MATHS

BOOKS - SAI MATHS (TELUGU ENGLISH)

PARABOLA, ELLIPSE AND HYPERBOLA

Problems

1. If P is a point on the parabola $y^2 = 8x$ and A is the point (1,0) then the locus of the mid point of the line segment AP is

A. $y^2 = 4\left(x - \frac{1}{2}\right)$

B. $y^2 = 2(2x + 1)$

C. $y^2 = x - \frac{1}{2}$

D. $y^2 = 2x + 1$

Answer: A

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

A. $x^2 + y^2 - 10x - 2y - 2xy - 5 = 0$

B. $x^2 + y^2 + 10x - 2y - 2xy - 5 = 0$

C. $x^2 + y^2 + 10x + 2y - 2xy - 5 = 0$

D. $x^2 + y^2 + 10x + 2y + 2xy - 5 = 0$

Answer: A

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3. The centre of the ellipse $\frac{(x+y-3)^2}{9} + \frac{(x-y+1)^2}{16} = 1$ is

A. (-1,2)

B. (1,-2)

C. (-1,-2)

D. (1,2)

Answer: D

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4. For the ellipse $\frac{x^2}{25}+\frac{y^2}{16}=1$ a list of lines given in List I are to be matched with their equations given in Lisht II.

The correct match is:

A.

i	ii	iii
a	b	a	e

B.

i	ii	iii
b	f	a	c

C.

i	ii	iii
c	b	d	c

D.

i	ii	iii
d	f	a	e

Answer: B

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5. The product of lenghts of perpendicular from any point on the hyperbola $x^2 - y^2 = 16$ to its asymptotes, is

A. 2

B. 4

C. 8

D. 16

Answer: C

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6. An equilateral triangle is inscribed in the parabola $y^2 = 8x$, with one of its vertices is the vertex of the parabola, Then, the length of the side of that triangle is

A. $24\sqrt{3}$

B. $16\sqrt{3}$

C. $8\sqrt{3}$

D. $4\sqrt{3}$

Answer: B

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7. The point (3,4) is the focus and 2x-3y+5=0 is the directrix of a parabola . Its latusrectum is

A. $\frac{2}{\sqrt{13}}$

B. $\frac{4}{\sqrt{13}}$

C. $\frac{1}{\sqrt{13}}$

D. $3\sqrt{13}$

Answer: A

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8. The radius of the circle passing throught the foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ and having its center at (0,3) is

A. 6

B. 4

C. 3

D. 2

Answer: B

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9. The values that can take so that straight line y=4x+n touches the curve $x^2 + 4y^2 = 4$ is

A. ± 45

B. $\pm\sqrt{60}$

C. $\pm\sqrt{65}$

D. $\pm\sqrt{72}$

Answer: C

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10. The foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ and the hyperbla $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$ coincide. Then, the value of b^2 is

A. 5

B. 7

C. 9

D. 1

Answer: B

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11. If a normal chord at a point t on the parabola $y^2 = 4ax$ subtends a right angle at the vertex, then t equals to

A. 1

B. $\sqrt{2}$

C. 2

D. $\sqrt{3}$

Answer: B

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12. The slopes of the focal chords of the parabola $y^2 = 32x$, which are tangents to the circle $x^2 + y^2 = 4$ are

A. $\frac{1}{2}, \frac{-1}{2}$

B. $\frac{1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}$

C. $\frac{1}{\sqrt{15}}, \frac{-1}{\sqrt{15}}$

D. $\frac{2}{\sqrt{5}}, \frac{-2}{\sqrt{5}}$

Answer: C

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13. If tangent are drawn from any point on the circle $x^2 + y^2 = 25$ to the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$, then the angle between the tangents is,

A. $\frac{2\pi}{3}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer: D

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14. An ellipse passing through $\left(4\sqrt{2}, 2\sqrt{6}\right)$ has foci at (-4,0) and (4,0). Then, its eccentricity is

A. $\sqrt{2}$

B. $\frac{1}{2}$

C. $\frac{1}{\sqrt{2}}$

D. $\frac{1}{\sqrt{3}}$

Answer: B

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15. A hyperbola passing through a focus of the ellipse $\frac{x^2}{169}+\frac{y^2}{25}=1$. Its transverse and conjugate axes coincide respectively with the major and minor axes of the ellipse. The product of eccentricities is 1. Then, the equation of the hyperbola is,

A. $\frac{x^2}{144}-\frac{y^2}{9}=1$

B. $\frac{x^2}{169}-\frac{y^2}{25}=1$

C. $\frac{x^2}{144}-\frac{y^2}{25}=1$

D. $\frac{x^2}{25}-\frac{y^2}{9}=1$

Answer: C

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16. A circle of radiu 4, drawn on a chord of the parabola $y^2 = 8x$ as dimater, touches the axis of the parabola. Then, the slope of the chord is

