

Geometry · Parabolas from Focus and Directrix, and Tangent Lines to a Circle · Test

Common Core G-GPE.A.2, G-C.A.4 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

This 45-minute test covers parabolas defined by a focus and a directrix and tangent lines to circles in Geometry: writing and reading equations, tangent lengths and angles, a construction and a real-world model. It has 9 questions worth 20 points. Show all work.

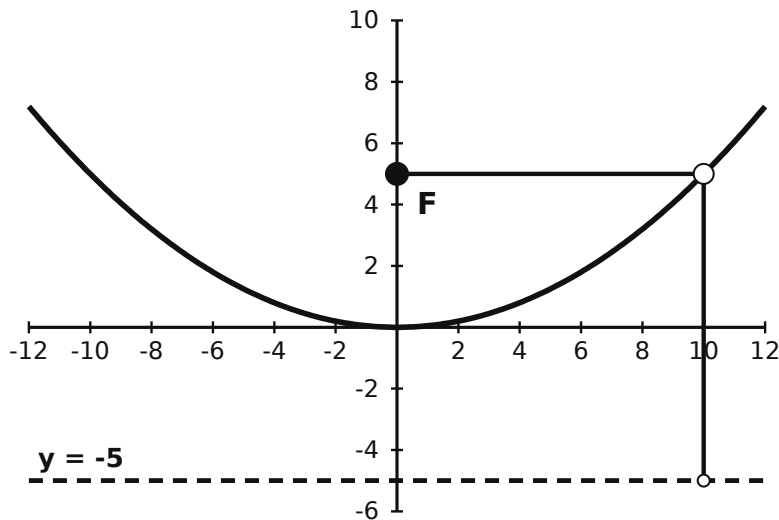
Test information

- **Grade:** Geometry
- **Chapter:** Parabolas from Focus and Directrix, and Tangent Lines to a Circle
- **Common Core:** G-GPE.A.2, G-C.A.4
- **Time:** 45 minutes
- **Total:** 20 points (Question 1: 2 pts; Question 2: 2 pts; Question 3: 2 pts; Question 4: 3 pts; Question 5: 2 pts; Question 6: 2 pts; Question 7: 3 pts; Question 8: 2 pts; Question 9: 2 pts)

Question 1: Equation from a focus and a directrix (2 points)

A parabola has focus $F(0,5)$ and directrix $y = -5$, as shown.

- Write the equation of the parabola. (1 point)
- Show that $P(10,5)$ is on the parabola. (1 point)



Focus, directrix and point P.

Question 2: Focus and directrix from an equation (2 points)

Find the focus and the directrix of the parabola $x^2 = 24y$. (1 point each)

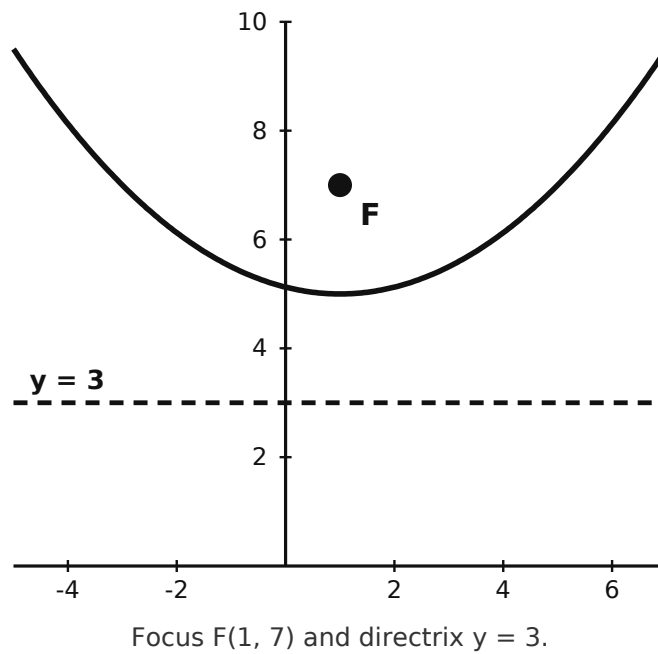
Question 3: A sideways parabola (2 points)

Write the equation of the parabola with focus $(-3, 0)$ and directrix $x = 3$.

Question 4: Parabola with a shifted vertex (3 points)

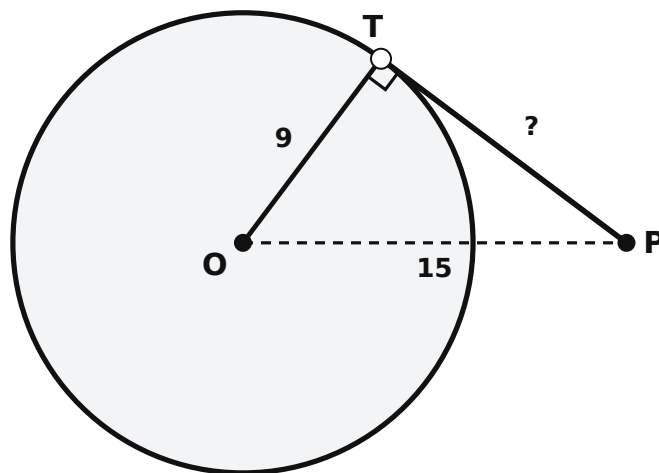
A parabola has focus $(1, 7)$ and directrix $y = 3$.

