



MATHS

BOOKS - CHHAYA PUBLICATION MATHS (BENGALI ENGLISH)

PARABOLA



1. Find the axis, coordinates of vertex and focus, length of latus rectum and the equation

of directrix for the following parabola :

$$y^2 = 18x$$



2. Find the axis, coordinates of vertex and focus, length of latus rectum and the equation of directrix for the following parabola :

$$3x^2=~-8y$$

3. Find the axis, coordinates of vertex and focurs, length of latus rectum and the equation of directrix of the following parabola

$$y^2 + 4x + 2y - 11 = 0$$

:

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4. Find the axis, coordinates of vertex and focus, length of latus rectum and the equation

of directrix for the following parabola :

$$y=lx^2+mx+n(l
eq 0)$$



5. If t be a variable parameter, find the vartex, axis, focus and length of the latus rectum of the parabola whose parametric equations are, 1

$$x=u\coslpha\cdot t, y=u\sinlpha\cdot t-rac{1}{2} extrm{gt}^2$$
 .

6. The parabola $y^2 = 2ax$ passes through the centre of the circle $4x^2 + 4y^2 - 8x + 12y - 7 = 0$. Find the focus the length of the latus rectum and the equation of the directrix of this parabola .



7. Find the point on the parabola $y^2=12x$ at

which the ordinate is double than abscissa.

8. If a+b
eq 0 , find the coordinates of focus and the length of latus rectum of the parabola $y^2 = 2mx$ which passes through the point of intersection of the straight lines $\frac{x}{a} + \frac{y}{b} = 1$ and $\frac{x}{b} + \frac{y}{a} = 1$. Watch Video Solution

9. Find the focal distance of a point on the parabola $x^2 = 8y$ if the ordinate of the point be 11.



10. Find the equation of the parabola whose coordinates of vertex and focus are (-2, 3) and (1, 3) respectively.



11. The length of latus rectum of a parabola is 18 unit . Let p be a point on the parabola whose distance from its axis is 15 unit . Find the distance of p form the focus of the

parabola .

12. The coordinates of one end of a focal chord

of the parabola $y^2 = 4ax$ are $(at^2, 2at)$.prove that the coordinates of the other end must be $\left(\frac{a}{t^2}, -\frac{2a}{t}\right)$.

13. Find the equation of the parabola whose
focus is (3, 4) and whose directrix is 3x + 4y +
25 = 0 . Also find the length of latus rectum of
he parabola .



14. A double ordinate of the parabola $y^2 = 4ax$ is of length 8a . Prove that the lines joining the vertex to its two ends are at right angles .



15. The focal distance of a point on the parabola $y^2=12x$ is 6 , find the corrdinates of the point .

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16. Find the two points on the parabola $x^2 = 8y$ each of which is at a distance 4 unit from the focus. Find also the equation of the

circle whose diameter is the line segment

joining these two points .



17. Find the equation of the parabola passing through the points (3,0), (-3,0) , (2,5) and having its axis parallel to the y - axis find the coordinates of its vertex .

18. The coordinates of the two ends of latus rectum of a parabola are (3,4) and (3,0) ,find the equation of the parabola.



19. Find the equation of the parabola whose vertex is (-1,3) and focus is (3, -1) .



20. Find the equation of the parabola whose coordinates of vertex are (-2,3) and the equation of the directrix is 2x + 3y + 8 = 0



21. A focal chord SE of the parabola $y^2 = 8x$ passes through the end point, having positive coordinates, of another chord EF': x = 4. Find the equation and the length of the chord



22. If a straight line passing through the focus of the parabola $y^2=4ax$ intersectts the parabola at the points (x_1,y_1) and (x_2,y_2) , then prove that $x_1x_2=a^2$.

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23. Examine with reasons the validity of the following statement : "The point (4,3) lies

outside the parabola $y^2 = 4x$ but the point (-4, -3) lies within it "

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24. If l and l' be the lengths of the segment \overline{PS} and $\overline{P'S}$ of a focal chord $\overline{PP'}$ of the parabola $y^2 = 4ax$, then show that $\frac{1}{l} + \frac{1}{l'} = \frac{1}{a}$.