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

B. $\frac{3}{4}$

C. 1

D. 2

Answer: C

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17. The mid point of a chord of the ellipse $x^2 + 4y^2 - 2x + 20y = 0$ is (2,-4). The equation of the chord is

A. x-6y=26

B. x+6y=26

C. 6x-y=26

D. 6x+y=26

Answer: A

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18. If the focii of the ellipse $\frac{x^2}{25}+\frac{y^2}{16}=1$ and the hyperbola $\frac{x^2}{4}-\frac{y^2}{b^2}=1$ coincide, then b^2 is equal to

A. 4

B. 5

C. 8

D. 9

Answer: B

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19. If x=9 is a chord of contact of the hyperbola $x^2 - y^2 = 9$, then the equation of the tangent at one of the points of contact is

A. $x + \sqrt{3}y + 2 = 0$

B. $3x - 2\sqrt{2}y - 3 = 0$

C. $3x - \sqrt{2}y + 6 = 0$

D. $x - \sqrt{3}y + 2 = 0$

Answer: B

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20. Let x+y=k be a normal to the parabola $y^2 = 12x$. If p is length of the perpendicular from the focus of the parabola onto this normal, then $4k - 2p^2$ is equal to

A. 1

B. 0

C. -1

D. 2

Answer: B

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21. If the line 2x+5y=12 intersect the ellipse $4x^2 + 5y^2 = 20$ in two distinct point A and B, then mid-point of AB is,

A. (0,1)

B. (1,2)

C. (1,0)

D. (2,1)

Answer: B

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22. Equation of one of the tangent passing through (2,8) to the hyperbola $5x^2 - y^2 = 5$ is

A. 3x+y-14=0

B. 3x-y+2=0

C. x+y+3=0

D. x-y+6=0

Answer: B

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23. The area (in sq. units) of the equilateral triangle formed by the tangnet at $\left(\sqrt{3}, 0\right)$ to the hyperbola $x^2 - 3y^2 = 3$ with the pair of asymptotes of the hyperbola is

A. $\sqrt{2}$

B. $\sqrt{3}$

C. $\frac{1}{\sqrt{3}}$

D. $2\sqrt{3}$

Answer: B

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24. If a chord of the parabola $y^2 = 4x$ passes through its focus and makes an angle θ with the X-axis, then its length is

A. $4\cos^2\theta$

B. $4\sin^2\theta$

C. $4 \quad \text{cosec}^2\theta$

D. $4\sec^2\theta$

Answer: C

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25. If the straight line y=mx+c is parallel ot the axis of the parabola $y^2 = lx$ and intersects the parabola at (c^(2)/8,c)`, then the length of the latusrectum is

A. 2

B. 3

C. 4

D. 8

Answer: D

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26. The eccentricity of the ellipse $x^2 + 4y^2 + 2x + 16y + 13 = 0$ is

A. $\frac{\sqrt{3}}{2}$

B. $\frac{1}{2}$

C. $\frac{1}{\sqrt{3}}$

D. $\frac{1}{\sqrt{2}}$

Answer: A

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27. The angle between the asymptotes of the hyperbola $x^2 - 3y^2 = 3$ is

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer: C

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28. Let M be the foot of the perpendicular from a point P on the parabola $y^2 = 8(x - 3)$ onto its directrix and let S be the foucs of the parabola. If $\triangle SPM$ is an equilateral triangle, then P is equal to

A. $\left(4\sqrt{3}, 8\right)$

B. $\left(8, 4\sqrt{3}\right)$

C. $\left(9, 4\sqrt{3}\right)$

D. $\left(4\sqrt{3}, 9\right)$

Answer: C

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29. If the lines 2x+3y+12=0, x-y+k=0 are conjugate with respect to the parabola $y^2 = 8$ then k is equal to

A. 10

B. $\frac{7}{2}$

C. -12

D. -2

Answer: C

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30. Find the equation to the parabola, whose axis is parallel to the y-axis and which passes through the

points (0,4), (1,9) and (4,5) is

A. $y = -x^2 + x + 4$

B. $y = -x^2 + x + 1$

C. $y = \frac{-19}{2}x^2 + \frac{79}{12}x + 4$

D. $y = \frac{-19}{12}x^2 + \frac{89}{12} + 1$

Answer: C

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31. The equation of the hyperbola which passes through the point (2,3) and has the asymptotes 4x+3y-7=0 and x-2y-1=0 is

