Quadratic polynomial and the parabola   <u>Solutions</u>   <u>Main Menu</u>

79 What is the solution to the quadratic equation $x^2 - 5x + 3 = 0$?

(A) $x = \dfrac{-5 \pm \sqrt{13}}{2}$

(B) $x = \dfrac{-5 \pm \sqrt{38}}{2}$

(C) $x = \dfrac{5 \pm \sqrt{13}}{2}$

(D) $x = \dfrac{5 \pm \sqrt{38}}{2}$

80 What is the solution to the inequation $x^2 + 4x + 3 \geq 0$?

(A) $x \leq -1$ or $x \leq -3$

(B) $x \leq -1$ or $x \geq -3$

(C) $x \geq -1$ or $x \geq -3$

(D) $x \geq -1$ or $x \leq -3$

81 Let α and β be roots of the equation $3x^2 - 7x + 12 = 0$. What is the value of $\alpha + \beta$?

(A) $-\dfrac{7}{3}$

(B) $\dfrac{7}{3}$

(C) 4

(D) 7

82 Let α and β be roots of the equation $x^2 - 2x + 4 = 0$. What is the value of $\alpha\beta$?

(A) $\dfrac{1}{4}$

(B) $\dfrac{1}{2}$

(C) 2

(D) 4

83 Let α and β be roots of the equation $x^2 - 8x + 5 = 0$. What is the value of $\alpha^2 + \beta^2$?

(A) 44

(B) 54

(C) 64

(D) 74

84 What is the value of k if the sum of the roots of $x^2 - (k-1)x + 2k = 0$ is equal to the product of the roots?

(A) -3

(B) -2

(C) -1

(D) 1

85 What is the discriminant of $2x^2 + 3x + k = 0$?

(A) $\Delta = 9 - 2k$

(B) $\Delta = 9 - 8k$

(C) $\Delta = 9 - 12k$

(D) $\Delta = 9 - 24k$

86 Which of the following is true for the equation $x^2 + 6x + 9 = 0$?

(A) No real roots

(B) One real root

(C) Two real distinct roots

(D) Three real roots

87 Which of the following is true for the equation $7x^2 - 5x + 2 = 0$?

(A) No real roots

(B) One real root

(C) Two real distinct roots

(D) Three real roots

88 Which of the following is true for the equation $3x^2 - x - 2$?

(A) No real roots

(B) One real root

(C) Two real distinct roots

(D) Three real roots

89 What values of k does the equation $x^2 + (k-1)x - (1+2k) = 0$ have equal roots?

   (A) $k = -5$ and $k = -1$

   (B) $k = -5$ and $k = 1$

   (C) $k = 5$ and $k = 1$

   (D) $k = 5$ and $k = -1$

90 What is the value of k if the equation $2x^2 + 3x + k = 0$ has -3 as one of its roots?

   (A) $k = -27$

   (B) $k = -9$

   (C) $k = 9$

   (D) $k = 27$

91 What values of m is $-4x^2 + 3x + m$ a positive definite?

   (A) $m < -\dfrac{9}{16}$

   (B) $m < -\dfrac{16}{9}$

   (C) $m \geq -\dfrac{9}{16}$

   (D) $m \geq -\dfrac{16}{9}$

92 What are the coordinates of the vertex of the parabola $x^2 - 4x - 12 = 8y$?
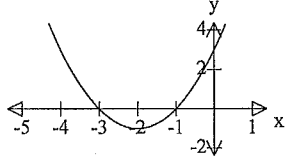
   (A) $(-2, 2)$

