## 11.5.4 Standard equation of an ellipse

In this section, we consider the equation of the ellipse with centre at the origin and foci along the coordinate axes.

First we derive the equation of the ellipse with focii along the $x$-axis. Let $F_1$ and $F_2$ be the foci and O be the midpoint of the line segment $F_1F_2$. Choose O as the origin. Draw the horizontal and vertical lines through O as $x$ and $y$ axes.

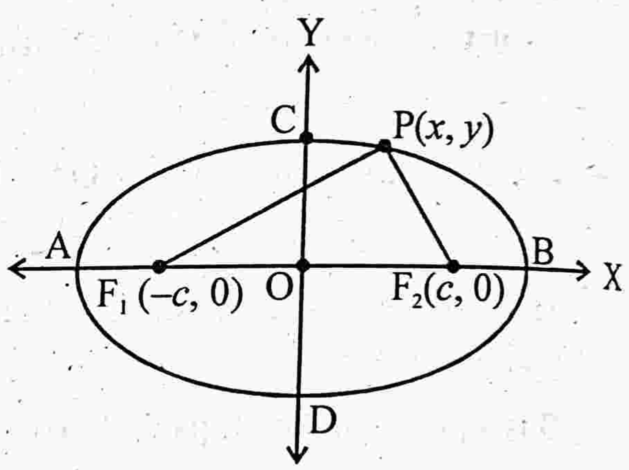



*Fig 11.23*

Take $F_1F_2 = 2c$

Then $F_1$ is the point $(-c, 0)$ and $F_2$ is $(c, 0)$.

Let $P(x, y)$ be any point on the ellipse such that the sum of the distances from P to the two foci be $2a$.

$PF_1 + PF_2 = 2a$

By using distance formula we get,

$$\sqrt{(x+c)^2+(y-0)^2}+\sqrt{(x-c)^2+(y-0)^2} = 2a$$

$$\sqrt{(x+c)^2+y^2} = 2a-\sqrt{(x-c)^2+y^2}$$

Squaring both sides, we get, $(x + c)^2 + y^2 = 4a^2-4a\sqrt{(x-c)^2+y^2}+(x-c)^2+y^2$

i.e, $x^2 + 2cx + c^2 + y^2 = 4a^2-4a\sqrt{(x-c)^2+y^2}+x^2-2cx+c^2+y^2$

i.e, $4cx = 4a^2 - 4a\sqrt{(x-c)^2 + y^2}$

i.e, $\frac{cx}{a} = a - \sqrt{(x-c)^2 + y^2} \Rightarrow \sqrt{(x-c)^2 + y^2} = a - \frac{cx}{a}$

Squaring we get, $(x-c)^2 + y^2 = \left(a - \frac{cx}{a}\right)^2$

i.e, $x^2 - 2cx + c^2 + y^2 = a^2 - 2cx + \frac{c^2}{a^2}x^2$

i.e, $x^2\left(1 - \frac{c^2}{a^2}\right) + y^2 = a^2 - c^2$

i.e, $x^2\left(\frac{a^2 - c^2}{a^2}\right) + y^2 = (a^2 - c^2)$

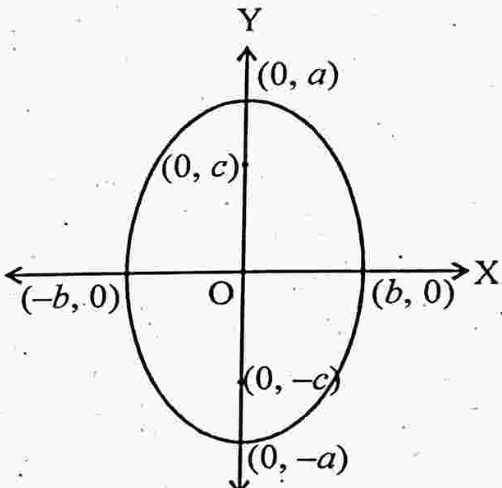
i.e, $\frac{x^2}{a^2} + \frac{y^2}{a^2 - c^2} = 1$

$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, where $c^2 = a^2 - b^2$

Any point $(x, y)$ on the ellipse satisfies the equation $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and conversely if any point satisfies $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, then the point $(x, y)$ lies on the ellipse.

