Foundation

# Udaan 2025
# Mathematics
# Polynomials

**DHA: 3**

**Q 1** The zeroes of the quadratic polynomial $4x^2 - 4x - 3$ are
Also, verify the relation between the zeroes and the coefficients.

(A) $\frac{-3}{2}, \frac{1}{2}$ (B) $\frac{3}{2}, \frac{-1}{2}$
(C) $\frac{3}{2}, \frac{1}{2}$ (D) $\frac{-3}{2}, \frac{-1}{2}$

**Q 2** If k is any no-zero constant, then the quadratic polynomial whose zeroes are 2 and -6 is

(A) $k[x^2 + 4x + 12]$ (B) $k[x^2 - 4x - 12]$
(C) $k[x^2 + 4x - 12]$ (D) $k[x^2 - 4x + 12]$

**Q 3** If $\alpha$ and $\beta$are the zeroes of the quadratic polynomial $f(x) = x^2 - 5x + 4$, then the value of $\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta$ is

(A) $\frac{-27}{4}$ (B) $\frac{27}{4}$
(C) $\frac{25}{2}$ (D) $\frac{-25}{2}$

**Q 4** If $\alpha$ and $\beta$ are the zeroes of the quadratic polynomial $f(t) = t^2 - 5t + 3$ , then the value of $\alpha^4\beta^3 + \alpha^3\beta^4$ is

(A) 54 (B) 55
(C) 135 (D) 41

Important question do again.

**Q 5** If $\alpha$ and $\beta$ are the zeroes of the polynomial $x^2 + 7x + 3$ , then the value of $(\alpha - \beta)^2$ is

(A) 34 (B) 37
(C) 39 (D) 41

Important question do again.

**Q 6** If $\alpha$ and $\beta$ are zeroes of the polynomial $x^2 - p(x + 1) + c$ such that $(\alpha + 1)(\beta + 1) = 0$, then the value of c is

(A) -2 (B) 2
(C) -1 (D) 1

**Q 7** The zeroes of the quadratic polynomial $x^2$ + 99x + 127 are

(A) Both positive (B) Both negative
(C) One positive and negative. (D) Both equal

**Q 8** If $\alpha, \beta$ are the zeros of the polynomial $f(x) = x^2 + x + 1$, then $\frac{1}{\alpha} + \frac{1}{\beta} =$

(A) 1 (B) -1
(C) 0 (D) None of these

**Q 9** If one zero of the polynomial $f(x) = (k^2 + 4)x^2 + 13x + 4k$ is reciprocal of the other, then ' k ' =

(A) 2 (B) -2
(C) 1 (D) -1

**Q 10** If $\alpha$ and $\beta$ are the zeros of the polynomial $f(x) = x^2 + px + q$ , then a polynomial having $\frac{1}{\alpha}$ and $\frac{1}{\beta}$ is its zeros is

(A) $x^2 + qx + p$ (B) $x^2 - px + q$
(C) $qx^2 + px + 1$ (D) $px^2 + qx + 1$

**Q 11** A quadratic polynomial, the sum of whose zeroes is 0 and one zero is 3 , is

(A) $x^2 - 9$ (B) $x^2 + 9$
(C) $x^2 + 3$ (D) $x^2 - 3$

# Answer Key

| | |
|---|---|
| **Q1** | **B** |
| **Q2** | **C** |
| **Q3** | **A** |
| **Q4** | **C** |
| **Q5** | **B** |
| **Q6** | **C** |
| **Q7** | **B** |
| **Q8** | **B** |
| **Q9** | **A** |
| **Q10** | **C** |
| **Q11** | **A** |

# Hints & Solutions

**Q 1** **Text Solution:**

Use the formula for sum of zero and Product of Zero

**Video Solution:**

**Q 2** **Text Solution:**

Use the formula for sum of zero and Product of Zero

$If\ \alpha = 2,\ \beta = -6$
$Required\ quadratic\ polynomial\ is\ k\left[x^2 - \left(\alpha + \beta\right)x + \alpha\beta\right],\ where\ 'k'\ is\ any\ number.$
$\Rightarrow k\left(x^2 - \left(2 + \left(-6\right)\right)x + 2\left(-6\right)\right.$
$\Rightarrow k\left[x^2 - \left(-4\right)x - 12\right]$
$\Rightarrow k\left[x^2 + 4x - 12\right]$

**Video Solution:**

**Q 3** **Text Solution:**

Use the formula for sum of zero and Product of Zero

$\alpha + \beta = \frac{-b}{a} = \frac{-(-5)}{1} = 5$
$\alpha\beta = \frac{c}{a} = \frac{4}{1} = 4$
$\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta = \frac{\alpha+\beta}{\alpha\beta} - 2\alpha\beta$
$\Rightarrow \frac{5}{4} - 2\left(4\right)$
$\Rightarrow \frac{5-32}{4} = \frac{-27}{4}$

