

Conics Review

4. Graph each relation and identify the curve.

a) $\frac{x^2}{16} + \frac{y^2}{9} = 1$

b) $x^2 = 4y$

c) $x^2 + y^2 = 25$

d) $x^2 - y^2 = 9$

e) $4x^2 + 4y^2 = 49$

f) $9x^2 - 16y^2 = -144$

6. An ellipse has centre (0,0) and major axis on the y-axis. Write the equation of the ellipse if:

- a) the x- and y-intercepts are ± 3 and ± 5 respectively
- b) the major axis is 12 units and the minor axis is 6 units.

7. Find the equation of the hyperbola, centre (0,0), conjugate axis on the y-axis, and:

- a) vertices at $(\pm 4, 0)$, and an asymptote defined by $y = 2x$
- b) a transverse axis of 8 units, and a conjugate axis of 14 units.

8. A stone thrown horizontally from a bridge 25 m above the river splashes in the water 40 m from the base of the bridge. If the stone falls in a parabolic path, find its equation.

9. One of the supports in a retractable roof of a sports complex is semi-elliptical. If it is 25 m high and spans 60 m, find its equation.

10. The base of a bridge arch is 80 m wide and 25 m high. Find its equation if the arch is in the shape of a rectangular hyperbola.

11. Describe and sketch the graph of each relation.

a) $y + 3 = \frac{1}{2}(x + 2)^2$

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

c) $\frac{(x + 5)^2}{25} - \frac{(y - 2)^2}{16} = 1$

d) $(x - 2)^2 - 3(y + 1)^2 = -27$

12. Describe the graph of each relation.

a) $x^2 + y^2 + 4x - 10y - 20 = 0$

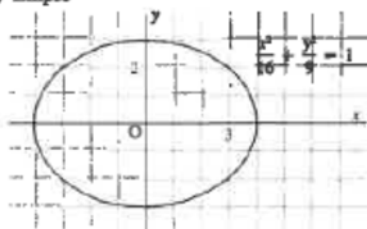
b) $9x^2 + 16y^2 - 18x + 96y + 9 = 0$

c) $y^2 - 4y - 6x = 38$

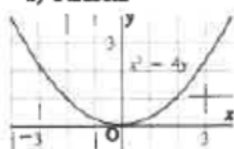
d) $5x^2 - 4y^2 - 30x - 16y + 49 = 0$

Key

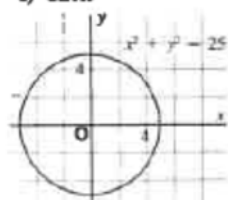
4. a) Ellipse



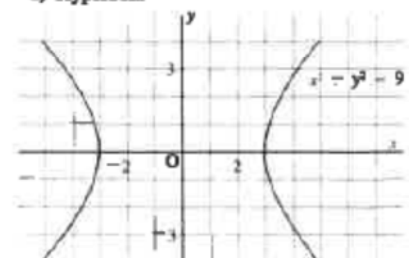
b) Parabola



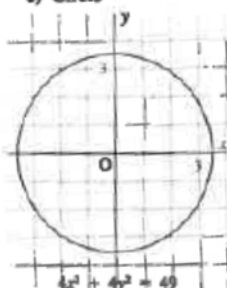
c) Circle



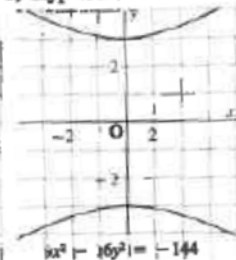
d) Hyperbola



e) Circle



f) Hyperbola



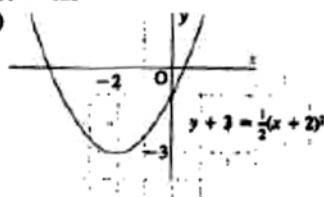
6. a) $\frac{x^2}{9} + \frac{y^2}{25} = 1$ b) $\frac{x^2}{9} + \frac{y^2}{36} = 1$

7. a) $\frac{x^2}{16} - \frac{y^2}{64} = 1$ b) $\frac{x^2}{16} - \frac{y^2}{49} = 1$

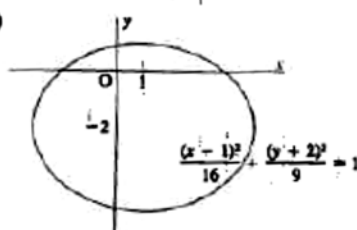
8. $y = -\frac{1}{4}x^2$

9. $\frac{x^2}{900} + \frac{y^2}{625} = 1$ 10. $x^2 - y^2 = -380.25$

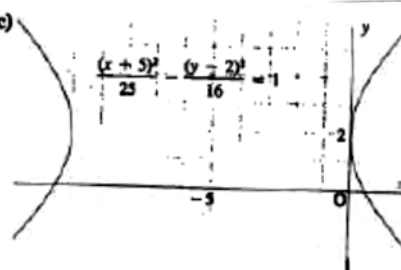
11. a)



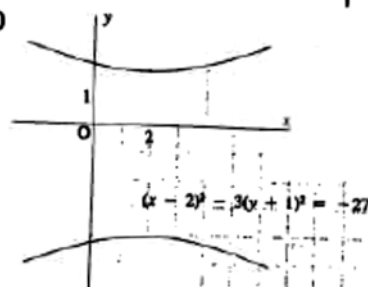
b)



c)



d)



12. a) $(x+2)^2 + (y-5)^2 = 49$; a circle, centre $(-2, 5)$, radius 7

b) $\frac{(x-1)^2}{16} + \frac{(y+3)^2}{9} = 1$; an ellipse, centre $(1, -3)$, major axis length 8, minor axis length 6

c) $x + 7 = \frac{1}{2}(y-4)^2$; a parabola, vertex $(-7, 4)$, opening to the right, congruent to $x = \frac{1}{2}y^2$

d) $\frac{(x-3)^2}{4} - \frac{(y+2)^2}{5} = -1$; a hyperbola, centre $(3, -2)$, transverse axis is vertical with length $2\sqrt{3}$, conjugate axis length 4