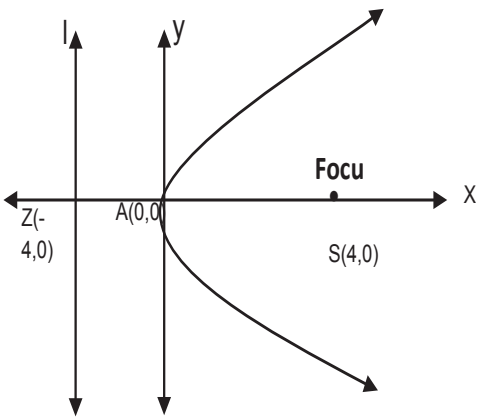
(=) $(x-x_1)(x-x_2)+(y-y1)(y-y_2)=0$

Parabola:

Defination :- When a quadratic function is graphed, it forms a parabola, a u-shaped curve that has to meets certain technical mathematical requirements. Think of the narrow curve at the end of an oval and you can imagine a parabola.

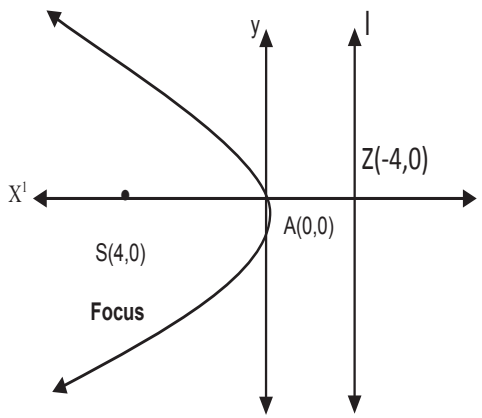
A parabola is the set of all points in the plane equidistant from a given line L

(the conic section directory) and a given point F not on the line (the focus). The focal parameter (i.e., the distance between the directory and focus) is therefore given by $p = 2a$, where a is the distance from the vertex to the directory or focus. The surface of revolution obtained by rotating a parabola about its axis of symmetry is called a parabolic.



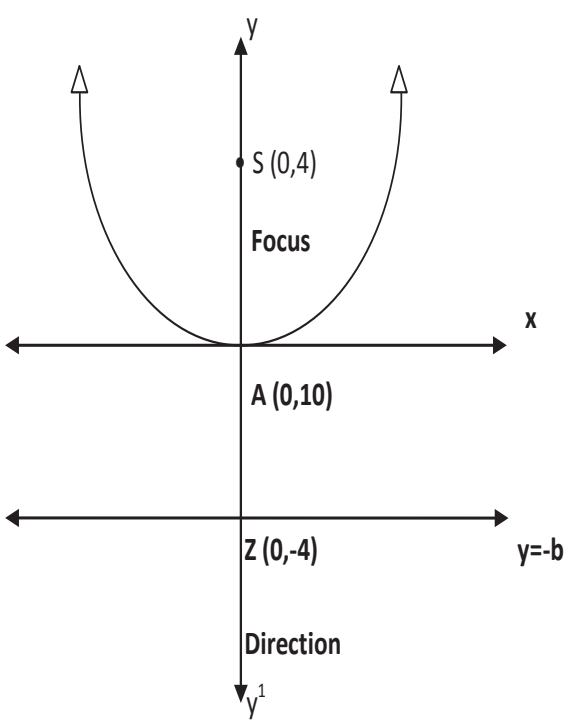
$x = -4$ y^1 $y^2 = 4ax(4>0)$

Direction

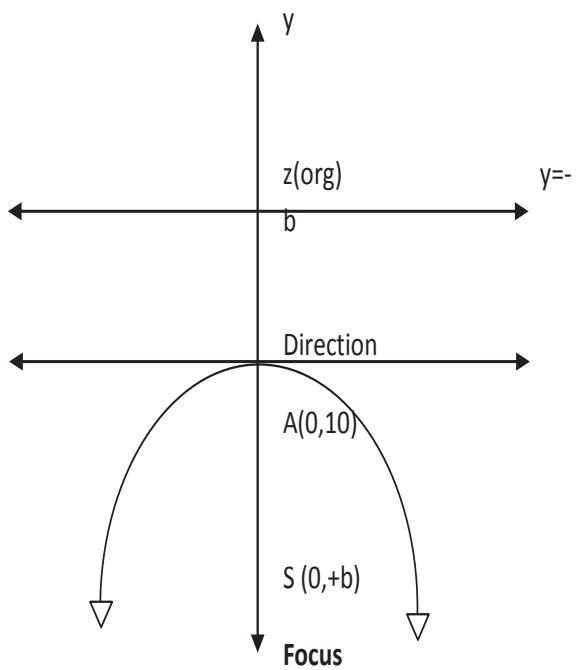


$y^2 = 4ax\ (4<0)$ y^1 $x = -4$

Direction



$(x2 = 4by)\ (b>0)$



Suppose that $p(t_1)$ and $2(t_2)$ are parabola's $y^2 = 4ax$ point's if $\overline{PQ}$ Focal chord. Then $t_1t_2 = -1$