A. $4x^2 + 5xy - 6y^2 - 11x + 11y + 50 = 0$

B. $4x^2 + 5xy - 6y^2 - 11x + 11y - 43 = 0$

C. $4x^2 - 5xy - 6y^2 - 11x + 11y + 57 = 0$

D. $x^2 - 5xy - y^2 - 11x + 11y - 43 = 0$

Answer: C

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32. The product of the perpendicular distances from any point of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ to its asymptotes is

A. $\frac{a^2b^2}{a^2 - b^2}$

B. $\frac{a^2b^2}{a^2+b^2}$

C. $\frac{a^2+b^2}{a^2b^2}$

D. $\frac{a^2-b^2}{a^2b^2}$

Answer: B

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33. The number of normals drawn to the parabola $y^2 = 4x$ from the point (1,0) is

A. 0

B. 1

C. 2

D. 3

Answer: B

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34. If the distance between the foci of an ellipse is 6 and the length of the minor axis is 8, then the ecentricity is

A. $\frac{1}{\sqrt{5}}$

B. $\frac{1}{2}$

C. $\frac{3}{5}$

D. $\frac{4}{5}$

Answer: C

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35. The eccentricity of the conic $\frac{5}{r} = 2 + 3\cos\theta + 4\sin\theta$ is

A. $\frac{1}{2}$

B. 1

C. $\frac{3}{2}$

D. $\frac{5}{2}$

Answer: D

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36. If the circle $x^2 + y^2 = a^2$ intersects the hyperbola $xy = c^2$ in four points (x_1, y_1) for $i = 1, 2, 3$ and 4 then $y_1 + y_2 + y_3 + y_4$ equals

A. 0

B. c

C. a

D. c^4

Answer: A

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37. The mid point of the chord 4x-3y=5 of the hyperbola $2x^2 - 3y^2 = 12$ is

A. $\left(0, -\frac{5}{3}\right)$

B. (2,1)

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

D. $\left(\frac{11}{4}, 2\right)$

Answer: B

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38. If 2x+3y+12=0 and $x - y + 4\lambda = 0$ are conjugate lines with respect to the parabola $y^2 = 8x$, then λ is equal to

A. 2

B. -2

C. 3

D. -3

Answer: D

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39. For an ellipse with eccentricity $\frac{1}{2}$ the centre is at the origin, if one directrix is x=4, then the equation of the ellipse is

A. $3x^2 + 4y^2 = 1$

B. $3x^2 + 4y^2 = 12$

C. $4x^2 + 34y^2 = 1$

D. $4x^2 + 3y^2 = 12$

Answer: B

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40. The distance between the foci of the hyperbola $x^2 - 3y^2 - 4x - 6y - 11 = 0$ is

A. 4

B. 6

C. 8

D. 10

Answer: C

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41. For the parabola $y^2 + 6y - 2x + 5 = 0$

Statement I The vertex is (-2,-3)

Statement II The directrix is y+3=0

Which of the following is correct?

A. Both I and II are true

B. I is true, II is false

C. I is false, II is true

D. Both I and II are false

Answer: B

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42. The value of k, if (1,2) (k,-1) are conjugate point with respect to the ellipse $2x^2 + 3y^2 = 6$ is

A. 2

B. 4

C. 6

D. 8

Answer: C

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43. If the line lx+my=1 is a normal to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ then $\frac{a^2}{l^2} - \frac{b^2}{m^2}$ is equal to

A. $a^2 - b^2$

B. $a^2 + b^2$

C. $\left(a^2 + b^2\right)^2$

D. $\left(a^2 - b^2\right)^2$

Answer: C

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44. Let O be the origin and A be a point on the curve $y^2 = 4x$. Then th locus of the mid point of OA is

A. $x^2 = 4y$

B. $x^2 = 2y$

C. $y^2 = 16x$

D. $y^2 = 2x$

Answer: D

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45. If b and c are the lengths of the segments of any focal chord of a parabola $y^2 = 4ax$, then the length of the semilatusrectum is

A. $\frac{bc}{b+c}$

B. $\sqrt{bc}$

C. $\frac{b+c}{2}$

D. $\frac{2bc}{b+c}$

Answer: D

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46. Equation of the latusrectum of the ellipse $9x^2 + 4y^2 - 18x - 8y - 23 = 0$ are

A. $y = \pm\sqrt{5}$

B. $x = \pm\sqrt{5}$

C. $y = 1 \pm \sqrt{5}$

D. $x = -1 \pm \sqrt{5}$

Answer: C

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47. If the ecentricity of a hyperbola is $srqt3$ then the eccentricity of its conjugate hyperbola is

