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QUANTITATIVE APTITUDE

QUADRATIC EQUATIONS



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Top 25 Questions Based on Quadratic Equations

Directions (Q. 1-4): Read the following information carefully to answer the questions that follow.

In the following questions an equation followed by some information is given. You have to choose best suitable option.

$$x^2 - 28x + k = 0$$

Root of the equation are a and b.

Here, $a^2 = 9b$ and $a, b > 0$.

Q1. Find the value of k.

- A. 336
- B. 252
- C. 125
- D. 192
- E. None of these

Q2. Find the equation whose roots are $1/a$ and $1/b$.

- A. $192x^2 + 28x + 1 = 0$
- B. $192x^2 - 28x + 1 = 0$
- C. $192x^2 + 28x - 1 = 0$
- D. $192x^2 - 28x - 1 = 0$
- E. None of these

Q3. Find the value of $(a^2 - b^2)$.

- A. 112
- B. -112
- C. 224
- D. -224
- E. None of these

Q4. Find the value of $(k^2 + 4k - 7)$.

- A. 37425

- B. 37450
- C. 37525
- D. 37550
- E. None of these

Directions (Q. 5-6): Read the following information carefully to answer the questions that follow.

In the following questions an equation followed by some information is given. You have to choose best suitable option.

$$x^2 - Kx - 64 = 0$$

Root of the equation are a and b. Value of $(a - b) = 20$

Q5. Find the value of $a^2 + b^2$.

- A. 264
- B. 272
- C. 296
- D. 308
- E. None of these

Q6. Find the value of $(k + 4)^2$ and $k > 0$.

- A. 169
- B. 196
- C. 225
- D. 256
- E. Cannot be determine

Q7. Which of the following options is correct?

- A. A quadratic equation always has two roots.
- B. If the discriminant of a quadratic equation is negative, then it has no roots.
- C. If the coefficient of the square term in a quadratic equation is negative, then it has no real roots.
- D. If the discriminant is 0, then the quadratic equation has exactly one root.
- E. None of these

Q8. Consider the following equation:

$$x^2 - 2ax + (a^2 + b^2) = 0$$

The difference of the roots of this equation is

- A. a
- B. b
- C. 2a
- D. 2b
- E. None of these

Q9. Suppose that the roots of the following equation are equal:

$$(a-b)x^2 + (b-c)x + (c-a) = 0$$

Which of the following options is correct?

- A. $a+c=2b$
- B. $a+c=b$
- C. $b+c=a$
- D. $b+c=2a$
- E. None of these

Q10. The equation $kx^2-6x-2=0$ has real roots for

- A. $k \geq -19/2$
- B. $k \geq -9/2$
- C. $k \leq -19/2$
- D. $k \leq -9/2$
- E. None of these

Directions (11-21) In the following questions, two equations I and II are given. You have to solve both equations and give answer as,

- A. $x > y$
- B. $x \geq y$
- C. $x < y$
- D. $x \leq y$
- E. $x = y$ or the relation cannot be established

Q11.

I. $5x + 4y - 20xy = 1$

II. $8 + 6xy - 6x - 8y = 0$

Q12.

I. $5x^2 - 20x + 15 = 0$

II. $y + \sqrt[3]{0.125} = 0.9$

Q13.

I) $x^2 + 7^{3/2} = (7^{1/2} + 7)x$

II) $y^{13} - (343^{9/2} / \sqrt{y}) = 0$

Q14.

I. $5\sqrt{2}x^2 + x - 3\sqrt{2} = 0$

II. $8y^2 + 10y - 7 = 0$

Q15.

I. $6x - 5y = 13$

II. $5x - 2y = 0$

Q16.

I. $x^{13} - (125^{9/2} / \sqrt{x}) = 0$

II. $y^2 + 5^{3/2} = (5^{1/2} + 5) y$

Q17.

I. $\sqrt{x + 3} = \sqrt{529} - \sqrt{324}$

II. $y^3 - 7932 = 11751$

Q18.

I. $x = (1728)^{1/3}$

II. $2y^2 - 51y + 325 = 0$

Q19.

I. $x^2 + 53 = 150\% \text{ of } 78$

II. $y = \sqrt[3]{512}$

Q20.

