MATHS

BOOKS - S CHAND MATHS (ENGLISH)

PARABOLA

Examples

1. For the following parabola, find the coordinates if the focus, length of the latus rectum, equation of the axis and the equation

of the directrix.

$y^2 = 18x$

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2. For the following parabolas, find the coordinates if the focus, length of the lutus rectum, equation of the axis and the euation of the directrices.

$y^2 = -16x$

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3. For the following parabolas, find the coordinates of the focus, length of the lutus rectum, equation of the axis and the equation of the directrices.

$x^2 = 10y$

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4. For the following parabolas, find the coordinates if the focus, length of the lutus rectum, equation of the axis and the euation

of the directrices.

$x^2 = -7y$

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5. For the following parabolas, find the coordinates if the focus, length of the latus rectum equation if the axis and the equation if the directrices.

$3x^2 = 8y$

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6. For the following parabolas, find the coordinates if the focus, length of the latus rectum equation if the axis and the equation if the directrices.

$4y^2 = 15x$

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7. Find the quation of the parabolas with vertices at the origin and satisfying the following conditions.

Focus at $(a, 0)$

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8. Find the quation of the parabolas with vertices at the origin and satisfying the following conditions.

Focus at $(0, a)$

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9. Find the quation of the parabolas with vertices at the origin and satisfying the

following conditions.

Focus at $(0, -a)$

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10. Find the equation of the parabola with vertices at the origin and satisfying the following conditions.

Directrix $x = 7$

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11. Find the equation of the parabola with vertices at the origin and satisfying the following conditions.

Directrix $y = 5$

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12. Find the quation of the parabolas with vertices at the origin and satisfying the following conditions.

Passing through $(-3, 7)$ and axis along the x-axis.

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13. Find the quation of the parabolas with vertices at the origin and satisfying the following conditions.

Passing through $(4, 9)$ and axis along the y-axis.

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14. Find the quation of the following parabolas.

Directrix $x = 0$, focus at $(6, 0)$

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15. The equation of axis of the parabola having focus (2,3) and directrix $x - 4y + 3 = 0$ is

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16. Find the quation of the following parabolas.

Focus (a, b), directrix $\frac{x}{a} + \frac{y}{b} = 1$

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17. Find the equation of the parabola whose vertex is at the point $(-2, 2)$ and whose focus is $(-6, -6)$.

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18. Derive the equation of the parabola with its vertex at $(3, 2)$ and its focus at $(5, 2)$.

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19. Determine the equation of the parabola with its vertex at the point $(2, 3)$, its axis parallel to the y-axis and which passes through the point $(4, 5)$.

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20. Find the equation of the parabola with its axis parallel to the x-axis and which passes through the point $(-2, 1), (1, 2)$ and $(-3, 3)$.

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21. Derive the equation of the parabola with latux rectum joining the points $(3, 5)$ and $(3, -3)$.

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22. Find the equation of the parabola whose vertex and focus lie on the y-axis at distance b and b' respectively from the origin.

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23. Transform the following parabolas to the standard forms:

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

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24. Transform the following parabolas to the standard forms:

$(x+3)^2 = 8(y-5)$

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25. Find the vertex, focus and directix and latus rectum of the parabola.

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

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26. Find the vertex, focus , and directrix axis of the parabola $x^2 + 4y + 3x = 2$. Sketch the curve.

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27. Find the vertex,focus, directrix and axis of the parabola and length of its latus rectum $5x + 30x + 2y + 59 = 0$.

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Try These

1. Find the equation of the parabola whose vertex is at the point $(-2, 2)$ and whose focus is $(-6, -6)$.

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2. Find the equation of a parabola whose vertex at $(-2, 3)$ and the focus at $(1, 3)$.

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3. Find the equation of the parabola whose focus is $(1, -1)$ and whose vertex is $2, 1$. Also, find its axis and latus-rectum.

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Exercise 23

1. The focus at (10, 0) the directrix $x = -10$.

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2. The focus at $(0, 5)$ the directrix $y = -5$.

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3. The focus at $(-3, 0)$ the directrix $x + 5 - 0$.

