ALBERT

Name _____ Date _____

Equation of a Circle Worksheet

Geometry · Common Core HSG-GPE.A.1

> Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.

Practice

Builds the skill step by step.

1. What is the center of the circle $(x - 3)^2 + (y + 2)^2 = 25$?

2. What is the radius of the circle $(x - 3)^2 + (y + 2)^2 = 25$?

3. Write the equation of the circle with center $(2, -5)$ and radius 4, in the form $(x - h)^2 + (y - k)^2 = r^2$.

4. What is the radius of the circle $x^2 + y^2 = 49$?

5. Write the equation of the circle with center $(0, 0)$ and radius 3, in the form $x^2 + y^2 = r^2$.

6. Which theorem gives the equation of a circle from its center and radius?

   A. the Pythagorean Theorem

   B. the Triangle Sum Theorem

   C. the Midpoint Formula

   D. the Law of Sines

7. A circle has center $(-1, 4)$ and radius 6. What is r^2 in its equation?

8. The point $(6, 2)$ is on a circle with center $(3, -2)$. What is the radius?

9. What is the center of the circle $(x + 7)^2 + y^2 = 10$?

10. A circle has center $(1, 1)$ and passes through $(1, 9)$. What is its radius?

ALBERT

Name _____ Date _____

Equation of a Circle Worksheet

Geometry · Common Core HSG-GPE.A.1

On Level

Grade-level practice.

1. Complete the square: $x^2 + y^2 - 6x + 4y - 12 = 0$. What is the center?

2. For the same circle ($x^2 + y^2 - 6x + 4y - 12 = 0$), what is the radius?

3. Complete the square: $x^2 + y^2 + 8x - 10y + 5 = 0$. What is the radius?

4. For the same circle ($x^2 + y^2 + 8x - 10y + 5 = 0$), what is the center?

5. Use the Pythagorean Theorem to derive the equation of a circle with center (h, k) and radius r.

6. Write the equation of the circle with center $(-3, 1)$ that passes through $(0, 5)$, in the form $(x - h)^2 + (y - k)^2 = r^2$.

7. Complete the square: $x^2 + y^2 + 6y = 16$. What is the radius?

8. Is the point $(4, -5)$ on the circle $(x - 1)^2 + (y + 1)^2 = 25$?

   A. Yes, because $3^2 + (-4)^2 = 25$.

   B. No, because $4 - 1 \neq 5$.

   C. No, because $-5 + 1 \neq 0$.

   D. Yes, because $4 + (-5) = -1$.

9. A circle has a diameter with endpoints $(-2, 3)$ and $(6, 9)$. What is its center?

10. For the same circle (diameter from $(-2, 3)$ to $(6, 9)$), what is the radius?

Equation of a Circle Worksheet

Geometry · Common Core HSG-GPE.A.1

Challenge

Multi-step and word problems that stretch it.

1. Complete the square: $2x^2 + 2y^2 - 8x + 12y - 6 = 0$. What is the radius?

2. Complete the square: $x^2 + y^2 - 2x - 14y + 46 = 0$. What is the center?

3. A circle centered at $(2, -1)$ is tangent to the x-axis. What is its radius?

4. A circle has center $(5, 5)$ and is tangent to both axes. Write its equation in the form $(x - h)^2 + (y - k)^2 = r^2$.

5. Which equation is NOT a circle?

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

   B. $x^2 + y^2 + 2x + 4y + 10 = 0$

   C. $x^2 + y^2 = 1$

   D. $x^2 + y^2 - 4x = 0$

6. The circle $(x - 4)^2 + (y - 3)^2 = 25$ crosses the x-axis at two points. What are their x-coordinates?

7. Complete the square: $x^2 + y^2 - 10x + 2y + k = 0$ is a circle with radius 3. What is k?

8. A circle with center $(-2, 3)$ passes through the origin. What is r^2?

9. Explain how completing the square turns $x^2 + y^2 - 6x + 8y = 0$ into the center-radius form.

10. Two circles: $x^2 + y^2 = 4$ and $(x - 6)^2 + y^2 = 16$. What is the distance between their centers?