PLOTTING SIMPLE QUADRATIC GRAPHS

Answer all of these questions. Remember to show your working out in all questions.

MAIN QUESTIONS

1. $y = x^2$ | Parabola with vertex at (0, 0)

2. $y = x^2 + 2$ | Parabola with vertex at (0, 2)

3. $y = x^2 - 3$ | Parabola with vertex at (0, -3)

4. $y = x^2 + 5$ | Parabola with vertex at (0, 5)

5. $y = x^2 - 1$ | Parabola with vertex at (0, -1)

6. $y = x^2 + 4x$ | Parabola with vertex at (-2, -4)

7. $y = x^2 - 2x$ | Parabola with vertex at (1, -1)

8. $y = x^2 + 6x$ | Parabola with vertex at (-3, -9)

9. $y = x^2 - 4x$ | Parabola with vertex at (2, -4)

10. $y = x^2 + 8x$ | Parabola with vertex at (-4, -16)

11. $y = x^2 + 3x$ | Parabola with vertex at (-1.5, -2.25)

12. $y = x^2 - 5x$ | Parabola with vertex at (2.5, -6.25)

13. $y = x^2 + 7x$ | Parabola with vertex at (-3.5, -12.25)

14. $y = x^2 - 6x$ | Parabola with vertex at (3, -9)

15. $y = x^2 + 9x$ | Parabola with vertex at (-4.5, -20.25)

16. $y = x^2 + 10x$ | Parabola with vertex at (-5, -25)

17. $y = x^2 - 7x$ | Parabola with vertex at (3.5, -12.25)

18. $y = x^2 + 11x$ | Parabola with vertex at (-5.5, -30.25)

19. $y = x^2 - 8x$ | Parabola with vertex at (4, -16)

20. $y = x^2 + 12x$ | Parabola with vertex at (-6, -36)

21. $y = x^2 - 9x$ | Parabola with vertex at (4.5, -20.25)

22. $y = x^2 + 13x$ | Parabola with vertex at (-6.5, -42.25)

23. $y = x^2 - 10x$ | Parabola with vertex at (5, -25)

24. $y = x^2 + 14x$ | Parabola with vertex at (-7, -49)

25. $y = x^2 - 11x$ | Parabola with vertex at (5.5, -30.25)

26. $y = x^2 + 15x$ | Parabola with vertex at (-7.5, -56.25)

27. $y = x^2 - 12x$ | Parabola with vertex at (6, -36)

28. $y = x^2 + 16x$ | Parabola with vertex at (-8, -64)

29. $y = x^2 - 13x$ | Parabola with vertex at (6.5, -42.25)

30. $y = x^2 + 17x$ | Parabola with vertex at (-8.5, -72.25)

MASTER QUESTIONS

M1. A ball is thrown upwards and its height h in metres after t seconds is given by $h = -t^2 + 6t$. Find the maximum height reached by the ball. | The maximum height is 9 metres

M2. The area of a square is given by $A = x^2$, where x is the length of a side. If the area is 64 cm^2, find the length of a side. | The length of a side is 8 cm

M3. A parabola has the equation $y = x^2 - 4x + 3$. Find the coordinates of its vertex.

The vertex is at (2, -1)

M4. The profit P in pounds from selling x items is given by $P = -x^2 + 10x$. Find the number of items that must be sold to maximise profit.

5 items must be sold to maximise profit

M5. A garden is in the shape of a rectangle with one side against a wall. The area is given by $A = -x^2 + 10x$, where x is the length of the side perpendicular to the wall. Find the maximum possible area.

The maximum possible area is 25 square metres

M6. The height h in metres of a rocket t seconds after launch is given by $h = -5t^2 + 50t$. Find the time when the rocket reaches its maximum height.

The rocket reaches its maximum height after 5 seconds

M7. A quadratic graph has its vertex at (3, -4) and passes through the point (1, 0). Find its equation in the form $y = x^2 + bx + c$.

The equation is $y = x^2 - 6x + 5$

M8. The cost C in pounds of producing x items is given by $C = x^2 - 20x + 200$. Find the number of items that minimises the cost.

10 items minimise the cost

M9. A bridge's arch is modelled by the equation $y = -x^2 + 9$, where y is the height in metres and x is the horizontal distance in metres from the centre. Find the maximum height of the arch.

The maximum height of the arch is 9 metres

M10. A farmer has 100 metres of fencing to enclose a rectangular area. If one side is x metres, show that the area A is given by $A = -x^2 + 50x$. Find the maximum area that