**Video Solution:**

**Q 4** **Text Solution:**

$Given\ polynomial\ is\ f\left(t\right) = t^2 - 5t + 3$
$Let\ \alpha, \beta\ are\ the\ zeroes\ of\ the\ polynomial$
$\alpha + \beta = \frac{-b}{a} = 5$
$\alpha\beta = \frac{c}{a} = 3$
$\alpha^4\beta^3 + \alpha^3\beta^4 = (\alpha\beta)^3\left(\alpha + \beta\right) = 3^3 \times 5 = 27 \times 5 = 135$

**Video Solution:**

**Q 5** **Text Solution:**

Given polynomial p(x)=$x^2 + 7x + 3$

$Sum\ of\ the\ zeroes = \alpha + \beta = \frac{-b}{a} = \frac{-7}{1} = -7$
$Product\ of\ zeroes = \alpha\beta = \frac{c}{a} = \frac{3}{1} = 3$
$(\alpha - \beta)^2 = (\alpha + \beta)^2 - 4\alpha\beta$
$\Rightarrow (\alpha - \beta)^2 = (-7)^2 - 4\left(3\right) = 49 - 12 = 37$

**Video Solution:**

**Q 6** **Text Solution:**

Given polynomial is $x^2 - p\left(x + 1\right) + c$=
$x^2 - px - p + c$
$sum of the zeroes = \alpha + \beta = \frac{-b}{a} = \frac{-[-p]}{1} = p$
$product\ of\ the\ zeroes\ = \frac{c}{a} = \frac{-p+c}{1} = -p + c$
$\left(\alpha + 1\right)\left(\beta + 1\right) = \alpha\beta + \alpha + \beta + 1 = 0$
$= -p + c + p + 1 = 0 \Rightarrow c = -1$

**Video Solution:**

**Q 7** **Text Solution:**

Both negative

**Video Solution:**

**Q 8** **Text Solution:**

$p\left(x\right) = x^2 + x + 1$
$Sum\ of\ the\ zeroes\ = \alpha + \beta = \frac{-b}{a} = -1$
$Product\ of\ the\ zeroes\ = \alpha\beta = \frac{c}{a} = 1$
$\frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha+\beta}{\alpha\beta} = \frac{-1}{1} = -1$

**Video Solution:**

**Q 9** **Text Solution:**

$Given\ polynomial\ is\ p\left(x\right) = \left(k^2 + 4\right)x^2 + 13x + 4k$
$Let\ the\ two\ zeroes\ are\ '\alpha'\ and\ '\frac{1}{\alpha}'.$
$Product\ of\ the\ zeroes\ = \frac{c}{a} = \frac{4k}{k^2+4}$
$\Rightarrow \alpha \times \frac{1}{\alpha} = \frac{4k}{k^2+4}$
$\Rightarrow k^2 + 4 = 4k$
$\Rightarrow k^2 + 4 - 4k = 0$
$\Rightarrow (k - 2)^2 = 0$
$\Rightarrow k = 2$

**Video Solution:**

**Q 10** **Text Solution:**

*Given polynomial is* $p\left(x\right) = x^2 + px + q$
*sum of the zeroes* $= \alpha + \beta = \frac{-b}{a} = -p$
*product of the zeroes* $= \alpha\beta = \frac{c}{a} = q$
*Required polynomial has zeroes* $\frac{1}{\alpha}$ *and* $\frac{1}{\beta}$
*sum of the zeroes* $= \frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha+\beta}{\alpha\beta} = \frac{-p}{q}$
*product of the zeroes* $= \frac{1}{\alpha} \times \frac{1}{\beta} = \frac{1}{\alpha\beta} = \frac{1}{q}$
*Required polynomial is* $k\left[x^2 - \left(sum\ of\ the\ zeroes\right)x + \left(product\ of\ the\ zeroes\right)\right]$
$\Rightarrow k\left[x^2 - \left(\frac{-p}{q}\right)x + \frac{1}{q}\right]$
*when* $k = q$
*The required polynomial is* $qx^2 + px + 1$

**Video Solution:**

**Q 11 Text Solution:**

*Given one zero of the polynomial is* $\alpha = 3$
*sum of the zeroes* $= \alpha + \beta = 0 \Rightarrow 3 + \beta = 0 \Rightarrow$
$\beta = -3$
*Required polynomial is* $(x - \alpha)(x - \beta)$
$\Rightarrow \left(x - 3\right)\left(x + 3\right)$
$\Rightarrow x^2 - 9$

**Video Solution:**