**Thus the standard equation of the ellipse is** $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

- Centre of the ellipse is (0, 0)
- Foci of the ellipse are $(-c, 0)$ and $(c, 0)$.
- Vertices are $(-a, 0)$ and $(a, 0)$
- Equation of the major axis is $y = 0$
- Length of the major axis is $= 2a$
- Equation of the minor axis is $x = 0$
- Length of the minor axis is $2b$.
- $c^2 = a^2 - b^2$




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

*Fig 11.24*

In the equation of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ where $a > b$, the major axis is the $x$-axis.

If we choose the major axis as $y$-axis, then the equation of the ellipse takes the form $\frac{x^2}{b^2}+\frac{y^2}{a^2}=1$, which is given in Fig 11.24

**OBSERVATIONS**

- For any point $P(x, y)$ on the ellipse, $-a \le x \le a$.
- Ellipse is symmetric with respect to both the coordinate axes.
- The foci always lie on the major axis.
- The major axis is along the $x$-axis if $x^2$ has the larger denominator.
  The major axis is along the $y$-axis if $y^2$ has the larger denominator.

### 11.5.5 Latus rectum

The eccenticity $e$ of an ellipse is given by $e=\frac{c}{a}$ $\quad \therefore c = ae$

Hence the foci are $(-ae, 0)$ and $(ae, 0)$.

The equation of the latus rectum are $x = -ae$ and $x = ae$

Let the length of $AF_2$ be $l$.

Then the coordinates of A are $(c, l)$, i.e., $(ae, l)$

Since A lies on the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, we have

$$\frac{(ae)^2}{a^2}+\frac{l^2}{b^2}=1 \Rightarrow \frac{l^2}{b^2}=1-e^2 \Rightarrow l^2 = b^2(1-e^2)$$

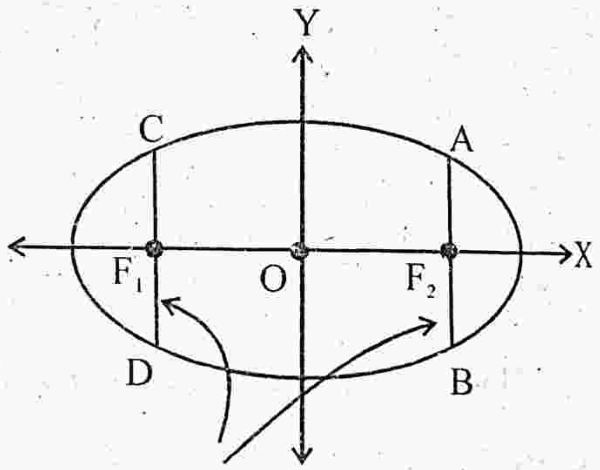


*Fig 11.25*

But $e^2 = \frac{c^2}{a^2} = \frac{a^2-b^2}{a^2} = 1-\frac{b^2}{a^2}$

Hence $1-e^2 = \frac{b^2}{a^2}$

Therefore $l^2 = \frac{b^4}{a^2}$, i.e., $l = \frac{b^2}{a}$

Since the ellipse is symmetric with respect to $y$-axis,. $AF_2 = F_2B$.

$\therefore$ Length of the latus rectum is $\frac{2b^2}{a}$.

**Example 23**

Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and latus rectum of the following ellipses (NCERT)

i. $\frac{x^2}{25}+\frac{y^2}{9}=1$ **(March 2013, 2014)** ii. $\frac{x^2}{25}+\frac{y^2}{100}=1$ **(March 2009)**

iii. $4x^2 + 9y^2 = 36$ **(March 2011)**

***Solution***

i. Since the denominator of $x^2$ is greater than the denominator of $y^2$, the equation of the ellipse is

$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. $\therefore$ The equation of the ellipse is $\frac{x^2}{25}+\frac{y^2}{9}=1$

