

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

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

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

Ten multiple-choice questions check the definition of a parabola, equations from a focus and a directrix, and the main facts about tangent lines to circles and their constructions. Each question has exactly one correct answer.

GeometryCommon Core: G-GPE.A.2 · G-C.A.4

Questions

Question 1

Which statement defines a parabola?

- A. The sum of the distances to two fixed points is constant
- B. Every point is the same distance from one fixed center
- C. The difference of the distances to two fixed points is constant
- D. Every point is the same distance from the focus and from the directrix

Question 2

A parabola has focus $(5,0)$ and directrix $x = -5$. Which equation describes it?

- A. $y^2 = 10x$
- B. $x^2 = 20y$
- C. $y^2 = -20x$
- D. $y^2 = 20x$

Question 3

What is the focus of the parabola $x^2 = 16y$?

- A. $(0,4)$
- B. $(0,16)$
- C. $(0,8)$

D. $(4,0)$

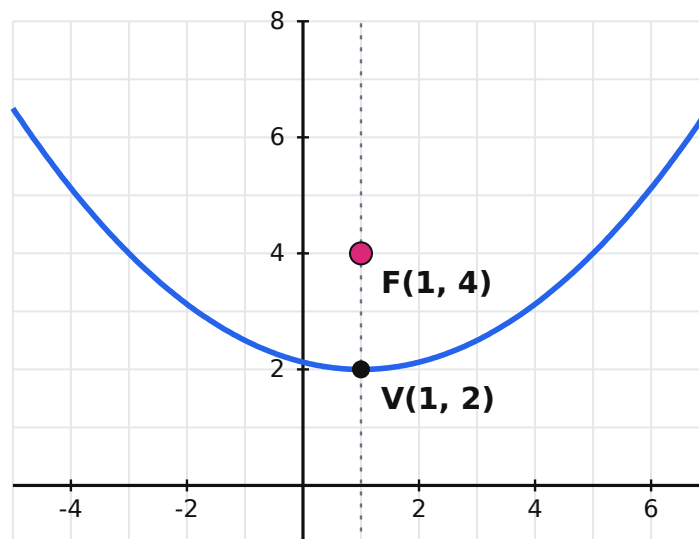
Question 4

What is the focus of the parabola $y^2 = -8x$?

- A. $(2,0)$
- B. $(-2,0)$
- C. $(0,-2)$
- D. $(-8,0)$

Question 5

The parabola shown has vertex $V(1, 2)$ and focus $F(1, 4)$. What is the equation of its directrix?

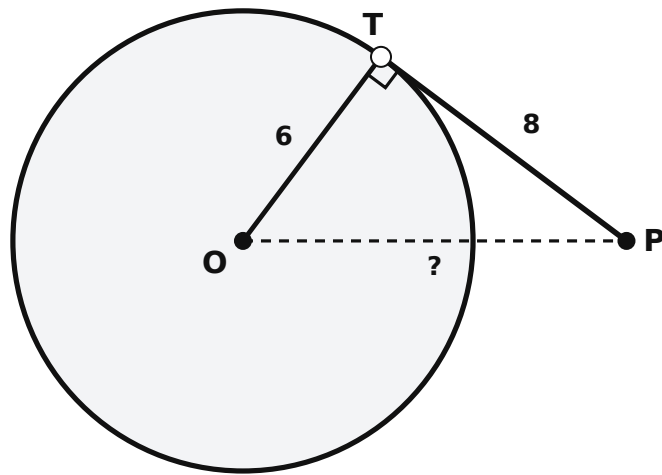


Vertex V and focus F.

- A. $y = 2$
- B. $y = 0$
- C. $y = 6$
- D. $y = -2$

Question 6

In the figure, $\overline{PT}$ is tangent to the circle at T, $OT = 6$ and $PT = 8$. Find OP.



Tangent PT.

- A. 10
- B. 14
- C. 12
- D. $2\sqrt{7}$

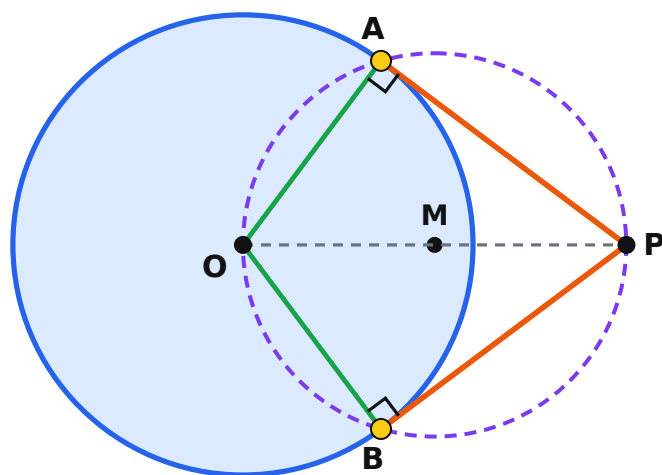
Question 7

Tangent segments $\overline{PA}$ and $\overline{PB}$ have lengths $5x-3$ and $2x+9$. What is PA?