Proof point $P(at_1^2, 2at_1)$ and $2(at_2^2, 2at_2)$ and parabola $y^2 = 4ax$ focus S(4,0) and $\overline{PQ}$ focal chord then P,Q and $ are linear point.

Suppose that $\overline{PQ}$ Then P (a, 2a) lotus – rectum $\therefore$ $ati^2 = a$, $2ati = 2a$

$\therefore$ $t_1 = 1$

$\therefore 2$ (a,-2a) $\therefore t_2 = -1$

Then t1 $t_2 = -1$

Now, suppose that $\overline{PQ}$ not latus –rectum.

$\therefore$ $at_1^2 \neq 4$, $at_2^2 \neq 4$.

Then spole of $\overleftarrow{SP}$ = slope of $\overleftarrow{SQ}$

$$\therefore \frac{2at_1}{at_1^2 - a} = \frac{2at_2}{at_2^2 - a}$$

$$\therefore \frac{t_1}{t_1^2 - 1} = \frac{t_2}{t_2^2 - 1}$$

$\therefore$ $t_1(t_2^2-1) = t_2(t_1^1-1)$

$\therefore$ $t_1 + t_2^2 - t_2 t_1^2 = t_1 - t_2$

$t_1t_2 (t_2-t_1) = -(t_2 - t_1)$

$\therefore$ $t_1 t_2 = -1$

Example: - Find area of triangle when parabola $x^2 = 12y$ at origin point and end vertices of focal chord.

Now compare x2 = 12y with x2 = 4by

The $12y = 4by \rightarrow 4b=12$

$\rightarrow b = 3$

$L(2| b^1 | , b)$, L^1 (-2 | b1 ,b)

Then

$$= \frac{1}{2} \begin{vmatrix} 0 & 0 \\ 1 & \\ 6 & 3 \\ 1 & \\ -6 & 3 \\ 1 & \end{vmatrix}$$

$$= \frac{1}{2} \mid 1\,(18+18) \mid = \frac{36}{2} = 18$$

Suppose that P(x,y) and S(3,0) ($\because$ $y^2 = 12x$)

Here Sp = 6

$\therefore$ $sp^2 = 3.6$

$(x-3)^2 + y^2 = 36$

$(x-3)^2 + 12x = 36$ ($\because$ $y^2 = 12x$)

$x^2 - 6x + 9 + 12x = 36$

$x^2 + 6x + 9 - 36 =$

$x^2 + 6x - 27 =$

$(x+9)(x - 3) = 0$

$x = -9$ = $x = 3$

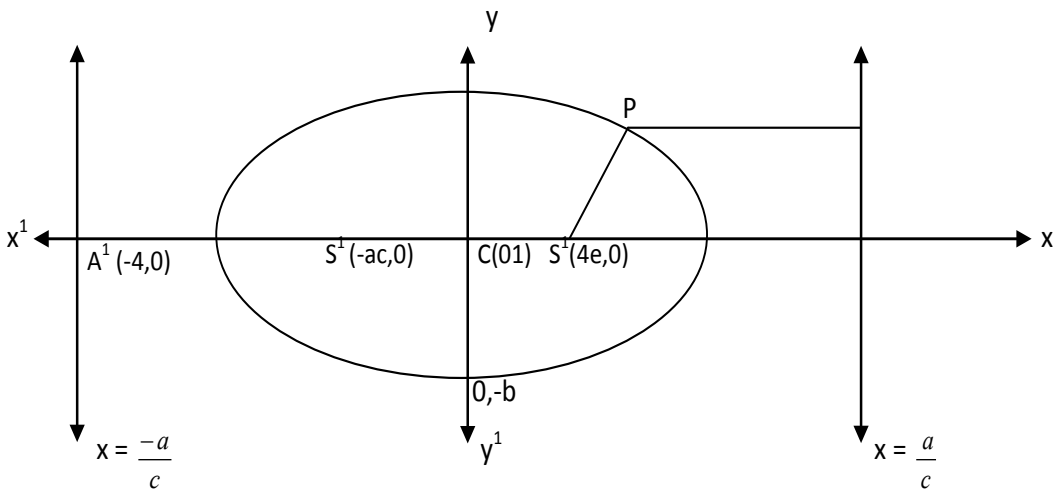
$x = -9$ then $y^2 20$

$\therefore$ $x = 3$ $y^2 = 36$ $y \pm 6$

Then p (3 , $\pm$ 6)

