In this worksheet you will learn to find the axis of symmetry in a parabola. The axis of symmetry is a vertical line that passes through the vertex of the parabola and is given by $x = \dfrac{-b}{2a}$ for a quadratic function $y = ax^2 + bx + c$.

Easy Questions

1. Determine the axis of symmetry for the parabola $y = x^2 + 4x + 3$.

2. Determine the axis of symmetry for the parabola $y = 2x^2 - 6x + 5$.

3. Determine the axis of symmetry for the parabola $y = -x^2 + 2x - 1$.

4. Determine the axis of symmetry for the parabola $y = 3x^2 + 12x + 7$.

5. Determine the axis of symmetry for the parabola $y = 0.5x^2 - 2x + 1$.

Intermediate Questions

6. Find the axis of symmetry for $y = \dfrac{1}{2}x^2 + \dfrac{1}{3}x + 4$.

7. Determine the axis of symmetry for the parabola $y = 4x^2 - 16$.

8. Find the axis of symmetry for $y = -3x^2 - 9x - 2$.

9. A parabola is given by $y = 5x^2 - 20x + 3$. Find its axis of symmetry.

10. Determine the axis of symmetry for $y = 6x^2 + 18x + 7$.

11. Identify the axis of symmetry for $y = -2x^2 + 4x - 6$.

12. For the quadratic function $y = \dfrac{3}{4}x^2 - \dfrac{3}{2}x + 8$, determine the axis of symmetry.

13. Calculate the axis of symmetry for $y = x^2 - x + 1$.

14. Rewrite $y = 2x^2 + 8x + k$ in vertex form and state the axis of symmetry in terms of k.

15. Find the axis of symmetry for $y = -0.5x^2 + x + 10$.

16. Given that the vertex of the parabola $y = 2x^2 - 4x + 1$ is (h, k), explain why the axis of symmetry is $x = h$ and find its value.

17. Determine the axis of symmetry for $y = 10x^2 + 5x - 3$.

18. If a quadratic function $y = x^2 + bx + c$ has an axis of symmetry $x = 3$, determine the value of b.

19. Find the axis of symmetry for $y = 25x^2 - 50x + 33$.

20. For the quadratic function $y = -8x^2 + 32x - 15$, compute the axis of symmetry.

Hard Questions

21. Prove that for a quadratic function $y = ax^2 + bx + c$ the parabola is symmetric about the line $x = \dfrac{-b}{2a}$.

22. A parabola with equation $y = ax^2 + bx + c$ has its vertex at $(2, 5)$ and $a = 3$. Determine b and hence state the axis of symmetry.

23. Determine the axis of symmetry for the function $y = (x - 1)^2 + 3$.

24. A quadratic function passes through the points $(0, 4)$, $(2, 0)$ and $(4, 4)$. Find an equation for this function and state its axis of symmetry.

25. A parabola is given by $y = 7x^2 + bx + 12$ and its axis of symmetry is $x = -1$. Compute the value of b.

26. Show how to rewrite $y = ax^2 + bx + c$ in vertex form by completing the square and explain how this form confirms that the axis of symmetry is $x = \dfrac{-b}{2a}$.

27. Given that a parabola has its axis of symmetry at $x = 3$ with vertex $(3, 1)$ and passes through $(2, 5)$, determine an equation of the parabola in standard form.

28. Show that if a parabola given by $y = ax^2 + bx + c$ has roots r_1 and r_2, then the axis of symmetry is given by $x = \dfrac{r_1 + r_2}{2}$.

29. For the quadratic function $y = -2x^2 + bx - 3$, if the axis of symmetry is $x = 2.5$, find the value of b.

30. Let $y = ax^2 + bx + c$ be a quadratic function. Prove that if the graph is vertically translated by any constant, the axis of symmetry remains $x = \dfrac{-b}{2a}$.