25. Show that the equation of the chord of the parabola $x^2 = 4ay$ joining the points (x_1, y_1) ann (x_2, y_2) on it is $(x - x_1)(x - x_2) = x^2 - 4ay$.

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26. Show that the locus of the middle points of chords of the parabola $y^2 = 4ax$ passing through the vertex is the parabola $y^2 = 2ax$.

27. Prove that the least focal chord of a parabola is the latus rectum .

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28. Find the latus rectum of the parabola $3y^2=5x$

29. A chord \overline{PQ} of the parabola $y^2 = 4ax$, subtends a right angle at the vertex, show that the mid point of \overline{PQ} lies on the parabola,

$$y^2=2a(x-4a)$$
 .

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1. The length of latus rectum of the parabola $3x^2 = -8y$ is

A.
$$\frac{4}{3}$$
 unit
B. $\frac{8}{3}$ unit
C. $\frac{2}{3}$ unit

D. 4 unit

Answer: B



2. The coordinates of focus of the parabola

$$y^2=\ -\,5x$$
 are _

A.
$$\left(-\frac{5}{4},0\right)$$

B. $\left(\frac{5}{4},0\right)$
C. $\left(\frac{4}{5},0\right)$
D. $\left(-\frac{4}{5},0\right)$

Answer: A

 $y^2=12x$ are _

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3. The parametric equations of the parabola

A.
$$x=6t^2, y=3t$$

B.
$$x = 3t^2, y = 6t$$

C.
$$x=t^2, y=6t$$

D.
$$x=3t^2, y=t$$

Answer: B

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4. The equation of directrix of the parabola $4x^2 = 3y$ is _

C.
$$8y + 3 = 0$$

D. 8y - 3 = 0

Answer: A

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 $\left(y+1
ight)^2=\ -4(x-3)$ is parallel to_

A. positive x - axis

B. positive y - axis

C. negative x - axis

D. negative y - axis

Answer: C

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6. The coordinates of the vertex of the parabola $(x+1)^2 = -9(y+2)$ are

A. (1, 2)

B.
$$(-1, 2)$$

C.
$$(1, -2)$$

D.
$$(-1, -2)$$

Answer: D

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7. The equation of directrix of the parabola $3y^2=\,-\,4x$ is _

A.
$$3x + 1 = 0$$

B.
$$3x + 2 = 0$$

C. 3x - 1 = 0

D. 3x - 2 = 0

Answer: C



A. positive x - axis

B. positive y - axis

C. negative x - axis

D. negative y - axis

Answer: B

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9. The coordinate of focus of the parabola

$$x^2 = rac{ab}{a+b} \cdot y$$
 are _

$$A. \left\{ \frac{ab}{4(a+b)}, 0 \right\}$$
$$B. \left\{ \frac{-ab}{4(a+b)}, 0 \right\}$$
$$C. \left\{ 0, \frac{ab}{4(a+b)} \right\}$$
$$D. \left\{ 0, \frac{-ab}{4(a+b)} \right\}$$

Answer: C

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10. The length of latus rectum of the parabola

$$(y-1)^2 = -6(x+2)$$
 is_

A. 2 units

- B. 3 units
- C. 5 units
- D. 6 units

Answer: D



11. The equation of the parabola of which the focus is at the point (-3, 0) and the directricx is the line x = 3 is

A.
$$y^2=12x$$

$$\mathsf{B.}\,x^2=12y$$

$$\mathsf{C}.\,y^2=\,-\,12x$$

D.
$$x^2 = -12y$$

Answer: C

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12. The coordinates of one of the end-points of

the latus rectum of the parabola $\left(y-1
ight)^2=2(x+2)$ are _

A.
$$(-2, 1)$$

B. $\left(\frac{-3}{2}, 1\right)$
C. $\left(\frac{-3}{2}, 3\right)$
D. $\left(\frac{-3}{2}, 0\right)$

Answer: D

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13. The coordinates of the focus of the parabola $2x^2 = -5y$ are _

A.
$$\left(-\frac{5}{8},0\right)$$

B. $\left(-\frac{5}{2},0\right)$
C. $\left(0,-\frac{5}{2}\right)$
D. $\left(0,-\frac{5}{8}\right)$

Answer: D

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14. The equation of directrix of the parabola