$\therefore a^2 = 25$ and $b^2 = 9$ $\therefore a = 5$ and $b = 3$

$c=\sqrt{a^2-b^2}=\sqrt{25-9}=\sqrt{16}=4$

$\therefore$ Foci $(\pm c, 0)=(\pm 4, 0)$ or $(4, 0)$ and $(-4, 0)$

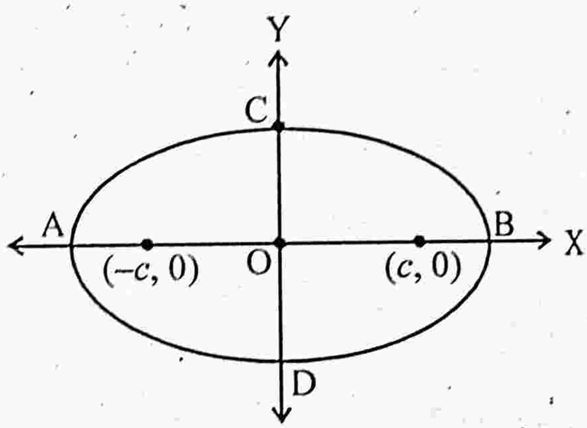
Vertices $(\pm a, 0)=(\pm 5, 0)$ or $(5, 0)$ and $(-5, 0)$

Length of the major axis $2a = 2 \times 5 = 10$

Length of the minor axis $2b = 2 \times 3 = 6$

Eccentricity $e=\frac{c}{a}=\frac{4}{5}$

Length of the latus rectum $\frac{2b^2}{a}=\frac{2\times 9}{5}=\frac{18}{5}$




ii. Equation of the ellipse is $\frac{x^2}{25}+\frac{y^2}{100}=1$

Since the denominator of $y^2$ is greater than the denominator of $x^2$, the equation of the ellipse is

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

$a^2 = 100$ and $b^2 = 25$ $\therefore a = 10$ and $b = 5$

$c = \sqrt{a^2 - b^2} = \sqrt{100-25} = \sqrt{75}$

Foci are $(0, \pm\sqrt{75})$

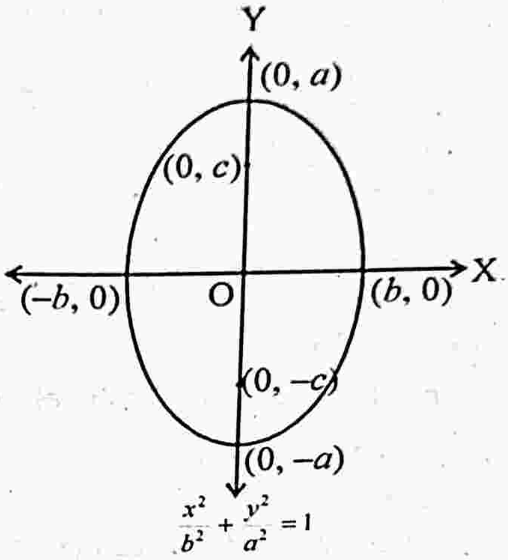
Vertices are $(0, \pm 10)$

Length of the major axis $= 2a = 20$

Length of the minor axis $= 2b = 10$

Eccentricity $e = \dfrac{c}{a} = \dfrac{\sqrt{75}}{10} = \dfrac{5\sqrt{3}}{10} = \dfrac{\sqrt{3}}{2}$

Length of the latus rectum $= \dfrac{2b^2}{a} = \dfrac{2 \times 25}{10} = 5$




iii. The equation of the ellipse is $4x^2 + 9y^2 = 36$

Dividing by 36, we get $\dfrac{x^2}{9} + \dfrac{y^2}{4} = 1$. Since the denominator of $x^2$ is greater than that of $y^2$, the equation of the ellipse is $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$

$a^2 = 9$ and $b^2 = 4$ $\therefore a = 3$ and $b = 2$

$c = \sqrt{a^2 - b^2} = \sqrt{9-4} = \sqrt{5}$

Foci are $(\pm\sqrt{5}, 0)$ and the vertices are $(\pm 3, 0)$

The length of the major axis $= 2a = 6$

The length of the minor axis $= 2b = 4$

Eccentricity $e = \dfrac{c}{a} = \dfrac{\sqrt{5}}{3}$

The length of the latus rectum $= \dfrac{2b^2}{a} = \dfrac{2 \times 4}{3} = \dfrac{8}{3}$.

