

- Find the coordinates of the foci of the equation $\frac{x^2}{225} + \frac{y^2}{289} = 1$.
 a) $(0, \pm 17)$ b) $(0, \pm 8)$ c) $(0, \pm 15)$ d) $(0, \pm \sqrt{2})$
 e) none of these
- Determine the equation of a hyperbola having its center at the origin, one vertex at $(14, 0)$ and the equation of one asymptote $5x - 7y = 0$.
 a) $\frac{x^2}{49} - \frac{y^2}{25} = 1$ b) $\frac{x^2}{196} - \frac{y^2}{100} = 1$ c) $\frac{x^2}{5} - \frac{y^2}{5} = 1$ d) $\frac{y^2}{49} - \frac{x^2}{25} = 1$
 e) none of these
- Determine the eccentricity of the hyperbola having its center at the origin, transverse axis on the x-axis, length of the latus rectum 6 and semi-transverse axis 2.
 a) $\frac{\sqrt{7}}{2}$ b) $\frac{\sqrt{22}}{4}$ c) $\sqrt{7}$ d) $\frac{\sqrt{7}}{6}$ e) none of these
- Find the equation of a circle with its center at $(3, -4)$ and which is tangent to the x-axis.
 a) $x^2 - 6x + y^2 + 8y - 16 = 0$ b) $x^2 + 6x + y^2 - 8y + 9 = 0$
 c) $x^2 - 6x + y^2 + 8y - 9 = 0$ d) $x^2 + 6x + y^2 - 8y + 16 = 0$
 e) none of these
- How high is a parabolic arch with a span of 36 feet and height of 54 feet at a distance of 12 feet from the center of the span?
 a) 30' b) 28' c) 32' d) 34' e) none of these
- The graph of $x^2 - 8xy + 16y^2 - 4 = 0$ would be described as a
 a) hyperbola b) ellipse c) parabola d) point
 e) none of these
- Find the area of a triangle with vertices having the polar coordinates $(4, \frac{\pi}{3})$, $(6, \frac{2\pi}{3})$ and $(8, \frac{4\pi}{3})$. (π is pi)
 a) $12\sqrt{3}$ b) $18\sqrt{3}$ c) $36\sqrt{3}$ d) $24\sqrt{3}$ e) none of these

8. Write the equation of the ellipse with minor axis length $2\sqrt{3}$, foci at $(\pm\sqrt{3}, 0)$.

- a) $x^2 + 2y^2 = 6$ b) $2x^2 + y^2 = 6$ c) $4x^2 + 5y^2 = 60$
 d) $3x^2 + y^2 = 9$ e) none of these

9. Change $x^2 + y^2 - 8x = 0$ to polar form.

- a) $r = 8 \sin \theta$ b) $r = -8 \sin \theta$ c) $r = 8 \cos \theta$ d) $r = -8 \cos \theta$
 e) none of these

10. Write the equation of the ellipse which has its major and minor axes coincident respectively with the transverse axis and conjugate axis of the hyperbola $x^2 - 4y^2 - 12x = 0$.

- a) $\frac{x^2}{36} + \frac{y^2}{9} = 1$ b) $\frac{x^2}{9} + \frac{y^2}{36} = 1$ c) $x^2 + 4y^2 - 12x = 0$
 d) $x^2 + 4y^2 + 12x = 0$ e) none of these

11. The line in the xy -plane whose equation is $x + y = 6$, is revolved about the x -axis. Find the equation of the conical surface thus generated.

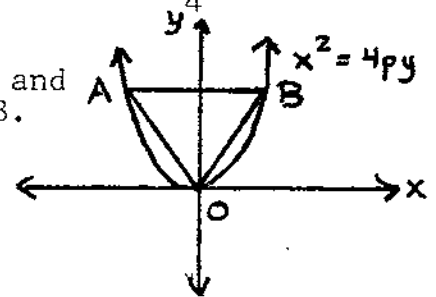
- a) $x^2 + y^2 - z^2 - 12x + 36 = 0$ b) $x^2 - y^2 + z^2 + 12x - 36 = 0$
 c) $x^2 - y^2 - z^2 - 12x + 36 = 0$ d) $x^2 + y^2 - z^2 - 6x + 12 = 0$
 e) none of these

12. An arch is in the shape of a parabola with a vertical axis. The arch is 15 feet high at the center and 40 feet wide at the base. At what height above the base is the width 20 feet?

- a) 11 ft. b) $11\frac{1}{2}$ ft. c) $11\frac{3}{4}$ ft. d) $11\frac{1}{5}$ ft. e) $11\frac{3}{4}$ ft.

13. In the following figure, triangle OAB is equilateral and AB is parallel to the x -axis. Find the area of $\triangle OAB$.