   (B) $(0, 2)$

   (C) $(2, 0)$

   (D) $(2, -2)$

93 What are the coordinates of the focus of the parabola $x^2 = 2(y-1)$?

   (A) $(0, \dfrac{1}{2})$

   (B) $(0, \dfrac{3}{2})$

   (C) $(\dfrac{1}{2}, 0)$

   (D) $(\dfrac{3}{2}, 0)$

94 What is the equation of the directrix of the parabola $10x = 1 - 4y - y^2$?

   (A) $x = 3$

   (B) $y = 3$

   (C) $x = 2$

   (D) $y = 2$

Quadratic polynomial and the parabola		Main Menu
	Solution	**Criteria**
79	$x = \dfrac{-(-5) \pm \sqrt{(-5)^2 - 4 \times 1 \times 3}}{2 \times 1}$ $= \dfrac{5 \pm \sqrt{13}}{2}$	1 Mark: C
80	$x^2 + 4x + 3 \geq 0$ $(x+3)(x+1) \geq 0$ Hence $x \geq -1$ or $x \leq -3$	1 Mark: D
81	$\alpha + \beta = -\dfrac{b}{a} = -\dfrac{-7}{3} = \dfrac{7}{3}$	1 Mark: B
82	$\alpha\beta = \dfrac{c}{a} = \dfrac{4}{1} = 4$	1 Mark: D
83	$\alpha + \beta = -\dfrac{b}{a} = -\dfrac{-8}{1} = 8 \qquad \alpha\beta = \dfrac{c}{a} = \dfrac{5}{1} = 5$ $\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta$ $\qquad = (8)^2 - 2 \times 5 = 54$	1 Mark: B
84	$\alpha + \beta = -\dfrac{b}{a} = -\dfrac{-(k-1)}{1} = (k-1)$ $\alpha\beta = \dfrac{c}{a} = \dfrac{2k}{1} = 2k$ Now $(k-1) = 2k$ $\qquad k = -1$	1 Mark: C
85	$\Delta = b^2 - 4ac$ $\quad = 3^2 - 4 \times 2 \times k$ $\quad = 9 - 8k$	1 Mark: B
86	$\Delta = b^2 - 4ac \qquad$ One real root $\quad = 6^2 - 4 \times 1 \times 9$ $\quad = 0$	1 Mark: B
87	$\Delta = b^2 - 4ac \qquad$ No real roots $\quad = (-5)^2 - 4 \times 7 \times 2$ $\quad = -31 < 0$	1 Mark: A

88	$\Delta = b^2 - 4ac \qquad$ Two distinct real roots $\quad = (-1)^2 - 4 \times 3 \times -2$ $\quad = 25 > 0$	1 Mark: C
89	Equal roots $\Delta = 0$ $\Delta = b^2 - 4ac$ $\quad = (k-1)^2 - 4 \times 1 \times -(1+2k)$ $\quad = k^2 - 2k + 1 + 4 + 8k$ $\quad = k^2 + 6k + 5$ $\quad = (k+5)(k+1)$ Therefore $k = -5$ and $k = -1$	1 Mark: A
90	Substitute $x = -3$ into $2x^2 + 3x + k = 0$ $2 \times (-3)^2 + 3 \times -3 + k = 0$ $\qquad 18 - 9 + k = 0$ $\qquad\qquad k = -9$	1 Mark: B
91	Positive definite $\Delta < 0$ or $b^2 - 4ac < 0$ $\qquad\qquad 3^2 - 4 \times -4 \times m < 0$ $\qquad\qquad 9 + 16m < 0$ $\qquad\qquad 16m < -9 \text{ or } m < -\dfrac{9}{16}$	1 Mark: A
92	$x^2 - 4x - 12 = 8y \qquad\qquad$ Vertex is (2, -2) $(x-2)^2 - 4 - 12 = 8y$ $\qquad (x-2)^2 = 8y + 16$ $\qquad (x-2)^2 = 4 \times 2 \times (y+2)$	1 Mark: D
93	$x^2 = 2(y-1)$ $(x-0)^2 = 4 \times \dfrac{1}{2} \times (y-1)$ Vertex is $(0,1)$ and focal length is $\dfrac{1}{2} \qquad$ Focus is $(0, \dfrac{3}{2})$	1 Mark: B
94	$10x = 1 - 4y - y^2$ $y^2 + 4y = -10x + 1$ $(y+2)^2 = -10x + 1 + 4$ $\qquad\quad = -10x + 5$ $(y+2)^2 = -4 \times \dfrac{5}{2} \times (x - \dfrac{1}{2})$ Vertex is $(\dfrac{1}{2}, -2)$, focal length is $\dfrac{5}{2}$ and directrix $x = 3$	1 Mark: A