Ellipse:

An ellipse usually looks like a squashed circle. In fact a circle is a special kind of ellipse. An ellipse is made by a point P moving around so that the sum of the distances from two other points (F and G) is constant. It is one of the "Conic Sections"



$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1\ (a>b)$$

e = Eccentricity $= \frac{SP}{PM}$ (eci)

and most important formula. $b^2 = a^2 (1-e^2)$ (a>b)

Example: find the question of ellipse pass through (4,3) and (-1,4).

- Suppose that Ellipse's equation is

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$$

$$(4,3)\ \frac{x^2}{a^2}+\frac{y^2}{b^2}=1$$

$$\therefore \frac{16}{a^2}+\frac{9}{b^2}=1$$

$$\text{And } (-1,4)\ \frac{x^2}{a^2}+\frac{y^2}{b^2}=1$$

$$\therefore \frac{1}{a^2}+\frac{16}{b^2}=1$$

$$\therefore \frac{1}{a^2}=1-\frac{16}{b^2}$$

$$\therefore a^2=\frac{b^2}{b^2-16}$$

$$\text{Now equation } \frac{16(b^2-16)}{b^2}+\frac{9}{b^2}=1$$

$$16b^2-256+9=b^2$$

$$15b^2-247=0$$

$$15b^2=247$$

$$b^2=\frac{247}{15}$$

$$\therefore\ a^2\ \frac{247/15}{\frac{247}{15}-16}$$

$$a^2 \quad \frac{247/15}{\frac{247-240}{15}}$$

$$a^2 \quad \frac{247}{7}$$

Then equation of Ellipse

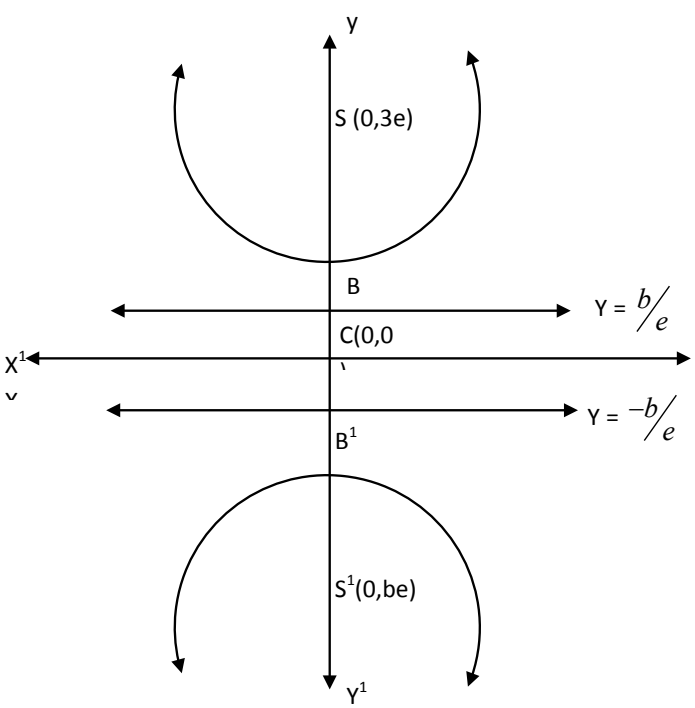
$$\frac{x^2}{247/7} + \frac{y^2}{247/15} = 1$$

$$\therefore \boxed{7x^2 + 15y^2 = 247}$$

Hyperbola:

A plane curve having two branches, formed by the intersection of a plane with both halves of a right circular cone at an angle parallel to the axis of the cone. It is the locus of points for which the difference of the distances from two given points is a constant.

Equation $\frac{x^2}{4^2} - \frac{y^2}{b^2} = 1$



Formula $a^2 = b^2(e^2-1)$ equation

$$\frac{y^2}{b^2} - \frac{x^2}{4^2} = 1$$

Routine usage of parabola:

- In optics it is used to make mirrors.
- It reselected from parabolic mirror's foci that why it is used in car's head light.
- Same way it is also used in making T.V.'S antenna.

Routine usage of Ellipse:

- Making of Telescope.
- In medical science. It is used to break the stone in kidney , urinary bladder.
- Lithotripper machine is used. Characteristic is used in such machine.

Routine usage of Hyperbola:

- Origin of gun firing can be diseded by the carestistick and sound speed.

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