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4. The focus at $(2, -3)$ the directrix $x + 5 = 0$.

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5. The focus at $(1, 1)$ the directrix $x - y = 3$.

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6. The vertex at the origin, the axis along the x-axis, and passes through $(-3, 6)$.

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7. The focus at $(-2, -1)$ and the latus rectum joins the points $(-2, 2)$ and $(-2, -4)$.

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8. Find the equation of a parabola whose vertex at $(-2, 3)$ and the focus at $(1, 3)$.

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9. Find the equation of parabola if it's vertex is at $(0, 0)$ and the focus at $(0, 1)$.

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10. Find the equation of the parabola whose vertex is at $(0, 0)$ and the focus is at $(0, a)$.

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11. The axis parallel to the x-axis, and the parabola passes through $(3, 3), (6, 5),$ and $(6, -3)$.

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12. The axis parallel to the x-axis, and the parabola passes through the points $(4, 5), (-2, 11),$ and $(-4, 21)$.

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13. The parabola $y^2 = 4px$ passes thrugh the point $(3, -2)$. Obtain the length of the latus rectum and the coordinates of the focus.

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14. Prove that the equation $y^2 + 2ax + 2by + c = 0$ represents a parabola whose axis is parallel to the axis of x. Find its vertex.

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15. Of the parabola, $4(y-1)^2 = -7(x-3)$

find

The length of the latus rectum.

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16. Of the parabola, $4(y-1)^2 = -7(x-3)$

find

The coordinates of the focus and the vertex.

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17. Find the vertex, focus, and directrix of the following parabolas:

$$y^2 - 2y + 8x - 23 = 0$$

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18. Find the vertex, focus, and directrix of the following parabolas:

$$x^2 + 8x + 12y + 4 = 0$$

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19. Find the vertex, focus and directix of the parabola $(x-h)^2+4a(y-k)=0$.

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20. Find the equatin to the parabola whose axis is parallel to the y-xis and which passes through the point $(0,4),(1.9),$ and $(-2,6)$ and determine its latus rectum.

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21. Find the coordinates of the point on the parabola $y^2 = 8x$ whose focal distance is 8.

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22. If the ordinate of a point on the parabola $y^2 = 4ax$ is twice the latus rectum, prove that the abscissa of this point is twice the ordinate.

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23. Find the equation of the parabola whose focus is at the origin, and whose directrix is the line $y - x = 4$.Find also the length of the latus rectum, the equation of the axis, and the coordinates of the vertex.

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24. The directrix of a conic section is the straight line $3x - 4y + 5 - 0$ and the focus is $(2, 3)$. If the eccontricity e is 1, find the

equation to the coin section. Is the coin sction a parabola?

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25. Find the equation to the parabola whose focus is $(-2, 1)$ and directrix is $6x - 3y = 8$.

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26. The length of the latus rectum of the parabola whose focus is $(3, 3)$ and directrix is

$3x - 4y - 2 = 0$ is.

A. 2

B. 1

C. 4

D. None of these

Answer: A

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Chapter Test

1. The equation of the diirectrix of the parabola is $3x + 2y + 1 - 0$. The focus is $(2, 1)$. Find the equation of the parabola.

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2. The point $(0, 4)$ and $(0, 2)$ are the vertex and focus of a parabola. Find the equation of the parabola.

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3. Find the equation of th parabola with latus rectum joining points $(4, 6)$ and $(4, -2)$.

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4. Find the equation of the parabola whose focus is $(-1, -2)$ and the equation of the directrix is given by $4x - 3y + 2 = 0$. Also find the equation of the axis.

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5. Find the equation of the parabola if its vertex is at $(0, 0)$, passes through $(5, 2)$ and is symmetric w.r.t. y-axis.

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6. The parabola $y^2 = 4ax$ passes through the point $(2, -6)$. Find the length of its latus rectum.

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7. Find the coordinates of the vertex and the focus of the parabola $y^2 = 4(x + y)$.

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8. Find the focus, the equation of the directrix and the length of latus rectum of the parabola $y^2 + 12 = 4x + 4y$.

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