PLOTTING QUADRATIC EQUATIONS

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

MAIN QUESTIONS

1. $y = x^2$
2. $y = -x^2$
3. $y = x^2 + 2$
4. $y = x^2 - 3$
5. $y = (x - 1)^2$
6. $y = (x + 2)^2$
7. $y = (x - 1)^2 + 2$
8. $y = (x + 3)^2 - 4$
9. $y = 2x^2$
10. $y = -3x^2$
11. $y = 0.5x^2$
12. $y = -0.25x^2$
13. $y = 2(x - 1)^2 + 3$
14. $y = -0.5(x + 2)^2 - 1$
15. $y = x^2 + 4x + 4$
16. $y = x^2 - 6x + 9$
17. $y = x^2 + 2x + 5$
18. $y = x^2 - 4x + 1$
19. $y = -x^2 + 2x - 1$
20. $y = -x^2 - 4x - 4$
21. $y = 2x^2 + 8x + 6$
22. $y = -3x^2 + 12x - 9$
23. $y = 0.5x^2 - 2x + 2$
24. $y = -0.25x^2 + x - 1$
25. $y = 3x^2 - 12x + 10$
26. $y = -2x^2 + 4x + 1$
27. $y = x^2 + 3x + 2.25$
28. $y = x^2 - 5x + 6.25$
29. $y = -x^2 + 6x - 8$
30. $y = -x^2 - 2x + 3$

MASTER QUESTIONS

M1. A ball is thrown upwards from a height of 2 metres with an initial velocity of 10 m/s. The height h at time t is given by $h = -5t^2 + 10t + 2$. Find the maximum height reached by the ball.

M2. The profit P in pounds from selling x items is given by $P = -2x^2 + 100x - 800$. Find the number of items that must be sold to maximise profit.

M3. A rectangular garden has a perimeter of 40 metres. Express the area A in terms of the length x, and find the maximum possible area.

M4. The path of a projectile is given by $y = -0.1x^2 + 2x$, where y is the height in metres and x is the horizontal distance in metres. Find the maximum height reached.

M5. A company's revenue R in thousands of pounds is given by $R = -0.5x^2 + 30x$, where x is the number of units sold. Find the number of units that maximise revenue.

M6. The area of a rectangle is given by $A = -x^2 + 14x$, where x is the length of one side. Find the dimensions that give the maximum area.

M7. A bridge's arch is modelled by $y = -0.02x^2 + 1.2x$, where y is the height in metres and x is the horizontal distance in metres. Find the maximum height of the arch.

M8. The cost C in pounds of producing x items is given by $C = x^2 - 60x + 2000$. Find the number of items that minimise the cost.

M9. A farmer has 200 metres of fencing to enclose a rectangular field next to a river. Express the area A in terms of the length x, and find the maximum possible area.

M10. The temperature T in degrees Celsius over a 24-hour period is modelled by $T = -0.5t^2 + 12t - 10$, where t is the time in hours. Find the maximum temperature reached.