

In this worksheet, you will discover how to write equations for circles and semicircles and interpret their graphical representations. Work through each question carefully and ensure you show all steps in your workings.

Easy Questions

- 1. Write the equation of a circle with centre at (3, 2) and radius 4.
- 2. Identify the centre and radius of the circle given by $(x+1)^2 + (y-5)^2 = 16$.
- 3. Write an equation for the upper semicircle (where $y \ge 2$) of the circle with equation $(x-2)^2 + (y-2)^2 = 9$.
- 4. Graph the circle $(x-2)^2 + (y+1)^2 = 9$.)
- 5. The endpoints of a diameter of a circle are (-2,3) and (4,3). Write the equation of this circle.

Intermediate Questions

- 6. Solve by completing the square: Write $x^2 + y^2 + 4x 6y 12 = 0$ in standard form and state the centre and radius.
- 7. Given the circle with equation $(x 3)^2 + (y + 4)^2 = 25$, determine the coordinates of the centre and the radius.
- 8. Write the equation of the circle with centre (3, -2) and radius 5.
- 9. Graph the circle defined by $(x 2)^2 + (y + 1)^2 = 9$.
- 10. Write the equation for the upper semicircle of the circle with centre (0,0) and radius 4.
- 11. Graph the lower semicircle of the circle given by $(x+1)^2 + (y-3)^2 = 25$.
- 12. For the circle $(x 1)^2 + (y + 2)^2 = 36$, find the coordinates of the endpoints of the vertical diameter.
- 13. Write the equation of the circle with centre (2, 8) that is tangent to the x-axis.

- 14. The endpoints of a diameter of a circle are (-3, 4) and (5, 4). Write the circle's equation.
- 15. Find the intersection points of the circle $(x-2)^2 + (y-3)^2 = 25$ with the vertical line x = 2.
- 16. A semicircle is defined as the right half of the circle with centre (0,0) and radius 6. Write its equation.
- 17. For the circle $(x + 4)^2 + (y 1)^2 = 49$, find the coordinates of the endpoints of the horizontal diameter.
- 18. For the circle $(x-3)^2 + (y+2)^2 = 16$, write the equation of the lower semicircle.
- 19. Determine the area of the circle given by $(x-1)^2 + (y+2)^2 = 9$.
- 20. For the circle $(x + 2)^2 + (y 5)^2 = 100$, decide whether the point (8, 5) lies inside, on, or outside the circle.

Hard Questions

- 21. Write $x^2 + y^2 + 2x 10y + 13 = 0$ in standard form by completing the square and state the centre and radius.
- 22. For the circle $(x-4)^2 + (y+3)^2 = 36$, write the equation of the top semicircle.
- 23. Find the length of the chord formed by the intersection of the circle $(x-1)^2 + (y+2)^2 = 25$ with the line y = 0.
- 24. A circle has its centre on the line x = -2 and is tangent to the line y = 3. If the point (-2, -1) lies on the circle, find its equation.
- 25. Determine the equation of a circle that passes through (1, 2) and (4, 6) and has its centre on the x-axis.
- 26. A semicircle has its diameter along the interval [-4, 4] on the x-axis. Write the equation for the upper half of the corresponding circle.
- 27. For the circle $(x-5)^2 + (y+1)^2 = 36$, write the equations for both the upper and the lower semicircles.
- 28. Determine the equation of the circle that has the same centre as the circle $(x + 2)^2 + (y 3)^2 = 49$ but passes through the point (5, 7).
- 29. A chord of a circle subtends a right angle at the centre. If the chord length is 6, find the radius of the circle.
- 30. Determine whether the point (4,3) lies inside, on, or outside the semicircle defined by $x^2 + y^2 = 25$ with $y \ge 0$.