

Geometry · Equation of a Circle · Test Answer Key

Common Core G-GPE.A.1 · mathovore.fr

Use this key to score the 20-point test. Every answer shows full work, and the scoring note explains how the points are awarded. Give partial credit for correct setups with arithmetic slips, and accept equivalent forms such as an expanded equation when the question allows.

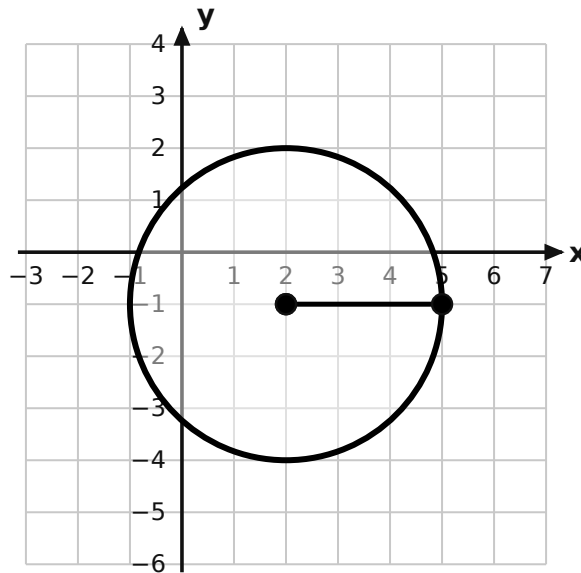
GeometryCommon Core: G-GPE.A.1

Question 1: Write the equation (2 points)

$$h = -4, k = 3, r^2 = 36: (x+4)^2 + (y-3)^2 = 36.$$

Scoring: 1 point for correct signs of h and k , 1 point for r squared equal to 36.

Question 2: Equation from a graph (2 points)



Center $(2, -1)$, radius 3.

The center is $(2, -1)$ and the radius is $5 - 2 = 3$.

$$(x-2)^2 + (y+1)^2 = 9$$

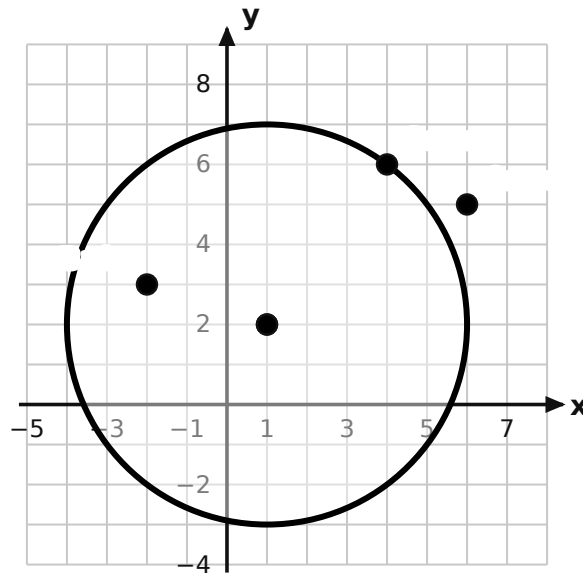
Scoring: 1 point for the center, 1 point for the radius squared equal to 9.

Question 3: Center and radius (2 points)

Center $(-3, 7)$. Radius $\sqrt{50} = \sqrt{25 \cdot 2} = 5\sqrt{2}$.

Scoring: 1 point for the center, 1 point for the simplified radius.

Question 4: Points and a circle (3 points)



A is on the circle, B is inside and C is outside.

A: $3^2 + 4^2 = 25$, on the circle.

B: $(-3)^2 + 1^2 = 10$, less than 25, inside.

C: $5^2 + 3^2 = 34$, greater than 25, outside.

Scoring: 1 point per point: correct calculation and correct classification.

Question 5: Complete the square (3 points)

Group the terms and move the constant: $(x^2 - 4x) + (y^2 + 10y) = -13$.

Add $\left(\frac{-4}{2}\right)^2 = 4$ for the x-terms and $\left(\frac{10}{2}\right)^2 = 25$ for the y-terms to both sides:
 $(x^2 - 4x + 4) + (y^2 + 10y + 25) = -13 + 4 + 25 = 16$.

Factor each perfect square: $(x - 2)^2 + (y + 5)^2 = 16$.

Center $(2, -5)$, **radius** 4

Scoring: 1 point for grouping and adding the correct numbers on both sides, 1 point for the

standard form, 1 point for the center and radius.

Question 6: Diameter endpoints (2 points)

Center (midpoint): $(1,1)$. $r^2 = (5-1)^2 + (4-1)^2 = 16+9 = 25$.

$$(x-1)^2 + (y-1)^2 = 25$$

Scoring: 1 point for the center, 1 point for the radius squared and the equation.

Question 7: Tangent circle (2 points)

The radius is the distance from the center to the x-axis: $r = |-4| = 4$.

$$(x-6)^2 + (y+4)^2 = 16$$

Scoring: 1 point for radius 4, 1 point for the equation.

Question 8: Derive the equation (2 points)

The horizontal leg has length $|x-h|$, the vertical leg has length $|y-k|$, and the hypotenuse is the radius r .

The Pythagorean theorem gives $|x-h|^2 + |y-k|^2 = r^2$, and since squares of absolute values equal squares, $(x-h)^2 + (y-k)^2 = r^2$.

Scoring: 1 point for identifying the legs and hypotenuse, 1 point for applying the Pythagorean theorem to reach the equation.

Question 9: Points on a circle (2 points)

$$5^2 + y^2 = 169, \text{ so } y^2 = 144.$$

$$y = 12 \text{ or } y = -12$$

Scoring: 1 point for y squared equal to 144, 1 point for both values.

Total
20 points