STPM - EXT1

Exercise 2.5

1. Write down the sum and product of the roots of each of the following quadratic equations.

(a) $x^2 + 5x - 6 = 0$ (b) $2x^2 - 9x + 5 = 0$

(c) $4x^2 + 7x - 3 = 0$ (d) $x(x - 3) = x + 4$

(e) $x^2 + px - p = 0$ (f) $x^2 - qx + q^2 = 0$

(g) $2x^2 - 3kx + k^2 = 0$ (h) $ax^2 - x(a + 2) - a = 0$

2. Write down the quadratic equations whose sum and product of the roots are as follows.

(a) 3, 8 (b) $-2, \frac{1}{4}$ (c) $\frac{1}{3}, -\frac{1}{9}$

(d) a, a^2 (e) $-(p + 1), p^2 - 3$ (f) $\frac{a}{b}, \frac{1}{ab}$

3. If α and β are the roots of the quadratic equation $2x^2 - 5x - 1 = 0$, find the values of

(a) $\alpha^2 + \beta^2$ (b) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ (c) $\frac{1}{\alpha} + \frac{1}{\beta}$

4. If α and β are the roots of the quadratic equation $x^2 + 2x - 1 = 0$, find the values of

(a) $\alpha^3 + \beta^3$ (b) $(\alpha + \beta)^2$ (c) $(\alpha - \beta)^2$

5. If α and β are the roots of the quadratic equation $2x^2 - 4x + 5 = 0$, find the values of

(a) $\frac{1}{\alpha + 1} + \frac{1}{\beta + 1}$ (b) $\frac{1}{2\alpha + \beta} + \frac{1}{\alpha + 2\beta}$ (c) $\frac{1}{\alpha^2 + 1} + \frac{1}{\beta^2 + 1}$

6. Given that α and β are the roots of the quadratic equation $x^2 - 3x + 5 = 0$, find the quadratic equation whose roots are

(a) $\alpha - 2, \beta - 2$ (b) $\frac{1}{\alpha}, \frac{1}{\beta}$ (c) α^2, β^2 (d) $(\alpha - \beta), (\beta - \alpha)$

7. The roots of the quadratic equation $x^2 + 3x + 1 = 0$ are α and β. Find the equation, whose roots are as follows.

(a) $2\alpha, 2\beta$ (b) $\frac{\alpha}{\beta + 1}, \frac{\beta}{\alpha + 1}$ (c) $2\alpha - \beta, 2\beta - \alpha$

8. The roots of an equation are the reciprocals of the roots of the equation $x^2 + 2ax - c^2 = 0$. Find that equation.

9. If one of the roots of the equation $mx^2 + nx + p = 0$ is twice the other root, find the relation between m, n and p.

10. If one of the roots of the equation $x^2 - 4px + 27 = 0$ is the square of the other root, find the value of p.

Exercise 2.5

1. (a) $-5, -6$ (b) $\frac{9}{2}, \frac{5}{2}$ (c) $-\frac{7}{4}, -\frac{3}{4}$
(d) $4, -4$ (e) $-p, -p$ (f) q, q^2
(g) $\frac{3k}{2}, \frac{k^2}{2}$ (h) $\frac{a + 2}{a}, -1$

2. (a) $x^2 - 3x + 8 = 0$ (b) $4x^2 + 8x + 1 = 0$
(c) $9x^2 - 3x - 1 = 0$ (d) $x^2 - ax + a^2 = 0$
(e) $x^2 + (p + 1)x + p^2 - 3 = 0$
(f) $abx^2 - a^2x + 1 = 0$

3. (a) $7\frac{1}{4}$ (b) $-14\frac{1}{2}$ (c) -5

4. (a) -14 (b) 4 (c) 8

5. (a) $\frac{8}{11}$ (b) $\frac{4}{7}$ (c) $\frac{4}{25}$

6. (a) $x^2 + x + 3 = 0$ (b) $5x^2 - 3x + 1 = 0$
(c) $x^2 + x + 25 = 0$ (d) $x^2 + 11 = 0$

7. (a) $x^2 + 6x + 4 = 0$ (b) $x^2 + 4x - 1 = 0$
(c) $x^2 + 3x - 9 = 0$

8. $c^2x^2 - 2ax - 1 = 0$

9. $9pm = 2n^2$

10. 3