 $3y^2=~-~4x$ is _

B.
$$3x - 1 = 0$$

C.
$$3y + 1 = 0$$

D.
$$3x + 1 = 0$$

Answer: B

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15. The coordinates of the focus of the parabola $3y^2=8x$ are _

A.
$$\left(\frac{2}{3}, 0\right)$$

B. $\left(\frac{8}{3}, 0\right)$
C. $\left(0, \frac{8}{3}\right)$
D. $\left(0, \frac{2}{3}\right)$

Answer: A

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16. The equation of the directrix of parabola $2x^2 = 3y$ is _

A.
$$8x + 3 = 0$$

B.
$$8x - 3 = 0$$

$$C. 8y + 3 = 0$$

D.
$$8y - 3 = 0$$

Answer: C

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Very Short Answer Type Qusetions

1. Find the focus, the length of the latus rectum and the directrix of the parabola $3x^2=8y$



2. Find the length of the latus rectum of the

parabola $y = -2x^2 + 12x - 17$.

3. Find the eqution of the parabola whose coordinates of vertex and focus are (0 , 0) and $\left(\frac{3}{2}, 0\right)$ respectively .

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4. The vertex of a parabola is at the origin and its focus is $\left(0, -\frac{5}{4}\right)$, find the equation of

the parabola.


5. The parabola $x^2 + 2py = 0$ passes through the point (4,-2) , find the coordinates of focus and the length of latus rectum .

6. The parabola $y^2 = 2ax$ gose through the point of intersection of $\frac{x}{3} + \frac{y}{2} = 1$ and $\frac{x}{2} + \frac{y}{3} = 1$. Find its focus .

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7. A parabola having vertex at the origin and axis along x-axis passes through (6,-20) , find the equation of the parabola .

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8. The axis of a parabola is along y-axis and vertex is (0,0) . If it passes through (-3,2) , find the coordinates of its focus .

9. Find the equation of the parabola whose vertex is (0,0) and directrix is the line x + 3 = 0.

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10. Find the equation of the parabola whose vertex is at the origin and directrix is the line y - 4 = 0.

11. If the parabola $y^2 = 4ax$ passes through the point of intersection of the straight lines 3x + y + 5 = 0 and x + 3y - 1 = 0, find the coordinates of its focus and the length of its latus rectum.

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12. The parabola $y^2=4ax$ passes through the centre of the circle $2x^2+2y^2+4x-12y-4=0$,Find the

coordinates of the focus , length of the latus

rectum and equation of the derectrix



 $x^2+y^2+4x-12y-4=0$ what is the

length of the latus rectum of the parabola?

14. Find the point on parabola $y^2 = -20x$ at

which the ordinate is double the abscissa .







16. Find the point on the parabola $y^2 = 4ax(a > 0)$ which forms a triangle of area $3a^2$ with the vertex and focus of the parabola.

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17. What type of conic is the locus of the moving point $(at^2, 2at)$? Find the equation of the locus .

18. The focal distance of a point on the parabola $y^2 = 8x$ is 4, find the coordinates of the point .



19. Find the focal distance of a point on the parabola $y^2=20x$ if the abscissa of the point be 7 .

20. Determine the positions of the points (a) (3,6) ,(b) (4,3) and (c) (1,-3) with respect to the parabola $y^2 = 9x$.



21. For what values of a will the point (8, 4) be

an inside point of the parabola $y^2=4ax$?

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Short Answer Tupe Questions

1. Find the axis, coordinates of vertex and focus, length of latus rectum, equation of directrix and the coordinates of the ends of latus rectum of the following parabola :

$$y^2 = 20x$$

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Long Answer Type Questions

1. Find the equation of the parabola whose vertex is (2,3) and the equation of latus rectum is x = 4. Find the coordinates of the point of intersection of this parabola with its latus rectum.