I. $x^2 + \sqrt[3]{59319} = (529 \div 23) \times 8 - 24$

II. $y^2 - 26y + 169 = 0$

Q21.

I) $35x^2 - 3x - 2 = 0$

II) $49y^2 + 7y - 6 = 0$

Q22. Select the correct match given in the options.

Equations	Conditions
a) $x^4 - 227 = 398$	(d) both roots are divisible by 4
(b) $2x^2 + 11x + 14 = 0$	e) both roots are positive
(c) $x^2 - 40x + 256 = 0$	(f) both roots are negative

A. c-e, c-d

B. a-e

C. c-e, a-d, b-f

D. b-e, c-e

E. c-d

Q23. Select the correct match given in the options.

Equations	Conditions
a) $4y^2 + 11y + 6 = 0$	(d) both roots are negative
(b) $y^2 - 9y + 20 = 0$	e) sum of roots is perfect square.
(c) $y^2 - 8y + 15 = 0$	(f) both root values are positive.

A. b-e

B. b-f, a-e, c-d

C. c-f

D. a-d, b-e, c-f

E. c-e

Q24. Select the correct match given in the options.

Equations	Conditions
a) $8x^2 - 78x + 169 = 0$	(d) Difference of roots is 7
(b) $2x^2 + 11x + 14 = 0$	e) Product of both root value is negative
(c) $x^2 - 19x + 78 = 0$	(f) both roots are negative values.

A. a-f, a-e

B. c-d, b-e, a-f

C. c-d, b-f

D. c-f, a-d

E. b-d, c-f

Q25. Consider the following pairs:

Column 1	Column 2
1. $x^2 - 30x + 221 = 0$	13,17
2. $y^2 - 36y + 323 = 0$	19,17
3. $z = \sqrt{289}$	-17,17

Which of the above pair is not correctly match?

A. Only 2

B. Only 3

C. Only 1

D. Both 1 and 3

E. Both 2 and 3

Solution With Answer Key:

1). D

Sum of the roots $(a + b) = 28$

$$a + a^2/9 = 28$$

$$9a + a^2 - 252 = 0$$

$$a^2 + 21a - 12a - 252 = 0$$

$$a(a + 21) - 12(a + 21) = 0$$

$$a = 12$$

$$b = 28 - 12 = 16$$

$$k = ab = 12 \times 16 = 192$$

2). B

Sum of the roots $(a + b) = 28$

$$a + a^2/9 = 28$$

$$9a + a^2 - 252 = 0$$

$$a^2 + 21a - 12a - 252 = 0$$

$$a(a + 21) - 12(a + 21) = 0$$

$$a = 12$$

$$b = 28 - 12 = 16$$

$$x^2 - \left(\frac{1}{a} + \frac{1}{b}\right)x + \frac{1}{ab} = 0$$

$$x^2 - \left(\frac{1}{12} + \frac{1}{16}\right)x + \frac{1}{12 \times 16} = 0$$

$$192x^2 - 28x + 1 = 0$$

3). B

Sum of the roots $(a + b) = 28$

$$a + a^2/9 = 28$$

$$9a + a^2 - 252 = 0$$

$$a^2 + 21a - 12a - 252 = 0$$

$$a(a + 21) - 12(a + 21) = 0$$

$$a = 12$$

$$b = 28 - 12 = 16$$

$$a^2 - b^2 = (12)^2 - (16)^2 = 144 - 256 = -112$$

4). E

Sum of the roots $(a + b) = 28$

$$a + a^2/9 = 28$$

$$9a + a^2 - 252 = 0$$

$$a^2 + 21a - 12a - 252 = 0$$

$$a(a + 21) - 12(a + 21) = 0$$

$$a = 12$$

$$b = 28 - 12 = 16$$

$$\text{value of } k = 12 \times 16 = 192$$

$$k^2 + 4k - 7 = (192)^2 + 4 \times 192 - 7 = 37625$$

5). B

$$ab = -64$$

$$a - b = 20$$

$$(a - b)^2 = 400$$

$$a^2 + b^2 - 2ab = 400$$

$$a^2 + b^2 - 2(-64) = 400$$

$$a^2 + b^2 = 400 - 128$$

$$a^2 + b^2 = 272$$

6). D

$$ab = -64$$

$K =$ sum of the roots. So,

$$a - b = 20$$

$$(a - b)^2 = 400$$

$$a^2 + b^2 - 2ab = 400$$

$$(a + b)^2 - 4ab = 400$$

$$(a + b)^2 = 400 + 4(-64)$$

$$(a + b)^2 = 144$$

$$a + b = +12 \text{ or } -12$$

Here, $k > 0$

So,

$$K = 12$$

$$(k + 4)^2 = (12 + 4)^2 = 256$$

7). A

8). D

The given equation can be factorized as follows:

$$\{x-(a+b)\}\{x-(a-b)\}=0$$

Thus, the two roots are $(a+b)$, $(a-b)$, and their difference is $2b$.

9). D

Let us represent the coefficients by A, B, C . We have:

$$A = a - b, B = b - c, C = c - a$$

$$\Rightarrow A + B + C = 0$$

$$\Rightarrow B = -(A + C)$$

Since the roots are equal, the discriminant must be 0. Thus,

$$D = B^2 - 4AC = 0$$

$$\Rightarrow (A + C)^2 - 4AC = 0$$

$$\Rightarrow (A - C)^2 = 0 \Rightarrow A = C$$

$$\Rightarrow a - b = c - a \Rightarrow b + c = 2a$$

10). D

For real roots, $D \geq 0$:

$$(-6)^2 - 4(k)(-2) \geq 0$$

$$\Rightarrow 36 + 8k \geq 0$$

$$\Rightarrow k \leq -\frac{9}{2}$$

11). E

$$I) 5x + 4y - 20xy - 1 = 0$$

Divide by 20,

$$(5x/20) + (4y/20) - (20xy/20) - (1/20) = 0$$

$$(x/4) + (y/5) - xy - (1/20) = 0$$

$$xy - (x/4) - (y/5) + (1/20) = 0$$

$$x(y - 1/4) - 1/5(y - 1/4) = 0$$

$$(x - 1/5)(y - 1/4) = 0$$

$$x = 1/5, y = 1/4$$

$$II) 8 + 6xy - 6x - 8y = 0$$

Divide by 6,

$$(8/6) + (6xy/6) - (6x/6) - (8y/6) = 0$$

$$(4/3) + xy - x - (4y/3) = 0$$

$$x(y - 1) - (4/3)(y - 1) = 0$$

$$(x - 4/3)(y - 1) = 0$$

$$x = 4/3, y = 1$$

Can't be determined

12). A

$$\begin{aligned}
 \text{I) } & 5x^2 - 20x + 15 = 0 \\
 & 5x^2 - 5x - 15x + 15 = 0 \\
 & 5x(x - 1) - 15(x - 1) = 0 \\
 & (5x - 15)(x - 1) = 0 \\
 & x = 3, 1 \\
 \text{II) } & y + \sqrt[3]{0.125} = 0.9 \\
 & y + 0.5 = 0.9 \\
 & y = 0.9 - 0.5 = 0.4 \\
 & x > y
 \end{aligned}$$

13). D

$$\begin{aligned}
 \text{I) } & x^2 + 7^{3/2} = (7^{1/2} + 7)x \\
 & x^2 - (\sqrt{7} + 7)x + 7\sqrt{7} = 0 \\
 & x = 7, \sqrt{7} \\
 \text{II) } & y^{13} - (343^{9/2} / \sqrt{y}) = 0 \\
 & [(y^{13} * y^{1/2}) - (7^3)^{9/2}] / \sqrt{y} = 0 \\
 & y^{27/2} - 7^{27/2} = 0 \\
 & y^{27/2} = 7^{27/2} \\
 & y = 7 \\
 & x \leq y
 \end{aligned}$$

14). E

$$\begin{aligned}
 \text{I. } & 5\sqrt{2}x^2 + x - 3\sqrt{2} = 0 \\
 & 5\sqrt{2}x^2 - 5x + 6x - 3\sqrt{2} = 0 \\
 & 5x(\sqrt{2}x - 1) + 3\sqrt{2}(\sqrt{2}x - 1) = 0 \\
 & (5x + 3\sqrt{2})(\sqrt{2}x - 1) = 0 \\
 & x = -3\sqrt{2}/5, 1/\sqrt{2} = -0.84, 0.707 \\
 \\
 \text{II. } & 8y^2 + 10y - 7 = 0 \\
 & 8y^2 - 4y + 14y - 7 = 0 \\
 & 4y(2y - 1) + 7(2y - 1) = 0 \\
 & (4y + 7)(2y - 1) = 0 \\
 & y = -7/4, 1/2 = -1.75, 0.5 \\
 & \text{Can't be determined}
 \end{aligned}$$