**Example 24**

Find the equation of the ellipse whose

i. Vertices $(\pm 5, 0)$, foci $(\pm 4, 0)$ ii. Vertices $(0, \pm 13)$, foci $(0, \pm 5)$ **(NCERT)**

***Solution***

The vertices are $(\pm 5, 0)$ and foci are $(\pm 4, 0)$

Since the vertices are on $x$-axis, the equation of ellipse is $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$

$\therefore a = 5$ and $c = 4$

Hence $c^2 = a^2 - b^2 \Rightarrow 16 = 25 - b^2$ $\therefore b^2 = 9$

$\therefore$ Equation of the ellipse is $\dfrac{x^2}{25} + \dfrac{y^2}{9} = 1$

Hence eccentricity, $e = \frac{c}{a} = \frac{3}{5}$

**Example 30**

An ellipse whose major axis as $x$-axis and the centre (0, 0) passes through (4, 3) and (−1, 4)

i. Find the equation of the ellipse.

ii. Find its eccentricity.

(March 2010)

***Solution***

Since the major axis is along $x$-axis, the equation of the ellipse is $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ ............ (1)

Since (4, 3) is a point on the ellipse, we get $\frac{4^2}{a^2}+\frac{3^2}{b^2}=1$ or $\frac{16}{a^2}+\frac{9}{b^2}=1$ .................... (2)

Since (−1, 4) is a point on the ellipse, we get $\frac{(-1)^2}{a^2}+\frac{4^2}{b^2}=1$ or $\frac{1}{a^2}+\frac{16}{b^2}=1$ ............... (3)

Multiplying (3) by 16 and subtracting (2), we get $\frac{256}{b^2}-\frac{9}{b^2}=16-1$

i.e, $\frac{247}{b^2}=15$ or $b^2=\frac{247}{15}$

$$(3) \to \frac{1}{a^2}=1-\frac{16}{b^2}=1-\frac{16}{\frac{247}{15}}=1-\frac{16\times 15}{247}=\frac{247-240}{247}=\frac{7}{247}$$

i.e, $\frac{1}{a^2}=\frac{7}{247}$ or $a^2=\frac{247}{7}$

Hence $(1) \to \frac{x^2}{\frac{247}{7}}+\frac{y^2}{\frac{247}{15}}=1$ or $7x^2+15y^2=247$

ii. $c^2=\frac{247}{7}-\frac{247}{15}=\frac{8(247)}{15\times 7}$ $\therefore c=\sqrt{\frac{8\times 247}{15\times 7}}$

Eccentricity $e=\frac{c}{a}=\frac{\sqrt{\frac{8\times 247}{15\times 7}}}{\sqrt{\frac{247}{7}}}=\sqrt{\frac{8}{15}}$

**Example 31**

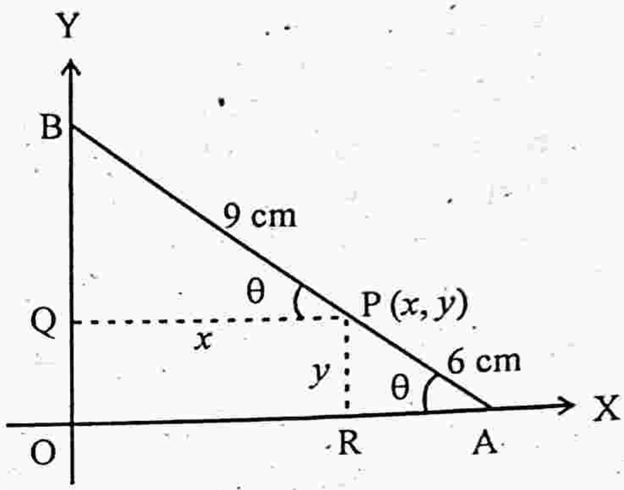
A rod AB of length 15 cm rests in between two coordinate axes in such a way that the end point A lies on $x$-axis and end point B lies on $y$-axis. A point P($x, y$) is taken on the rod in such a way that AP = 6 cm. Show that the locus of P is an ellipse. **(NCERT)**

***Solution***

Let AB be the rod making an angle $\theta$ with OX as shown in figure and P $(x, y)$ the point on it such that AP = 6 cm.

Since AB = 15 cm, we have PB = 9 cm.

From P. draw PQ and PR perpendicular on $y$-axis and $x$-axis, respectively.




From $\Delta PBQ$, $\cos\theta = \dfrac{x}{9}$

From $\Delta PRA$, $\sin\theta = \dfrac{y}{6}$

Since $\cos^2\theta + \sin^2\theta = 1$ we get $\left(\dfrac{x}{9}\right)^2 + \left(\dfrac{y}{6}\right)^2 = 1$ or $\dfrac{x^2}{81} + \dfrac{y^2}{36} = 1$

Thus the locus of P is an ellipse.

