

Parabolas, Ellipses and Hyperbolas in Standard Form

Grade 12 – Precalculus math · Test · Standards: G-GPE.A.1, G-GPE.A.2, G-GPE.A.3

Name: _____ Date: _____ Class: _____

This 45-minute test has 8 questions worth 20 points. Show the completed squares and the values of a , b , c and p . Give exact values unless the question asks you to round.

Standards: G-GPE.A.1, G-GPE.A.2, G-GPE.A.3 · **Level:** Grade 12 Precalculus

Time: 45 minutes · 8 questions · Total: 20 points · Calculator: as allowed by your teacher

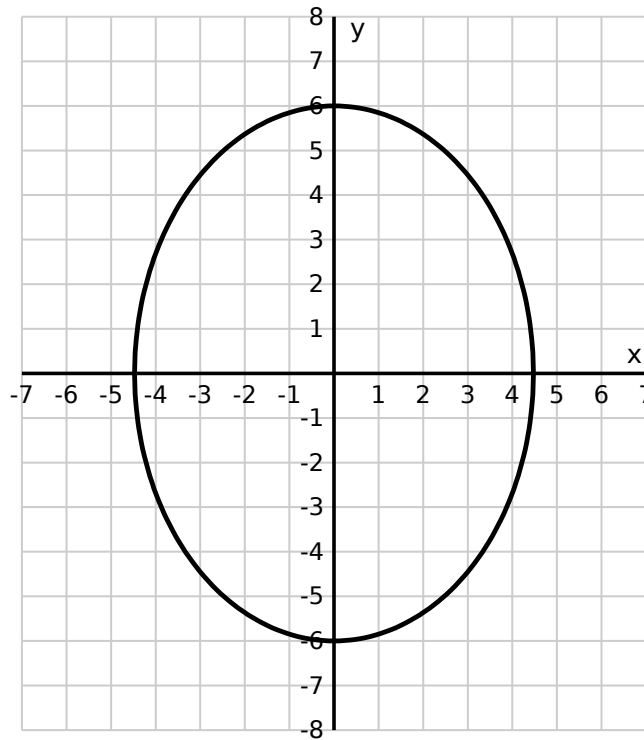
Question 1 Circle in General Form (2 points)

Find the center and radius of the circle $x^2 + y^2 + 10x - 6y + 18 = 0$.

Question 2 A Downward Parabola (2 points)

A parabola has vertex $(-1, 4)$ and directrix $y = 7$. Write its equation and find its focus.

Question 3 Reading an Ellipse (3 points)



An ellipse centered at the origin.

The figure shows $\frac{x^2}{20} + \frac{y^2}{36} = 1$.

- Find the vertices. (1 point)
- Find the endpoints of the minor axis. (1 point)
- Find the foci. (1 point)

Question 4 A Hyperbola from Foci (3 points)

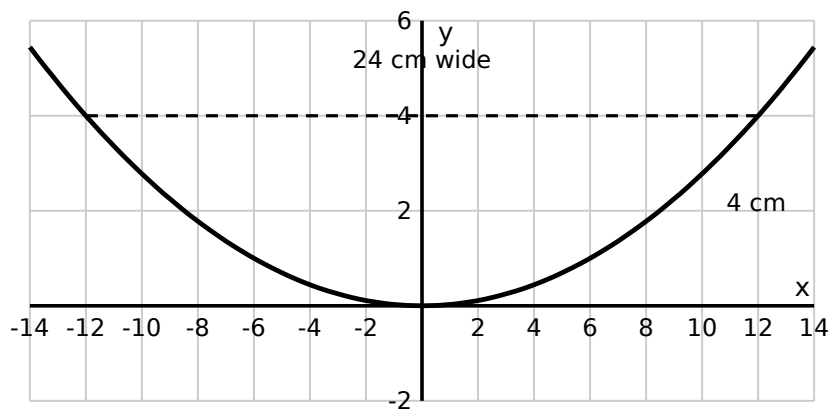
A hyperbola is centered at the origin with foci $(\pm 7, 0)$ and vertices $(\pm 4, 0)$.

- Write its equation. (2 points)
- Find the equations of its asymptotes. (1 point)

Question 5 Identify the Conic (2 points)

Complete the square to identify $4x^2 + y^2 - 24x + 4y + 24 = 0$. State the center and the foci.

Question 6 Parabolic Mirror (2 points)



Cross-section of the mirror.

A parabolic mirror is 24 centimeters wide and 4 centimeters deep, with its vertex at the origin opening upward. Write its equation and find how far the light source belongs from the vertex.

Question 7 Running Track (3 points)

An elliptical running track is 120 meters long and 80 meters wide.

- Write an equation with the center at the origin and the long side horizontal. (1 point)
- Find the distance from the center to each focus, to the nearest tenth. (1 point)
- Find the distance between the two foci. (1 point)

Question 8 Checking the Definition (3 points)

An ellipse is given by $\frac{x^2}{49} + \frac{y^2}{40} = 1$.

- Find its foci. (1 point)
- Show that the point $(0, 2\sqrt{10})$ is on the ellipse. (1 point)
- Find the distances from that point to each focus and show that their sum is $2a$. (1 point)