15). A

$$\begin{aligned}
 6x - 5y &= 13 \text{ ---(1)} \\
 5x - 2y &= 0 \text{ ----(2)} \\
 \text{By solving the equation (1) and (2), we get,} \\
 x &= -2, y = -5 \\
 x &> y
 \end{aligned}$$

16). B

$$\begin{aligned}
 \text{I. } & x^{13} - (125^{9/2} / \sqrt{x}) = 0 \\
 & x^{13} * x^{1/2} = 125^{9/2} \\
 & x^{(13 + 1/2)} = (5^3)^{9/2} \\
 & x^{27/2} = 5^{27/2} \\
 & x = 5
 \end{aligned}$$

$$\text{II) } y^2 + 5^{3/2} = (5^{1/2} + 5) y$$

$$y^2 - (\sqrt{5} + 5) y + 5\sqrt{5} = 0$$

$$y = 5, \sqrt{5}$$

$$x \geq y$$

17). C

$$\text{I. } \sqrt{x+3} = \sqrt{529} - \sqrt{324}$$

$$\sqrt{x+3} = 23 - 18$$

$$\sqrt{x+3} = 5$$

$$(x+3) = 25$$

$$x = 25 - 3 = 22$$

$$\text{II. } y^3 - 7932 = 11751$$

$$y^3 = 19683$$

$$y = 27$$

$$x < y$$

18). C

$$\text{I. } x = (1728)^{1/3}$$

$$x = 12$$

$$\text{II. } 2y^2 - 51y + 325 = 0$$

$$2y^2 - 26y - 25y + 325 = 0$$

$$2y(y - 13) - 25(y - 13) = 0$$

$$(2y - 25)(y - 13) = 0$$

$$y = 12.5, 13$$

$$x < y$$

19). D

$$\text{I) } x^2 + 53 = 150 \% \text{ of } 78$$

$$x^2 = (150/100) * 78 - 53$$

$$x^2 = 117 - 53 = 64$$

$$x = 8, -8$$

$$\text{II) } y = \sqrt[3]{512}$$

$$y = 8$$

$$x \leq y$$

20). C

$$\text{I) } x^2 + \sqrt[3]{59319} = (529 \div 23) \times 8 - 24$$

$$x^2 + 39 = (529/23) * 8 - 24$$

$$x^2 = 184 - 24 - 39$$

$$x^2 = 121$$

$$x = 11, -11$$

$$\text{II) } y^2 - 26y + 169 = 0$$

$$(y - 13)(y - 13) = 0$$

$$y = 13, 13$$

$$x < y$$

21). E

I) $35x^2 - 3x - 2 = 0$

$$35x^2 + 7x - 10x - 2 = 0$$

$$7x(5x + 1) - 2(5x + 1) = 0$$

$$(7x - 2)(5x + 1) = 0$$

$$x = 2/7, -1/5 = 0.285, -0.2$$

II) $49y^2 + 7y - 6 = 0$

$$49y^2 - 14y + 21y - 6 = 0$$

$$7y(7y - 2) + 3(7y - 2) = 0$$

$$(7y + 3)(7y - 2) = 0$$

$$y = -3/7, 2/7 = -0.428, 0.285$$

Can't be determined

22). A

$x^4 - 227x + 398 = 0$ or, $x = -5$	Roots are +5 and -5
$2x^2 + 11x + 14 = 0$ Or, $(x+2)(2x+7) = 0$	Roots are -2, -7/2
$x^2 - 40x + 256 = 0$ $(x-32)(x-8) = 0$	Roots are 32, 8