**Example 32**

An arch on a road is in the shape of semi-ellipse. The breadth of the road is 30 feet. A man 6 feet tall just touches the arch when he stands 2 feet from the side.

i. Assuming the road level as x-axis (major axis). Find the point C.

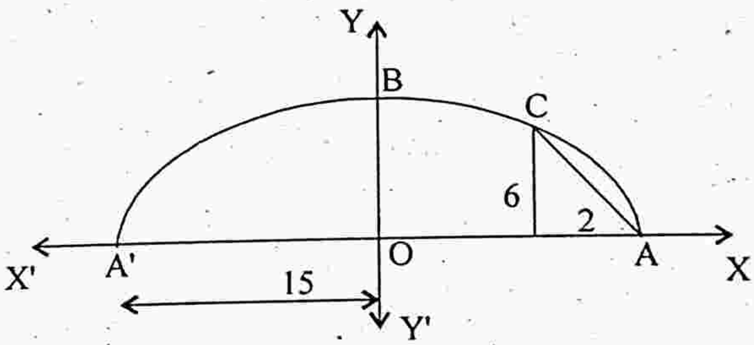
ii. What is the maximum height of arch (minor axis)?

***Solution***

i. Take O as the origin, Since OA = 15, C is the point (13, 6)

ii. Let the equation of the ellipse be

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




The length of the major axis $2a = 30$

$\therefore a = 15$

Hence the equation of the ellipse is

$$\frac{x^2}{15^2} + \frac{y^2}{b^2} = 1 \quad ..............(1)$$

Since (13, 6) is a point on (1), we get $\dfrac{13^2}{15^2} + \dfrac{6^2}{b^2} = 1$

$$\frac{6^2}{b^2} = 1 - \frac{13^2}{15^2} = \frac{225-169}{225} = \frac{56}{225} \Rightarrow b^2 = \frac{36}{56} \times 225 \Rightarrow b = \frac{6\times 15}{2\sqrt{14}} = \frac{45}{\sqrt{14}} \text{ feet}$$

## SOLUTIONS TO NCERT TEXT BOOK EXERCISE 11.3

**In each of the Questions 1 to 9, find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of the latus rectum of the ellipse.**

1. $\frac{x^2}{36}+\frac{y^2}{16}=1$

***Solution***

The equation of the ellipse is $\frac{x^2}{36}+\frac{y^2}{16}=1$

Since the denominator of $x^2$ is greater than the denominator of $y^2$, the equation of the ellipse is $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$.

$a^2=36$ and $b^2=16$ $\therefore$ $a=6$ and $b=4$

$c=\sqrt{a^2-b^2}=\sqrt{36-16}=\sqrt{20}$

$\therefore$ The foci are $(-\sqrt{20}, 0)$ and $(\sqrt{20}, 0)$

Vertices are $(-6, 0)$ and $(6, 0)$

Length of major axis is $2a=2\times6=12$

Length of minor axis is $2b=2\times4=8$

The eccenticity $e=\frac{c}{a}=\frac{\sqrt{20}}{6}$

Length of the latus rectum $=\frac{2b^2}{a}$

$=\frac{2\times16}{6}=\frac{16}{3}$

2. $\frac{x^2}{4}+\frac{y^2}{25}=1$

***Solution***

The equation of the ellipse is $\frac{x^2}{4}+\frac{y^2}{25}=1$

Since the denominator of $y^2$ is greater than denominator of $x^2$, the equation of the ellipse is $\frac{x^2}{b^2}+\frac{y^2}{a^2}=1$

$b^2=4$ and $a^2=25$ $\therefore b=2$ and $a=5$

$\therefore$ $c=\sqrt{a^2-b^2}=\sqrt{25-4}=\sqrt{21}$

Foci are $(0, \pm c)$ i.e, $(0, \pm\sqrt{21})$

Vertices are $(0, \pm a)$ i.e, $(0, \pm 5)$

Length of major axis is $2a=10$

Length of minor axis is $2b=4$

The eccentricity $e=\frac{c}{a}=\frac{\sqrt{21}}{5}$

Length of the latus rectum $=\frac{2b^2}{a}$

$=\frac{2\times4}{5}=\frac{8}{5}$

3. $\frac{x^2}{16}+\frac{y^2}{9}=1$

***Solution***

The equation of the ellipse is $\frac{x^2}{16}+\frac{y^2}{9}=1$

Since the denominator of $x^2$ is greater than denominator of $y^2$, the equation of the ellipse is $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

