CHAPTER 1.4

Solving Quadratic Equations

Multiple-Choice Old Exam Questions

24 questions • 4 topics • options A–E • two questions per page

Topic 1 | Completing the Square

Rewriting a quadratic equation in the form $(x - a)^2 = b$ and using the result • Questions 1–8

Q **1**

If the quadratic equation $2x^2 + 16x + 30 = 0$ is written in the form $(x - a)^2 = b$, then $a + b =$

A) -3

B) -4

C) -2

D) 1

E) 5

Q **2**

If the equation $-3x^2 + 6x + 5 = 0$ is written in the form $(x - a)^2 = b$, then $a + b =$

A) $\frac{11}{3}$

B) $\frac{8}{3}$

C) $\frac{5}{3}$

D) $\frac{7}{3}$

E) 3

Q
3

If completing the square in the equation $4x(x-2)=b$ gives $(x-a)^2=3$, then $a+b=$

A) 9

B) 3

C) 2

D) 7

E) 5

Q
4

When completing the square in the equation $9x^2-12x+9=0$, we get $(x+a)^2=b$. Then $b-a^2=$

A) -1

B) 1

C) $-\frac{5}{9}$

D) $\frac{4}{9}$

E) 0

Q
5

When completing the square in the equation $3x(x-4)+6=0$, we get $(x+a)^2=b$. Then $a+b=$

A) 10

B) 4

C) -8

D) 0

E) 2

Q
6

If the equation $(\sqrt{2}x+1)(\sqrt{2}x-1)+6x=1$ is written in the form $(x-a)^2=b$, then $a+b=$

A) $\frac{7}{4}$

B) $\frac{19}{4}$

C) $\frac{\sqrt{13}}{2}$

D) $\frac{3}{4}$

E) $\frac{\sqrt{13}}{4}$

Q
7

If the equation $(3x-4)(x+1)=-2$ is written in the form $(x+m)^2=n$, then $m+n=$

A) $\frac{19}{36}$

B) $-\frac{2}{3}$

C) -1

D) $\frac{35}{36}$

E) 1

Q
8

If $16x^2+36a^4-48a^2x=9$, then one value of x is equal to

A) $\frac{3}{4}(2a^2-1)$

B) $\frac{3}{2}(2a^2-1)$

C) $\frac{1}{2}(2a^2+1)$

D) $\frac{1}{4}(2a^2+1)$

E) $3(2a^2+1)$

Topic 2 | Roots: Sum, Product and Relationships

Using the sum and product of the solutions, and finding a second solution • Questions 9–14

Q **9**

If $x = \frac{1}{2}$ is one of the solutions of the quadratic equation $2x^2 + x + k = 0$, then the other solution is

A) -1

B) 1

C) 2

D) -2

E) 0

Q **10**

If $x = a \pm b\sqrt{2}$ are the solutions of the quadratic equation $x^2 - 6x + 7 = 0$, then $a^2 + b^2 =$

A) 10

B) 13

C) 5

D) 25

E) 20

Q
11

If $1+\sqrt{2}$ and $1-\sqrt{2}$ are the solutions of the quadratic equation $x^2+bx+c=0$, then $b+c=$

A) -3

B) -1

C) $-2+2\sqrt{2}$

D) 1

E) 2

Q
12

If 4 is the sum and 1 is the product of the solutions of the equation $2x^2+bx+c=0$, then $b+c=$

A) -6

B) -10

C) 10

D) 6

E) -2

Q
13

If the sum and the product of the two roots of the equation $2x^2 + bx + c = 0$ are -4 and $-\frac{3}{2}$ respectively, then $b + c$ is equal to

A) 5

B) -5

C) 11

D) -11

E) 3

Q
14

The quadratic equation $ax^2 - 7x + c = 0$ has sum of solutions $\frac{7}{6}$ and product of solutions $-\frac{1}{2}$. The value of $a + c$ is