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Sample Questions For Competitive Exams A M C Q 1. The focus and directrix of the parabola $9x^2-24xy+16y^2-20x-15y-60=0$ is

A.
$$\left(-\frac{43}{25}, -\frac{129}{100}\right)$$

B. $\left(-\frac{43}{25}, \frac{129}{100}\right)$
C. 16 x + 12 y + 53 = 0

Answer: A::C

2. Let $y^2 = 4ax$ be a parabola and $x^2 + y^2 + 2bx = 0$ be a circle . If the parabola and the circle touch each other externally , then

A.
$$a>0, b>0$$

B. a > 0, b > 0

 ${\sf C}.\, a < 0, b > 0$

D. a < 0, b < 0

Answer: A::D

3. If the points of intersection of the parabola $y^2=4ax$ and the circle $x^2+y^2+2gx+2fy+c=0$ are $(x_1,y_1),\,(x_2,y_2),\,(x_3,y_3)$ and (x_4,y_4) respectively , then _

A. $y_1 + y_2 + y_3 + y_4 = 0$

 $\mathsf{B}.\sqrt{x}_1+\sqrt{x}_2+\sqrt{x}_3+\sqrt{x}_4=0$

C. $y_1 - y_2 + y_3 - y_4 = 0$

D. $y_1 - y_2 - y_3 + y_4 = 0$

Answer: A::B



4. $Ay^2 + By + Cx + D = 0$ be the equation of a parabola , then _

A. the length of the latus rectum is $\left|\frac{C}{A}\right|$

B. the axis of the parabola is vertical

C. the y - coordinate of the vertex is $-\frac{B}{2A}$

D. the x - coordinate of the verte is

$$rac{D}{A}+rac{B^2}{4AC}$$

Answer: A::C



5. If equation of directrix of the parabola

$$x^2+4y-6x+k=0$$
 is y + 1 = 0 , then _

1. S is focus of parabola $y^2=8x$ and AB is common chord of $y^2=4ax$ and circle $x^2+y^2-2x-4y=0$ the area of ΔPQS is

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2. x - 1 = 0 is the equation of directrix of the parabola $y^2 - kx + 8 = 0$. Then the value of

k is _

A. $\frac{1}{8}$ B. 8 C. 4 D. $\frac{1}{4}$

Answer: C



3. If $x = \frac{3}{k}$ be the equation of directrix of the parabola $y^2 + 4y + 4x + 2 = 0$ then , k is _ Watch Video Solution

4. If $\lambda x^2 + 4xy + y^2 + \lambda x + 3y + 2 = 0$

represents the equation of the parabola , then the vlaue of λ is _

5. Find the latus rectum of the parabola $2x^2 + 3y = 0$ Watch Video Solution

Sample Questions For Competitive Exams C Matrix Match Type

1. Find the latus rectum of the parabola
$$\left(y-3
ight)^2=6(x-2)$$

2. Find the focus of the parabola $(y-3)^2 = 6(x-2)$ Watch Video Solution

Sample Questions For Competitive Exams D Comprehension Type

1. Find the focus of the parabola
$$x^2 - 4x - 5y - 1 = 0$$

2. Find the latus rectum of the parabola $y^2 + 4x + 2y = 11$



$$(x-3)^2+8(y+1)=0$$

4. If the locus of the circumcentre of variable triangle having sides x = 0, y = 2 and |x + my = 1 where (I, m) lies on the Parabola $y^2 = 4ax$ is a curve 'C' then

Coorrdinates of the vertex of this curve 'C' is _

A.
$$\left(-2, \frac{3}{2}\right)$$

B. $\left(-2, -\frac{3}{2}\right)$
C. $\left(2, \frac{3}{2}\right)$
D. $2, -\frac{3}{2}$

Answer: A

5. If the locus of the circumcentre of variable triangle having sides x = 0, y = 2 and |x + my = 1where (I, m) lies on the Parabola $y^2 = 4ax$ is a curve 'C' then The length of smallest focal chord of this curve 'C' is

A.
$$\frac{1}{4}$$

B. $\frac{1}{12}$
C. $\frac{1}{8}$

D. $\frac{1}{16}$

Answer: C

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6. If the locus of the circumcentre of variable triangle having sides x = 0 , y = 2 and lx + my = 1 where (l , m) lies on the Parabola $y^2 = 4ax$ is a curve 'C' then

The curve 'C' is symmetric about the line _

A.
$$x=rac{3}{2}$$

B.
$$y=-rac{3}{2}$$

C. $x=-rac{3}{2}$
D. $y=rac{3}{2}$

Answer: D

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Sample Questions For Competitive Exams E Assertion Reason Type

1. Find the latus rectum of the parabola

$$x = 2y^2 - 4y + 5$$

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2. Statemet - I : Number of focal chords of length 6 units that can be drawn on the parabola $y^2 - 2y - 8x + 17 = 0$ is zero Statement - II : Latus rectum is the shortest focal chord of the parabola

A. Statement - I is true Statement - II is true

and

Statement - II is a correct explantion for

Statement - I.