$a^2=16, b^2=9$ $\therefore$ $a=4, b=3$

$c=\sqrt{a^2-b^2}=\sqrt{16-9}=\sqrt{7}$

Foci are $(\pm c, 0)$ i.e, $(\pm\sqrt{7}, 0)$

Vertices are $(\pm a, 0)$ i.e, $(\pm4, 0)$

Length of major axis is $2a=8$

Length of minor axis is $2b=6$

Eccentricity $e=\frac{c}{a}=\frac{\sqrt{7}}{4}$

Length of the latus rectum $= \frac{2b^2}{a}$

$= \frac{2\times 9}{4} = \frac{9}{2}$.

4. $\frac{x^2}{25} + \frac{y^2}{100} = 1$

*Solution*

**Refer Example 23(ii)**

5. $\frac{x^2}{49} + \frac{y^2}{36} = 1$

*Solution*

The equation of the ellipse is $\frac{x^2}{49} + \frac{y^2}{36} = 1$.

Since the denominator of $x^2$ is greater than denominator of $y^2$, the equation of the ellipse is $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

$a^2 = 49$ and $b^2 = 36$

$\therefore a = 7$ and $b = 6$

$c = \sqrt{a^2 - b^2} = \sqrt{49-36} = \sqrt{13}$

Foci are $(\pm\sqrt{13}, 0)$

Vertices are $(\pm 7, 0)$

Length of the major axis $= 2a = 14$

Length of the minor axis $= 2b = 12$

Eccentricity $e = \frac{c}{a} = \frac{\sqrt{13}}{7}$

Lenth of the latus rectum $= \frac{2b^2}{a}$

$= \frac{2\times 36}{7} = \frac{72}{7}$

6. $\frac{x^2}{100} + \frac{y^2}{400} = 1$

*Solution*

The equation of the ellipse is

$\frac{x^2}{100} + \frac{y^2}{400} = 1$. Since the denominator of $y^2$ is greater than denominator of $x^2$, the equation of the ellipse is $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$

$a^2 = 400$ and $b^2 = 100$

$\therefore a = 20$ and $b = 10$

$c = \sqrt{a^2 - b^2} = \sqrt{400-100} = \sqrt{300}$

$\therefore c = 10\sqrt{3}$

Foci are $(0, \pm 10\sqrt{3})$

Vertices are $(0, \pm 20)$

Length of the major axis $= 2a = 40$

Length of the minor axis $= 2b = 20$

Eccentricity $e = \frac{c}{a} = \frac{10\sqrt{3}}{20} = \frac{\sqrt{3}}{2}$

Length of the latus rectum $= \frac{2b^2}{a}$

$= \frac{2\times 100}{20} = 10$

7. $36x^2 + 4y^2 = 144$

*Solution*

The equation of the ellipse is

$36x^2 + 4y^2 = 144$

Dividing by 144, we get

$\frac{x^2}{4} + \frac{y^2}{36} = 1$. Since the denominator of $y^2$ is greater than denominator of $x^2$, the equation of the ellipse is $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$

$a^2 = 36$ and $b^2 = 4$

$\therefore a = 6$ and $b = 2$

$c = \sqrt{a^2 - b^2} = \sqrt{36-4} = \sqrt{32}$

Foci are $(0, \pm\sqrt{32})$

Vertices are $(0, \pm 6)$

Length of the major axis $= 2a = 12$

Length of the minor axis $= 2b = 4$

Eccentricity $e = \frac{c}{a} = \frac{\sqrt{32}}{6} = \frac{4\sqrt{2}}{6}$

$= \frac{2\sqrt{2}}{3}$

Length of the latus rectum $= \frac{2b^2}{a}$

$= \frac{2\times 4}{6} = \frac{4}{3}$

8. $16x^2 + y^2 = 16$

***Solution***

The equation of the ellipse is

$16x^2 + y^2 = 16$

Dividing by 16, we get $\frac{x^2}{1} + \frac{y^2}{16} = 1$

Since the denominator of $y^2$ is greater than denominator of $x^2$, the equation of the ellipse is $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$.

