Class 10 Mathematics · Chapter 2: Polynomials

Answer key and marking scheme · 20 marks · about 40 minutes · based on NCERT

Scan for the free Class 10 Mathematics test

1. The zero of the linear polynomial $5x + 4$ is [1]

(a) $-\frac{4}{5}$ (b) $\frac{4}{5}$

(c) $-\frac{5}{4}$ (d) 4

Answer: (a) The zero of $ax + b$ is $-\frac{b}{a} = -\frac{4}{5}$. Check: $5(-\frac{4}{5}) + 4 = 0$.

2. The degree of the polynomial $3 - 5y + 2y^4 - y^2$ is [1]

(a) 2 (b) 4

(c) 3 (d) −5

Answer: (b) The highest power of y that appears is y^4, so the degree is 4. The terms need not be in order.

3. If $p(x) = 2x^2 - 5x + 3$, then $p(-2)$ equals [1]

(a) 5 (b) 1

(c) 21 (d) −5

Answer: (c) $p(-2) = 2(-2)^2 - 5(-2) + 3 = 8 + 10 + 3 = 21$. Taking $(-2)^2$ as -4 or $-5(-2)$ as -10 gives the distractors.

4. The graph of $y = -3x^2 + x + 5$ is a parabola that [1]

(a) opens upwards (b) opens downwards

(c) is a straight line (d) opens upwards because the constant term is positive

Answer: (b) For $y = ax^2 + bx + c$ the parabola opens downwards when $a < 0$. Here $a = -3$.

5. $ax^3 + bx^2 + cx + d$, with a, b, c, d real, is a cubic polynomial provided [1]

(a) $a \neq 0$ (b) $d \neq 0$

(c) $b \neq 0$ and $c \neq 0$ (d) a, b, c and d are all non-zero

Answer: (a) Only the coefficient of the highest power must be non-zero; if $a = 0$ the degree drops below 3. The other coefficients may be zero ($x^3 - 8$ is a cubic).

6. If -2 is a zero of $3x^2 + kx - 10$, find k and the other zero. [2]

$p(-2) = 0$: $12 - 2k - 10 = 0$, so $k = 1$. The polynomial is $3x^2 + x - 10$; product of the zeroes $= -\frac{10}{3}$, so the other zero is $-\frac{10}{3} \div (-2) = \frac{5}{3}$. ($3x^2 + x - 10 = (x + 2)(3x - 5)$.)

- $p(-2) = 0$ gives $k = 1$ (1)
- other zero $\frac{5}{3}$ (1)

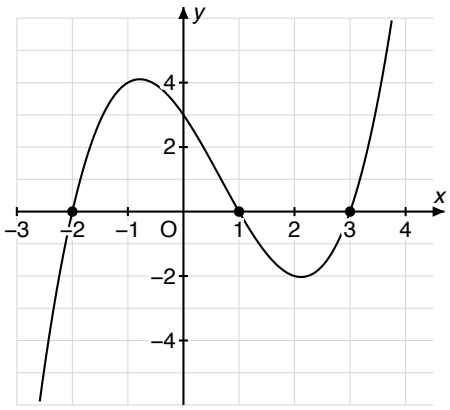
Every question original, written from NCERT, checked by a second reviewer · photocopy freely for your class

7. Find a quadratic polynomial, with integer coefficients, the sum and product of whose zeroes are $-\frac{3}{2}$ and -1 respectively. [2]

$x^2 - (\text{sum})x + (\text{product}) = x^2 + \frac{3}{2}x - 1$. Multiplying by 2 (any $k \neq 0$ keeps the zeroes): $2x^2 + 3x - 2$. Check: $-\frac{3}{2}$ and $\frac{-2}{2} = -1$.

- writes $x^2 + \frac{3}{2}x - 1$ (1)
- clears the fraction: $2x^2 + 3x - 2$ (or any k times it) (1)

8. The graph of $y = p(x)$ is shown. (a) How many zeroes has $p(x)$? (b) Write them. (c) What is the least possible degree of $p(x)$? [2]



(a) The curve meets the x-axis at three points, so $p(x)$ has 3 zeroes. (b) They are the x-coordinates of those points: -2, 1 and 3. (c) A polynomial of degree n has at most n zeroes, so with 3 zeroes the degree is at least 3.

- 3 zeroes, namely -2, 1 and 3 (1)
- least degree 3, since degree n allows at most n zeroes (1)

9. If α and β are the zeroes of $x^2 - 5x + 2$, find a quadratic polynomial whose zeroes are $\frac{1}{\alpha}$ and $\frac{1}{\beta}$. [3]

$\alpha + \beta = 5$, $\alpha\beta = 2$. New sum $= \frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha + \beta}{\alpha\beta} = \frac{5}{2}$. New product $= \frac{1}{\alpha\beta} = \frac{1}{2}$. Polynomial: $x^2 - \frac{5}{2}x + \frac{1}{2}$, or, multiplying by 2, $2x^2 - 5x + 1$.

- $\alpha + \beta = 5$ and $\alpha\beta = 2$ (1)
- new sum $\frac{5}{2}$ and new product $\frac{1}{2}$ (1)
- $2x^2 - 5x + 1$ (or any k times it) (1)

10. Find the zeroes of $4x^2 + 20x + 25$, verify the relationship between the zeroes and the coefficients, and state at how many points the graph of $y = 4x^2 + 20x + 25$ meets the x-axis. [3]

$4x^2 + 20x + 25 = (2x + 5)^2$, so the zeroes are $-\frac{5}{2}$ and $-\frac{5}{2}$. Sum $= -5 = -\frac{20}{4}$; product $= \frac{25}{4} = \frac{c}{a}$, both copies used. The graph touches the x-axis at one point, $(-\frac{5}{2}, 0)$: two coincident points.

- $(2x + 5)^2$, zeroes $-\frac{5}{2}$, $-\frac{5}{2}$ (1)
- sum -5 and product $\frac{25}{4}$ verified with both copies (1)
- graph meets the axis at one point (1)

Every question original, written from NCERT, checked by a second reviewer · photocopy freely for your class

11. If α and β are the zeroes of $2x^2 - 6x + 3$, find without finding the zeroes: (a) $\alpha^2 + \beta^2$ (b) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$. [3]

$\alpha + \beta = 3$, $\alpha\beta = \frac{3}{2}$. (a) $\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta = 9 - 3 = 6$. (b) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} = \frac{\alpha^2 + \beta^2}{\alpha\beta} = 6 \div \frac{3}{2} = 4$.

- $\alpha + \beta = 3$ and $\alpha\beta = \frac{3}{2}$ (1)
- $\alpha^2 + \beta^2 = 6$ (1)
- $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} = 4$ (1)

Every question original, written from NCERT, checked by a second reviewer · photocopy freely for your class