B. Statement - I is true, Statement - II is

true but

Statement - II is not a correct

explanation of Statement - I.

C. Statement - I is true , Statement - II is

false .

D. Statement - I false , Statement - II is true .



1. Find the axis, coordinates of vertex and focus, length of latus rectum, equation of directrix and the coordinates of the ends of

latus rectum of the following parabola :

$$x^2=\,-\,12y$$

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2. Find the axis, coordinates of vertex and focus, length of latus rectum, equation of directrix and the coordinates of the ends of latus rectum of the following parabola :

 $5x^2 = 16y$

3. Find the axis, coordinates of vertex and focus, length of latus rectum, equation of directrix and the coordinates of the ends of latus rectum of the following parabola :

$$3y^2=\ -4x$$

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4. Find the axis, coordinates of vertex and focus, length of latus rectum, equation of directrix and the coordinates of the ends of

latus rectum of the following parabola :

$$\left(y+3\right)^2=2(x+2)$$

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5. Find the axis, coordinates of vertex and focus, length of latus rectum, equation of directrix and the coordinates of the ends of latus rectum of the following parabola :

$$4(x-2)^2 = -5(y+3)$$

6. Find the axis, coordinates of vertex and focus, length of latus rectum, equation of directrix and the coordinates of the ends of latus rectum of the following parabola :

$$y^2 = 6(x+y)$$

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7. Find the axis, coordinates of vertex and focus, length of latus rectum, equation of directrix and the coordinates of the ends of

latus rectum of the following parabola :

$$y^2 - 4x - 2y - 7 = 0$$

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8. Find the equation of the parabola whose vertex is at (2,-3) , axis is parallel to x - axis and length of latus rectum is 12 .



9. The coordinates of the vertex and focus of a parabola are (1,2) and (-1,2) respectively : find its equation.



10. Show that the equation of the parabola whose vertex is (2,3) and focus is (2, -1) is

$$x^2 - 4x + 16y = 44$$
 .

11. show that the equation of the parabola whose vertex and focus are on the x -axis at distances a and a' from the origin respectively is $y^2 = 4(a'-a)(x-a)$

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12. Find the equation of the parabola whose vertex is the point (-2,3) and directrix is the line x + 7 = 0
13. Find the equation of the parabola whose vertexi is the point (1,-2) and the eqation of directrix is y + 5 = 0.



14. Find the equatio of the parabola whose focus is at the origin and the equation of directrix is x + y = 1.



15. Find the equation of the parabola whose focus is (2,1) and whose directrix is 3x - y + 1 = 0



16. The equation of the directrix of a parabola

is x = y and the coordinates of its focus ar (4,0)

. Find the equation of the parabola.

17. Find the coordinates of vartex and the length of latus rectum of the parabola whose focus is (0,0) and the directrix is the line $2 \times + y = 1$



18. A point moves in such a way that its ditance from the point (2,5) is equal to its distace from the line 2x + 4y = 3. Find the equation of its path . What is the name of the curve ?



19. The coordinates of a moving point P are $\left(2t^2+4,\,4t+6
ight)$, show that the locus of P is a parabola.

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20. If θ is a variable parameter , show that the

equations

$$x=rac{1}{4}ig(3-\cos ec^2 hetaig), y=2+\cot heta$$

represent the equation of a parabola. Find the

coordinates of vertex , focus and the length of

latus rectum of the parabola.



21. Find the equation of the circle, one of whose diameters is the latus rectum of $y^2 = 4ax$. Show that this circle goes through the common point of the axis and the directrix of the parabola.



