



Attempt questions first; check the separate key afterward. Show steps and draw labelled diagrams where asked.

A. Very short answers - 1 mark each

1. Define the degree of a polynomial.
2. Find degree of $5x^3 - 2x + 7$.
3. Find the zero of $3x - 12$.
4. State sum of zeros of $ax^2 + bx + c$, $a \neq 0$.
5. State product of zeros of $ax^2 + bx + c$.
6. Can a quadratic have three distinct zeros?
7. Evaluate $p(2)$ for $p(x) = x^2 - 5x + 6$.
8. Find zeros of $x^2 - 9$.

B. Short answers / practice - 2 marks each

9. Find zeros of $x^2 - 7x + 12$.
10. Verify sum and product of zeros of $2x^2 - 7x + 3$.
11. Form a monic quadratic with zeros 2 and -5 .
12. Find k if 2 is a zero of $x^2 + kx - 6$.
13. Find sum and product of zeros of $3x^2 + 4x - 2$.
14. A quadratic has zeros whose sum is 6 and product 8. Form it.
15. Find zeros of $4x^2 - 4x + 1$.
16. If zeros of $x^2 - 5x + 6$ are α, β , find $\alpha^2 + \beta^2$.
17. For the same polynomial find $1/\alpha + 1/\beta$.
18. Find k if zeros of $x^2 - kx + 16$ are equal and positive.
19. Find a quadratic with zeros $\sqrt{2}$ and $-\sqrt{2}$.
20. Explain how zeros appear on a polynomial's graph.

C. Application / reasoning - 3 marks each

21. Find a quadratic whose zeros are 3 more than zeros of $x^2 - 3x + 2$.

22. Find a quadratic whose zeros are reciprocals of zeros of $2x^2 - 5x + 2$.
23. Find k if one zero of $x^2 - 6x + k$ is twice the other.
24. For zeros of $2x^2 - 3x - 5$, find $(\alpha - \beta)^2$.
25. Find zeros of $6x^2 + x - 2$ and verify their relations.
26. Can a polynomial graph touch the x -axis at a zero without crossing?
27. Find zeros of $3x^2 - 10x + 3$.
28. For zeros α, β of $x^2 - 7x + 10$, find $1/\alpha^2 + 1/\beta^2$.
29. Find k if the product of zeros of $4x^2 + 3x + k$ is -2 .
30. Form a monic quadratic with zeros -2 and 7 .
31. If one zero of $2x^2 + 5x + k$ is -3 , find k and the other zero.

D. Extended practice - 5 marks each

32. Derive sum and product relations for a quadratic from its factorised form.
33. A rectangle's area is $x^2 + 7x + 12$. Factorise to suggest its sides and find area at $x = 2$.
34. Find a monic quadratic with zero sum -3 and difference of zeros 5 .
35. For zeros α, β of $x^2 - 4x + 1$, find $\alpha^3 + \beta^3$ and $\alpha^2\beta + \alpha\beta^2$.

ANSWER KEY - Numerical / closed questions

- 2) 3. 3) 4. 4) $-b/a$. 5) c/a . 6) No. 7) 0. 8) ± 3 .
9) 3, 4. 10) Zeros 3, $1/2$; sum $7/2$; product $3/2$.
11) $x^2 + 3x - 10$. 12) $k = 1$. 13) $-4/3; -2/3$. 14) $x^2 - 6x + 8$. 15) $1/2, 1/2$. 16) 13. 17) $5/6$. 18) 8.
19) $x^2 - 2$. 21) $x^2 - 9x + 20$. 22) $2x^2 - 5x + 2$, up to non-zero factor. 23) 8. 24) $49/4$. 25) $1/2, -2/3$.
26) Yes; $y = x^2$ at 0. 27) $3, 1/3$. 28) $29/100$. 29) -8 . 30) $x^2 - 5x - 14$. 31) $k = -3$; other zero $1/2$. 33) $(x+3)(x+4)$; 30 square units. 34) Zeros 1, -4 ; $x^2 + 3x - 4$. 35) 52; 4.