A. $\sqrt{2}$

B. $\sqrt{3}$

C. $\sqrt{\frac{3}{2}}$

D. $2\sqrt{3}$

Answer: C

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48. If a point P moves such that its distances from the point A(1,1) and the line x+y+2=0 are equal, then the locus of P is

A. a straight line

B. a pair of straight line

C. a parabola

D. an ellipse

Answer: C

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49. The parabola with drectrix x+2y-1=0 and focus (1,0) is

A. $4x^2 - 4xy + y^2 - 8x + 4y + 4 = 0$

B. $4x^2 + 4xy + y^2 - 8x + 4y + 4 = 0$

C. $4x^2 + 5xy + y^2 - 8x + 4y + 4 = 0$

D. $4x^2 - 4xy + y^2 - 8x - 4y + 4 = 0$

Answer: A

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50. The lines among the following which touches the parabola $y^2 = 4ax$, is

A. $x + my + am^3 = 0$

B. $x - my + am^2 = 0$

C. $x + my - am^2 = 0$

D. $x + my + am^2 = 0$

Answer: B

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51. The eccentricity of the conic $36x^2 + 144y^2 - 36x - 96y - 119 = 0$ is

A. $\frac{\sqrt{3}}{2}$

B. $\frac{1}{2}$

C. $\frac{\sqrt{3}}{4}$

D. $\frac{1}{\sqrt{3}}$

Answer: A

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52. The ecentricty of the ellipse $9x^2 + 5y^2 - 18x - 20y - 16 = 0$ is

A. $\frac{1}{2}$

B. $\frac{2}{3}$

C. $\frac{3}{2}$

D. 2

Answer: B

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53. The product of the lengths of perpendiculars drawn from any point on the hyperbola $x^2 - 2y^2 - 2 = 0$ to its asymptotes is

A. $\frac{1}{2}$

B. $\frac{2}{3}$

C. $\frac{3}{2}$

D. 2

Answer: B

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54. The equations of the parabola with focus (0,0) and directrix x+y=4, is

A. $x^2 + y^2 - 2xy + 8x + 8y - 16 = 0$

B. $x^2 + y^2 - 2xy + 8x + 8y = 0$

C. $x^2 + y^2 + 8x + 8y - 16 = 0$

D. $x^2 - y^2 + 8x + 8y - 16 = 0$

Answer: A

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55. The equation of the parabola with the focus (3,0) and the directrix x+3=0 si

A. $y^2 = 3x$

B. $y^2 = 6x$

C. $y^2 = 12x$

D. $y^2 = 2x$

Answer: C

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56. If e and e' are the ecentricities of the ellipse $5x^2 + 9y^2 = 45$ and the hyperboala $5x^2 - 4y^2 = 45$

respectively, then ee' is equal to

A. 1

B. 4

C. 5

D. 9

Answer: A

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57. The pole of the straight line x+4y=4 with respect to the ellipse $x^2 + 4y^2 = 4$ is

A. (1,1)

B. (1,4)

C. (4,1)

D. (4,4)

Answer: A

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58. Locus of the poles of focal chord of a parabola is

A. the axis

B. a focal chord

C. the directrix

D. the tangent at the vertex

Answer: C

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59. The equation $\frac{1}{r} = \frac{1}{8} + \frac{3}{8}\cos\theta$ represents

A. a parabola

B. an ellipse

C. a hyperbola

D. a rectangular hyperbola

Answer: C

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60. The lengths of latusrectum of parabola $y^2 + 8x - 2y + 17 = 0$ is

A. 2

B. 4

C. 8

D. 16

Answer: C

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61. If the normal to the parabola $y^2 = 4x$ at P(1,2) meets the parabola again at Q, then coordinates of Q are

A. (-6,9)

B. (9,-6)

C. (-9,-6)

D. (-6,-9)

Answer: B

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62. The eccentricity of ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ is

A. $\frac{7}{16}$

B. $\frac{5}{4}$

C. $\frac{\sqrt{7}}{4}$

D. $\frac{\sqrt{7}}{2}$

Answer: C

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63. The products of lengths of perpendicuylars from anypoint of hyperbola $x^2 - y^2 = 8$ to its asymptotes,

is

A. 2

B. 3

C. 4

D. 8

Answer: C

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64. The equation $16x^2 + y^2 + 8xy - 74x - 78y + 212 = 0$ represents

A. a circle

B. a parabola

C. an ellipse

D. a hyperbola

Answer: B

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65. Equation of curve in polar coordinates is $\frac{I}{r} = 2\sin^2\frac{\theta}{2}$ then it represents

A. a straight line

B. a parabola

C. a circle

D. an ellipse

Answer: B

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