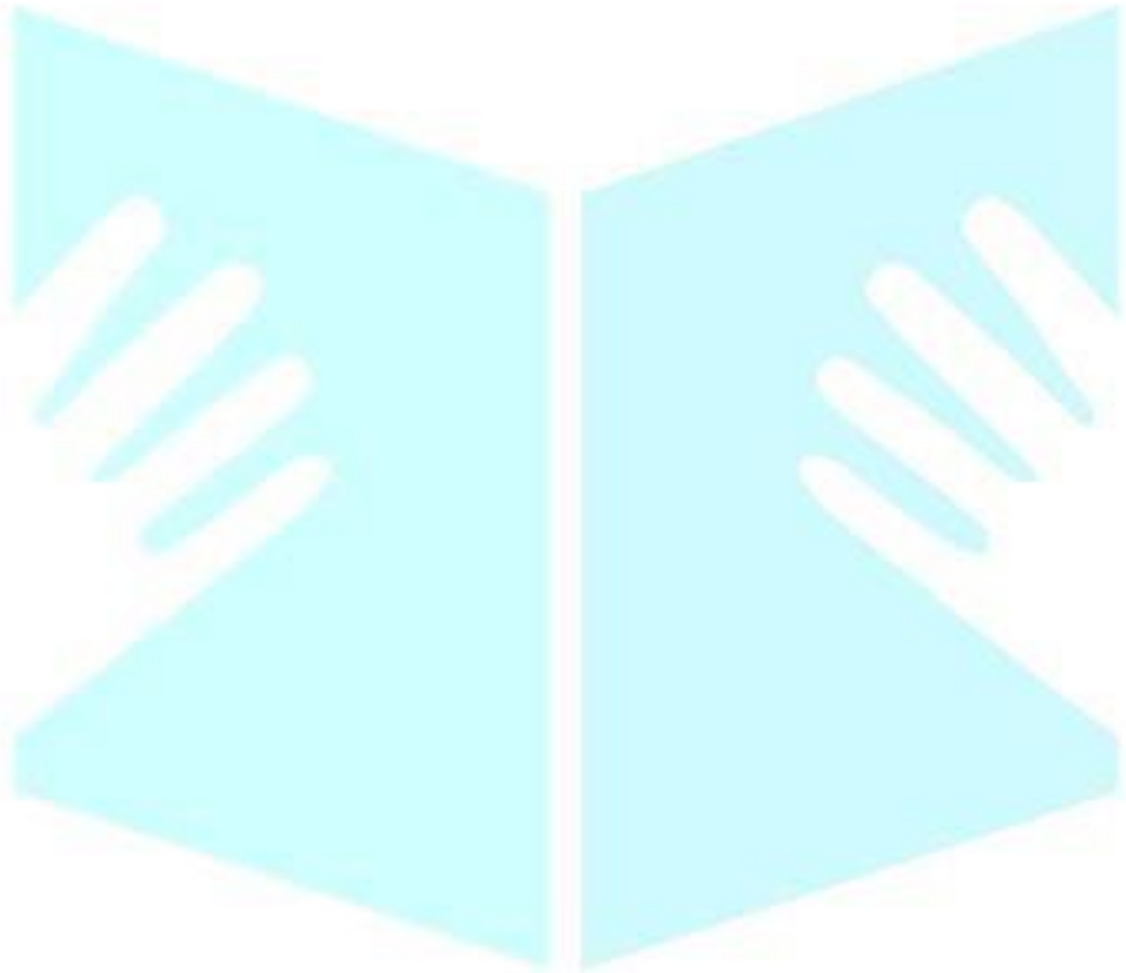
23). D

Equations	
$4y^2 + 11y + 6 = 0$ Or, $(4y+8)(4y+3) = 0$	Roots are -2, -3/4
$y^2 - 9y + 20 = 0$ or, $(y-5)(y-4) = 0$	Roots are 5, 4
$y^2 - 8y + 15 = 0$ $(y-5)(y-3) = 0$	Roots are 5, 3

24). C

Equations	
$8x^2 - 78x + 169 = 0$ Or, $8x^2 - 52x - 26x + 169 = 0$ Or, $(2x-13)(4x-13) = 0$	Roots are $13/2$ and $13/4$
$2x^2 + 11x + 14 = 0$ Or, $(2x+7)(x+2) = 0$	Roots are $-7/2$, -2
$x^2 - 19x + 78 = 0$ $(x-13)(x-6)$	Roots are $13, 6$

25). B



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