- Find the vertex and p , and write the equation. (2 points)
- Find the y -coordinate of the point on the parabola with x -coordinate 5. (1 point)



Question 5: Length of a tangent (2 points)

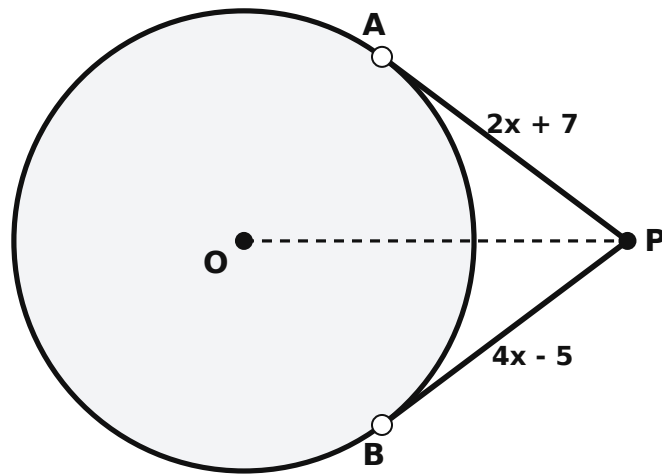
In the figure, $\overline{PT}$ is tangent to the circle with center O . The radius is 9 and $OP = 15$. Find PT .



Tangent segment PT .

Question 6: Two tangent segments (2 points)

Segments $\overline{PA}$ and $\overline{PB}$ are tangent to the circle at A and B , with $PA = 2x + 7$ and $PB = 4x - 5$. Find x and PA .

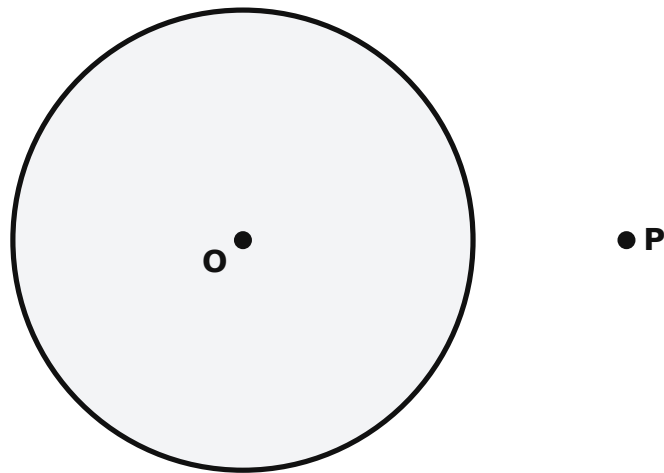


Tangents from P.

Question 7: Constructing a tangent (3 points)

Point P is outside the circle with center O.

- Describe a compass-and-straightedge construction of the tangent lines from P to the circle. (2 points)
- Explain why each line you construct is tangent. (1 point)

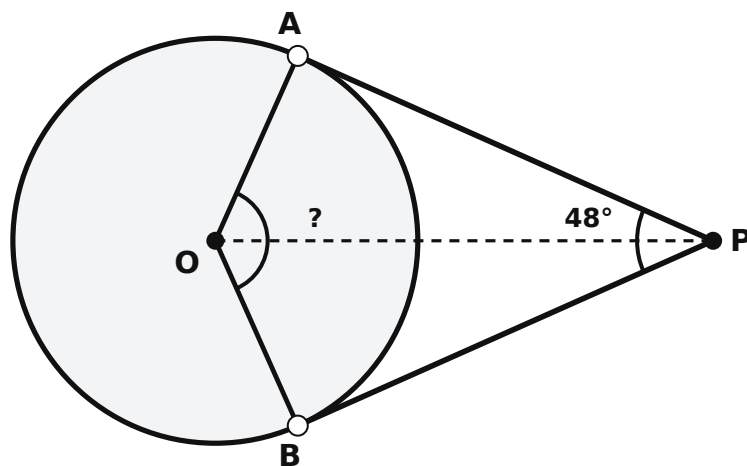


Circle O and point P.

Question 8: Angles formed by two tangents (2 points)

Tangents $\overline{PA}$ and $\overline{PB}$ touch the circle with center O at A and B, and $m\angle APB = 48^\circ$. Find (a)

$m\angle AOB$ and (b) $m\angle OPA$. (1 point each)



Angle APB = 48° .

Question 9: A satellite dish (2 points)

A dish has a parabolic cross-section with its vertex at the origin, opening upward. The receiver is at the focus, 2 ft above the vertex. (a) Write the equation of the cross-section. (1 point) (b) The dish is 10 ft wide. How deep is it? (1 point)