A) 3

B) -1

C) -2

D) 5

E) -4

Topic 3 | Discriminant and Nature of Solutions

Using the discriminant to find parameter values and describe the solutions • Questions 15–18

Q **15**

The value of k for which the quadratic equation $kx^2 + 3kx + (2k + 1) = 0$ has two equal solutions is

A) 4

B) 0

C) -4

D) 1

E) 2

Q **16**

If the quadratic equation $kx^2 - (k - 3)x + 1 = 0$ has two equal solutions, then one possible value of k is

A) 9

B) -1

C) -9

D) -10

E) 10

Q
17

If the discriminant of the equation $\sqrt{2}x^2 + kx + \frac{\sqrt{2}}{5} = 0$ is equal to $\frac{8}{45}$, then a possible value of k is

A) $\frac{4}{3}$

B) $\frac{2}{3}$

C) $\frac{8}{3}$

D) $\frac{16}{9}$

E) $\frac{1}{3}$

Q
18

If the discriminant of the quadratic equation $2x^2 + \frac{3}{5}x = k$ is $\frac{49}{25}$, where k is a constant, then the solution set of the equation contains

A) one positive and one negative rational number

B) two positive irrational numbers

C) two positive rational numbers

D) two negative rational numbers

E) two negative irrational numbers

Topic 4 | Solving Equations and Applications

Solving by factoring, and word problems on integers, triangles and rectangles • Questions 19–24

Q **19**

If $x_1 < x_2$ are the solutions of the equation $6x(1-x) = x + 1$, then $6x_1 - 2x_2 =$

A) 1

B) 0

C) 2

D) -1

E) 3

Q **20**

If the sum of the squares of three consecutive positive integers a, b and c is 149, then $a + b + c$ is equal to

A) 21

B) 30

C) 24

D) 15

E) 27

Q
21

If the shorter sides of a right triangle have lengths k and $2k + 2$, and the hypotenuse has length $k + 8$, then the value of $3k + 1$ is equal to

A) 16

B) 10

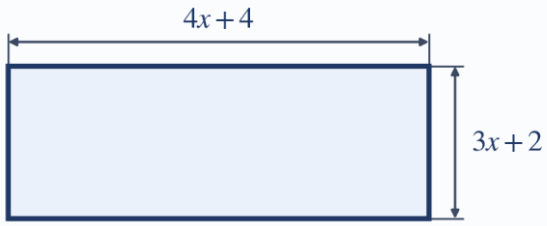
C) 46

D) 4

E) -8

Q
22

If the area of the rectangle in the figure is 21 square feet, then its perimeter, in feet, is



A) 19

B) 30

C) 20

D) 17

E) 32

Q
23

A farmer has a rectangular garden plot surrounded by 30 m of fence. If the area of the garden is 36 m², then the dimensions of the garden are

A) 3 m and 12 m

B) 4 m and 11 m

C) 4 m and 9 m

D) 5 m and 10 m

E) 6 m and 6 m

Q
24

The length of a rectangle is one meter more than twice the width. If the area of the rectangle is 6 square meters, then its length, in meters, is

A) 4

B) $\frac{3}{2}$

C) 3

D) 6

E) 2

Answer Key

"Original" shows the question number in the source worksheet.

Q	Original	Ans.	Value
1	1	**A**	-3
2	16	**A**	$\frac{11}{3}$
3	18	**A**	9
4	17	**A**	-1
5	19	**D**	0
6	6	**A**	$\frac{7}{4}$
7	9	**A**	$\frac{19}{36}$
8	24	**A**	$\frac{3}{4}(2a^2-1)$
9	21	**A**	-1
10	2	**A**	10
11	8	**A**	-3
12	5	**A**	-6
13	15	**A**	5
14	7	**A**	3
15	14	**A**	4
16	4	**A**	9
17	13	**A**	$\frac{4}{3}$
18	10	**A**	one positive and one negative rational number
19	20	**A**	1
20	11	**A**	21
21	12	**A**	16
22	3	**A**	19
23	22	**A**	3 m and 12 m
24	23	**A**	4