- A. 4
- B. 34
- C. 17
- D. 7

Question 8

In the construction of a tangent from P to the circle with center O, M is the midpoint of OP. What is the next step?

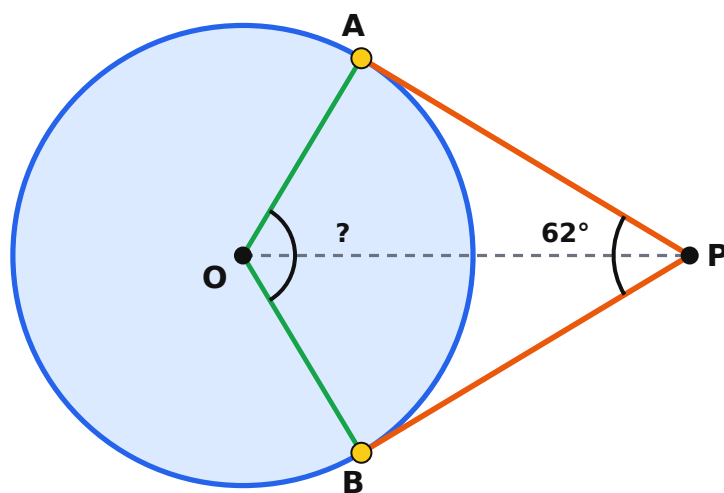


Construction in progress.

- A. Draw the circle centered at M through O; it meets the given circle at the tangent points
- B. Draw the circle centered at P through O; it meets the given circle at the tangent points
- C. Draw the line through M perpendicular to OP; it is the tangent line
- D. Draw the line through P parallel to the radius from O to M

Question 9

Tangents from P touch a circle with center O at A and B, and $m\angle APB = 62^\circ$. Find $m\angle AOB$.



Angle $APB = 62^\circ$.

- A. 28°
- B. 128°

C. 118°

D. 90°

Question 10

Segment PT is drawn from P to a point T on a circle with center O. Which lengths (OT, PT, OP) show that PT is tangent at T?

A. 6, 8, 11

B. 5, 10, 12

C. 6, 8, 10

D. 4, 5, 7

Answer key

1. **D** - A parabola uses one point (the focus) and one line (the directrix). The other statements describe an ellipse, a circle and a hyperbola.
2. **D** - The vertex is the origin and $p=5$, so $y^2=4px=20x$. Using p instead of $4p$ gives $10x$, and swapping the variables gives a parabola that opens up.
3. **A** - Compare with $x^2 = 4py$: $4p = 16$, so $p = 4$ and the focus is $(0, 4)$. The value 16 is $4p$, not p .
4. **B** - Here $4p = -8$, so $p = -2$ and the focus is $(p, 0) = (-2, 0)$. The negative sign puts the focus to the left of the vertex.
5. **B** - The focus is 2 units above the vertex, so the directrix is 2 units below it: $y = 2 - 2 = 0$. The line $y = 6$ is on the wrong side of the vertex.
6. **A** - OT is perpendicular to PT, so OP is the hypotenuse: $\sqrt{36 + 64} = 10$. Adding $6 + 8$ gives 14, and $2\sqrt{7}$ comes from subtracting the squares.
7. **C** - Tangent segments from one point are equal: $5x - 3 = 2x + 9$ gives $x = 4$, so $PA = 17$. The value 4 is x , and 34 is $PA + PB$.
8. **A** - The circle with diameter OP gives right angles OAP and OBP, so A and B are the tangent points. The other steps do not produce a line perpendicular to a radius.
9. **C** - The radii are perpendicular to the tangents, so the four angles of OAPB add to 360 degrees: $360 - 90 - 90 - 62 = 118$ degrees. The value 28 degrees is $90 - 62$.
10. **C** - PT is tangent exactly when triangle OTP has a right angle at T, so $OT^2 + PT^2 = OP^2$. Only $36 + 64 = 100$ works.

Remember:

- A parabola is the set of points equidistant from the focus and the directrix (G-GPE.A.2).
- Vertex (h, k) : $(x - h)^2 = 4p(y - k)$ has focus $(h, k + p)$ and directrix $y = k - p$; $(y - k)^2 = 4p(x - h)$ opens sideways.
- p is the signed distance from the vertex to the focus; a negative p means the parabola opens down or left.
- A tangent to a circle is perpendicular to the radius at the point of tangency (G-C.A.4).
- Tangent segments from one outside point are congruent; the circle on diameter OP gives the tangent points in a construction.