22. Show that the locus of the middle points of chords of the parabola $y^2 = 4ax$ passing through the vertex is the parabola $y^2 = 2ax$



23. Find the locus of middle points of a family

of focal chords of the parabola $y^2=4ax$

24. PN is any ordinate of the parabola $y^2 = 4ax$, the point M divides PN in the ratio m: n . Find the locus of M .



25. Prove that the lines joining the ends of latus rectum of the parabola $y^2 = 4ax$ with the point of intersection of its axis and directrix are at right angles.

26. PQ is a chord of the parabola $y^2=4ax$. The ordinate of P is twice that of Q . Prove that the locus of the mid - point of PQ is $5y^2=18ax$

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27. The coordinates of the two ends of latus rectum of a parabola are (8,1) and (-4,1) , find the equation of the parabola.

28. Find the equation of the parabola whose

vertex is (-2,2) and focus is (-6,-6).



29. The directrix of a parabola is x + y + 4 = 0and vertix is the point (-1,-1) . Find (i) the position of focus and (ii) the equation of the parabola. **30.** The axis of a parabola is parallel to x -axis and it passes through the points (2,0) ,(1,-1) and (6, -2) , find its equation .

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31. A parabola passes through the points (0.0)

,(2,2) and (-2,-6) and its asix ia parallel to y-axis .

Find its equation .

32. If the extremities of a focal chord of the parabola $y^2=4ax$ be $\left(at_1^2,2at^1
ight)$ and $\left(at_2^2,2at_2
ight)$, prove that $t_1t_2=-1$

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33. If $(at^2, 2at)$ be the coordinates of an extremity of a focal chord of the parabola $y^2 = 4ax$, then show that the length of the chord is $a\left(t+\frac{1}{t}\right)^2$.

34. Show that the equation of the chord of the parabola $y^2 = 4ax$ through the points (x_1, y_1) and (x_2, y_2) on it is $(y - y_1)(y - y_2) = y^2 - 4ax$

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35. Show that the product of the ordinates of the ends of a focal chord of the parabola $y^2 = 4ax$ is constant .

36. If a straight line pasing through the focus of the parabola $y^2 = 4ax$ intersects the parabola at the points (x_1, y_1) and (x_2, y_2) then prove that $y_1y_2 + 4x_1x_2 = 0$.

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37. Find the equation of the circle, passing through the origin and the foci of the parabolas $y^2 = 8x$ and $x^2 = 24y$.

38. Find the equation of the circle on SC as diameter, where S is the focus of $y^2 = 12x$ and C is the centre of $x^2 + y^2 - 18x - 16y + 45 = 0$. Also find the length of the chord of the circle lying along the x - axis



39. Q is any point on the parabola $y^2 = 4ax$,QN is the ordinate of Q and P is the mid-point of QN ,. Prove that the locus of p is a parabola whose latus rectum is one -fourth that of the given parabola.

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40. Find the equation of the circle drawn on the line-segment joining the foci of the two

parabolas $x^2 = 4ay$ and $y^2 = 4a(x-a)$ as

diameter.



41. \overline{PQ} is a double ordinate of the parabola $y^2 = 4ax$,find the equation to the locus of its point of trisection .



42. Show that the circle described on a focal chord of a parabola as diameter touches its directrix .



43. Prove that the sum of the reciprocals of the segments of any focal chord of a parabola

is constant .



44. The length of latus rectum of a parabola is 16 unit . The distance of a point P on the parabola from its axis is 12 unit . Find the distance of P from the focus of the parabola .



45. Prove that the length of any chord of the parabola $y^2 = 4ax$ passing through the vertex and making an angle θ with the positive direction of the x-axic is $4a \cos ec\theta \cot \theta$

46. If a
eq 0 and the line 2bx + 2cy + 4d = 0 is passing through the points of intersection of parabolas $y^2 = 4ax$ and $x^2 = 4ay$, then prove that $d^2 = a^2(2b + 3c)^2$.

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47. Find the equation of the parabola which has its axis along the x -axis and passes through the points (3,2) and (-2,-1).

48. A chord is drawn through the vertex of the parabola $y^2 = 4ax$ making an angle heta with its axis . Find the length of the chord .