$a^2 = 16$ and $b^2 = 1$ $\therefore$ $a = 4$ and $b = 1$

$c = \sqrt{a^2 - b^2}$

$= \sqrt{16-1} = \sqrt{15}$

Foci are $(0, \pm\sqrt{15})$

Vertices are $(0, \pm 4)$

Length of the major axis $= 2a = 8$

Length of the minor axis $= 2b = 2$

Eccentricity $e = \frac{c}{a} = \frac{\sqrt{15}}{4}$

Length of the latus rectum $= \frac{2b^2}{a}$

$= \frac{2\times 1}{4} = \frac{1}{2}$

9. $4x^2 + 9y^2 = 36$

***Solution***

**Refer Example 23(iii)**

***In each of the following Questions 10 to 20, find the equation for the ellipse that satisfies the given conditions:***

10. Vertices $(\pm 5, 0)$, foci $(\pm 4, 0)$

***Solution***

**Refer Example 24(i)**

11. Vertices $(0, \pm 13)$, foci $(0, \pm 5)$.

***Solution***

**Refer Example 24(ii)**

12. Vertices $(\pm 6, 0)$, foci $(\pm 4, 0)$

***Solution***

Vertices are $(\pm 6, 0)$ and foci are $(\pm 4, 0)$.

The vertices lie on $x$-axis.

The equation of the ellipse is $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

$\therefore$ $a = 6$ and $c = 4$

$c^2 = a^2 - b^2 \Rightarrow 16 = 36 - b^2$

$\therefore b^2 = 20$

$\therefore$ The equation of the ellipse is $\frac{x^2}{36} + \frac{y^2}{20} = 1$

13. Ends of major axis $(\pm 3, 0)$, ends of minor axis $(0, \pm 2)$.

***Solution***

**Refer Example 25**

14. Ends of major axis $(0, \pm\sqrt{5})$, ends of minor axis $(\pm 1, 0)$

***Solution***

End points of major axis are $(0, \pm\sqrt{5})$

End points of minor axis are (± 1, 0)

Since the major axis is $y$-axis, the equation of the ellipse is $\frac{x^2}{b^2}+\frac{y^2}{a^2}=1$

Here $a=\sqrt{5}$ and $b=1$

$\therefore$ The equation of the ellipse is $\frac{x^2}{1}+\frac{y^2}{5}=1$

15. Length of major axis 26, foci (± 5, 0)

***Solution***

Since the foci lie on $x$-axis, the equation of the ellipse is $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

The length of the major axis $2a=26$

$\therefore a=13$

The foci are $(\pm c, 0)$ $\therefore c=5$

$c^2=a^2-b^2 \Rightarrow b^2=a^2-c^2$

$=169-25=144$

$\therefore$ The equation of the ellipse is $\frac{x^2}{169}+\frac{y^2}{144}=1$

16. Length of minor axis 16, foci (0, ± 6).

***Solution***

**Refer Example 27**

17. Foci (± 3, 0), $a=4$

***Solution***

Since the foci are on $x$-axis, the equation of the ellipse is $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

Foci are (± 3, 0). $\therefore c=3$, $a=4$

$\therefore c^2=a^2-b^2 \Rightarrow b^2=a^2-c^2$

$=16-9=7$

$\therefore$ The equation of the ellipse is $\frac{x^2}{16}+\frac{y^2}{7}=1$

18. $b=3, c=4$, centre at the origin; foci on the $x$ axis.

***Solution***

Since the foci are on $x$-axis, the equation of the ellipse is $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

Given $b=3$ and $c=4$

$c^2=a^2-b^2$

$\Rightarrow a^2=b^2+c^2 = 16+9=25$

$\therefore$ The equation of the ellipse is $\frac{x^2}{25}+\frac{y^2}{9}=1$

19. Centre at (0, 0), major axis on the $y$-axis and passes through the points (3, 2) and (1,6).

***Solution***

**Refer Example 28**

20. Major axis on the $x$-axis and passes through the points (4, 3) and (6, 2).

***Solution***

Since major axis is on the $x$-axis, the equation of the ellipse is $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

Since the ellipse passes through (4, 3) and (6, 2) we get

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

$\frac{6^2}{a^2}+\frac{2^2}{b^2}=1$ ...... (2)

Solving (1) and (2) we get

$a^2=52$ and $b^2=13$

$\therefore$ The equation of the ellipse is $\frac{x^2}{52}+\frac{y^2}{13}=1$