- a) $64\sqrt{3} p^2$ b) $8\sqrt{3} p^2$ c) $4\sqrt{3} p^2$
 d) $48\sqrt{3} p^2$ e) $64 p^2$



14. Find the equation of the line tangent to the graph of $y^2 = -8x$ at the point $(-2, 4)$.

- a) $y = 3x + 10$ b) $y = -2x$ c) $y = -x + 2$ d) $y = \frac{x}{2} + 5$
 e) $y = x + 6$

15. Find the equation of a hyperbola having asymptotes $y = \pm \frac{\sqrt{10}}{5}x$ and foci $(\pm\sqrt{7}, 0)$
- a) $2x^2 - 5y^2 = 10$ b) $5x^2 - 2y^2 = 10$ c) $5x^2 - 7y^2 = 10$
d) $7x^2 - 5y^2 = 10$ e) $\frac{x^2}{10} - \frac{y^2}{2} = 1$
16. If the angle of rotation is 45° , find the equation $2xy = 7$ in terms of the $x'-y'$ coordinate system.
- a) $7x'^2 - 2y'^2 = 1$ b) $y'^2 - x'^2 = 7$ c) $x'^2 - y'^2 = 7$
d) $2x'^2 - 7y'^2 = 1$ e) $\sqrt{2}x'^2 - \sqrt{2}y'^2 = 7$
17. Find the equation of a circle through the points of intersection of the circles $x^2 + y^2 - 16x - 6y + 37 = 0$ and $x^2 + y^2 - 2x + 8y - 33 = 0$ and through $(-8, 5)$.
- a) $x^2 + y^2 + 12x + 22y - 103 = 0$ b) $x^2 + y^2 - 12x + 22y - 103 = 0$
c) $x^2 + y^2 + 12x - 22y + 29 = 0$ d) $x^2 + y^2 + 12x + 10y - 29 = 0$
e) $x^2 + y^2 + 20x + 22y - 103 = 0$
18. Find the equation of the directrix of the parabola having the equation $y^2 - 6x - 8y - 2 = 0$.
- a) $x = -\frac{3}{2}$ b) $x = -\frac{9}{2}$ c) $x = -4$ d) $x = -3$
e) none of these
19. Find the eccentricity of an equilateral hyperbola.
- a) 2 b) $\frac{3}{2}$ c) $\sqrt{3}$ d) $\sqrt{2}$ e) none of these
20. An elliptical flower bed is made by driving two stakes in the ground 16 feet apart, passing a loop of rope of total length 36 feet about stakes, and marking the boundary of the bed with a third stake while holding the rope taut. Find the length and width of the flower bed.
- a) $l = 20'$, $w = 16'$ b) $l = 22'$, $w = 12'$ c) $l = 20'$, $w = 14'$
d) $l = 24'$, $w = 12'$ e) $l = 20'$, $w = 12'$
21. Find an equation of the circle containing the points $(-5, 2)$, $(-3, 4)$ and $(1, 2)$.
- a) $x^2 + y^2 - 4x + 2y - 5 = 0$ b) $x^2 + y^2 - 4x - 2y - 5 = 0$
c) $x^2 + y^2 + 4x + 2y - 5 = 0$ d) $x^2 + y^2 + 4x - 2y - 5 = 0$
e) $x^2 + y^2 + 4x - 2y + 5 = 0$

22. Find an equation of an ellipse with vertices $(-4, 3)$ and $(6, 3)$ and having eccentricity $3/5$.

a) $\frac{(x - 1)^2}{25} + \frac{(y - 3)^2}{9} = 1$ b) $\frac{(y - 1)^2}{25} + \frac{(x - 3)^2}{16} = 1$

c) $\frac{(x - 1)^2}{16} + \frac{(y - 3)^2}{25} = 1$ d) $\frac{(x + 1)^2}{25} + \frac{(y - 3)^2}{16} = 1$

e) none of these

23. Write the equation of an ellipse with foci at $(1, 0)$, $(-1, 0)$ and major axis 5.

a) $\frac{x^2}{5} + \frac{y^2}{4} = 1$ b) $\frac{x^2}{\frac{25}{4}} + \frac{y^2}{\frac{21}{4}} = 1$ c) $\frac{x^2}{\frac{5}{2}} + \frac{y^2}{\frac{\sqrt{21}}{2}} = 1$

d) $\frac{x^2}{\frac{25}{4}} + \frac{y^2}{\frac{9}{4}} = 1$ e) none of these

24. Translate the curve represented by $2x^2 - 4x - y + 5 = 0$ so that the curve is in standard position and the equation is in standard form.

a) $x^2 = 2y$ b) $x^2 = \frac{5}{2}y$ c) $x^2 = \frac{3}{2}y$ d) $x^2 = \frac{1}{2}y$ e) $x^2 = \frac{2}{5}y$

25. To the nearest degree, find the angle through which the axes must be rotated to eliminate the xy -term in $8x^2 + 4xy + 5y^2 = 40$.

a) 27° b) 45° c) 53° d) 30° e) 36°

TIE BREAKER: Identify the conic or degenerate form having the equation $11x^2 - 24xy + 4y^2 + 30x + 40y - 45 = 0$ by eliminating the xy -term and writing the $x'y'$ equation.