

# 18

## Quadratic Equation and Inequalities

- If  $\alpha$  and  $\beta$  are the roots of the equation  $4x^2 + 3x + 7 = 0$ , then  $\frac{1}{\alpha} + \frac{1}{\beta}$  is equal to  
 (A)  $-\frac{3}{7}$  (B)  $\frac{3}{7}$   
 (C)  $-\frac{3}{5}$  (D)  $\frac{3}{5}$
- If the roots of the equation  $3x^2 - 5x + q = 0$  are equal, then what is the value of  $q$ ?  
 (A) 2 (B)  $\frac{5}{12}$   
 (C)  $\frac{12}{25}$  (D)  $\frac{25}{12}$
- If the product of the roots of the equation  $(a+1)x^2 + (2a+3)x + (3a+4) = 0$  be 2, then the sum of roots is  
 (A) 1 (B) -1  
 (C) 2 (D) -2
- If the roots of the equation  $ax^2 + bx + c = 0$  be  $\alpha$  and  $\beta$ , then the roots of the equation  $cx^2 + bx + a = 0$  are  
 (A)  $-\alpha, -\beta$  (B)  $\alpha, \frac{1}{\beta}$   
 (C)  $\frac{1}{\alpha}, \frac{1}{\beta}$  (D) None of these
- If the equations  $x^2 - px + q = 0$  and  $x^2 - ax + b = 0$  have a common root and the roots of the second equation are equal, then which one of the following is correct?  
 (A)  $aq = 2(b+p)$  (B)  $aq = b+p$   
 (C)  $ap = 2(b+q)$  (D)  $ap = b+q$
- The equation  $x^2 - 4x + 29 = 0$  has one root  $2 + 5i$ . What is the other root? ( $i = \sqrt{-1}$ )  
 (A) 2 (B) 5  
 (C)  $2 + 5i$  (D)  $2 - 5i$
- If one of the roots of the equation  $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$  is 1, what is the second root?  
 (A)  $-\frac{b(c-a)}{a(b-c)}$  (B)  $\frac{b(c-a)}{a(b-c)}$   
 (C)  $\frac{c(a-b)}{a(b-c)}$  (D)  $-\frac{c(a-b)}{a(b-c)}$
- What are the roots of the equation  $2(y+2)^2 - 5(y+2) = 12$ ?  
 (A)  $-7/2, 2$  (B)  $-3/2, 4$   
 (C)  $-5/3, 3$  (D)  $3/2, 4$
- Let  $\alpha$  and  $\beta$  be the roots of the equation  $x^2 + x + 1 = 0$ . The equation, whose roots are  $\alpha^{19}$ , and  $\beta^7$  is  
 (A)  $x^2 - x - 1 = 0$  (B)  $x^2 - x + 1 = 0$   
 (C)  $x^2 + x - 1 = 0$  (D)  $x^2 + x + 1 = 0$
- If  $2 + i\sqrt{3}$  is a root of the equation  $x^2 + px + q = 0$ , where  $p$  and  $q$  are real, then  $(p, q)$  is equal to  
 (A)  $(-4, 7)$  (B)  $(4, -7)$   
 (C)  $(4, 7)$  (D)  $(-4, -7)$
- The coefficient of  $x$  in the equation  $x^2 + px + q = 0$  was taken as 17 in place of 13, its roots were found to be  $-2$  and  $-15$ . The roots of the original equation are  
 (A) 3, 10 (B)  $-3, -10$   
 (C)  $-5, -8$  (D) None of these
- What is the value of  $\sqrt{8 + 2\sqrt{8 + 2\sqrt{8 + 2\sqrt{8 + \dots}}}}$ ?  
 (A) 10 (B) 8  
 (C) 6 (D) 4

13. If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2 - q(1+x) - r = 0$ , then what is the value of  $(1+\alpha)(1+\beta)$ ?
- (A)  $1-r$                       (B)  $q-r$   
 (C)  $1+r$                       (D)  $q+r$
14. What is the solution set for the equation  $x^4 - 26x^2 + 25 = 0$ ?
- (A)  $\{-5, -1, 1, 5\}$   
 (B)  $\{-5, -1\}$   
 (C)  $\{1, 5\}$   
 (D)  $\{-5, 0, 1, 5\}$
15. If the equations  $x^2 - kx + 64 = 0$  and  $x^2 - 8x + k = 0$  have real roots, then what is the value of  $k$ ?
- (A) 4                              (B) 8  
 (C) 12                             (D) 16
16. If the product of the roots of the equation  $x^2 - 5x + k = 15$  is  $-3$ , then what is the value of  $k$ ?
- (A) 12                             (B) 15  
 (C) 16                             (D) 18
17. If  $p$  and  $q$  are the roots of the equation  $x^2 - px + q = 0$ , then what are the value of  $p$  and  $q$ , respectively?
- (A) 1, 0                         (B) 0, 1  
 (C)  $-2, 0$                       (D)  $-2, 1$
18. If  $\alpha$  and  $\beta$  are the roots of  $ax^2 + bx + b = 0$ , then what is  $\frac{\sqrt{\alpha}}{\sqrt{\beta}} + \frac{\sqrt{\beta}}{\sqrt{\alpha}} + \frac{\sqrt{b}}{\sqrt{a}}$  equal to?
- (A) 0                              (B) 1  
 (C) 2                              (D) 3
19. If the roots of  $ax^2 + bx + c = 0$  are  $\sin \alpha$  and  $\cos \alpha$  for some  $\alpha$ , then which one of the following is correct?
- (A)  $a^2 + b^2 = 2ac$          (B)  $b^2 - c^2 = 2ab$   
 (C)  $b^2 - a^2 = 2ac$          (D)  $b^2 + c^2 = 2ab$
20. If  $x = 2 + 2^{\frac{1}{3}} + 2^{\frac{2}{3}}$ , then what is the value of  $x^3 - 6x^2 + 6x$ ?
- (A) 1                              (B) 2  
 (C) 3                              (D)  $-2$