GYANTECH GURU JI

Mathematics

Class 10 (Secondary) — Question Bank with Answers

Chapter-wise | MCQ · Short · Medium · Long | Paper Analysis | Computer Typed

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12	6	4	3
MCQ with answers	Short questions	Medium questions	Long questions

How to use: Read the chapter, solve the questions without looking at the answers, then check. Questions marked with more stars (★) come from the most important parts of the chapter and are the most likely to be asked. This is our expected-question analysis based on the syllabus and the book's terminal exercises; it is not a guarantee of the actual paper.

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Paper Analysis & Chapter Index

Multiple Choice Questions | Short Answer Questions | Medium Answer Questions | Long Answer Questions

Ch	Chapter	Importance	Key areas to prepare	MCQ / Short / Med / Long
10	Quadratic Equations	★★★★★	Factorisation, quadratic formula, discriminant, word problems	12 / 6 / 4 / 3

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CHAPTER 10

Quadratic Equations

Expected importance ★★★★★ | Factorisation, quadratic formula, discriminant, word problems

Multiple Choice Questions

MCQ · 12 questions

Q1. Which of the following is a quadratic equation?

A $x^2 + 2x + 1 = 0$ B $x^3 + x = 0$

C $2x + 5 = 0$ D $x + 1 = 0$

Answer: A) $x^2 + 2x + 1 = 0$

Q2. The standard form of a quadratic equation is

A $ax + b = 0$ B $ax^2 + bx + c = 0, a \neq 0$

C $ax^3 + bx^2 + c = 0$ D $ax^2 + bx + c = 0, a = 0$

Answer: B) $ax^2 + bx + c = 0, a \neq 0$

Q3. The maximum number of roots a quadratic equation can have is

A 1 B 2

C 3 D 4

Answer: B) 2

Q4. The discriminant of $ax^2 + bx + c = 0$ is

A $b^2 + 4ac$ B $b^2 - 4ac$

C $4ac - b^2$ D $b - 4ac$

Answer: B) $b^2 - 4ac$

Q5. If D > 0, the roots of a quadratic equation are

A real and equal B real and distinct

C not real D zero

Answer: B) real and distinct

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Q6. If D = 0, the roots are

A real and equal
B real and distinct
C imaginary
D not defined

Answer: A) real and equal

Q7. The roots of $x^2 - 5x + 6 = 0$ are

A 2 and 3
B -2 and -3
C 1 and 6
D -1 and -6

Answer: A) 2 and 3

Q8. Is x = 1 a root of $x^2 - 5x + 6 = 0$?

A Yes
B No
C Only if x > 1
D Cannot say

Answer: B) No

Q9. For $x^2 + 4x + k = 0$ to have real distinct roots, k must be

A k > 4
B k < 4
C k = 4
D k ≥ 8

Answer: B) k < 4

Q10. The roots of $x^2 - 2x - 24 = 0$ are

A 6 and -4
B -6 and 4
C 6 and 4
D -6 and -4

Answer: A) 6 and -4

Q11. The quadratic formula was given by

A Euclid
B Sridharacharya
C Pythagoras
D Newton

Answer: B) Sridharacharya

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Q12. The nature of roots of $4x^2 - 12x + 9 = 0$ is

A real and distinct

B real and equal

C no real roots

D cannot be found

Answer: B) real and equal

Short Answer Questions

2 marks · 6 questions

Q1. Write the standard form of a quadratic equation.

Answer:
The standard form is $ax^2 + bx + c = 0$, where a, b, c are real numbers and $a \neq 0$.

Q2. What is the discriminant of $2x^2 - 4x + 3 = 0$?

Answer:
a = 2, b = -4, c = 3.
$D = b^2 - 4ac = 16 - 24 = -8$

Q3. Is $x^2 + 3x - 5 = (x - 1)^2$ a quadratic equation?

Answer:
Expand RHS: $x^2 - 2x + 1$. So $x^2 + 3x - 5 = x^2 - 2x + 1$ gives $5x - 6 = 0$, which is **linear**. So it is **not** a quadratic equation.

Q4. Find the roots of $x^2 - 9 = 0$.

Answer:
$x^2 = 9$, so $x = 3$ or $x = -3$.

Q5. State the nature of roots when $D < 0$.

Answer:
If $D < 0$, the equation has **no real roots**, because the square root of a negative number is not a real number.

Q6. Check whether 2 is a root of $x^2 - 7x + 6 = 0$.

Answer:
Put x = 2: $4 - 14 + 6 = -4 \neq 0$.
So **2 is not a root**.

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Medium Answer Questions

3-4 marks · 4 questions

Q1. Solve $x^2 - 2x - 24 = 0$ by factorisation.

Answer:

Split the middle term: $-2x = -6x + 4x$

- $x^2 - 6x + 4x - 24 = 0$
- $x(x - 6) + 4(x - 6) = 0$
- $(x - 6)(x + 4) = 0$

$x = 6$ or $x = -4$

Q2. Find the roots of $4x^2 + 12x + 5 = 0$ using the quadratic formula.

Answer:

$a = 4, b = 12, c = 5$

- $D = 144 - 80 = 64$
- $x = (-12 \pm 8) / 8$
- $x = -4/8 = -1/2$ or $x = -20/8 = -5/2$

Roots: $-1/2$ and $-5/2$

Q3. Find the nature of roots of $2x^2 + 16x + 25 = 0$ without solving.

Answer:

$a = 2, b = 16, c = 25$

- $D = 256 - 200 = 56$
- $D > 0$

The roots are **real and distinct**.

Q4. If $x^2 + 4x + k = 0$ has real distinct roots, find the value of k.

Answer:

- $D = 16 - 4k$
- For real distinct roots, $D > 0$
- $16 - 4k > 0$, so $k < 4$

$k < 4$

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Long Answer Questions

5-6 marks · 3 questions

Q1. **Prove the quadratic formula $x = (-b \pm \sqrt{(b^2 - 4ac)}) / 2a$ by completing the square.**

Answer:

Start with $ax^2 + bx + c = 0$, $a \neq 0$.

- Multiply by 4a: $4a^2x^2 + 4abx + 4ac = 0$
- Add b^2 on both sides: $4a^2x^2 + 4abx + b^2 = b^2 - 4ac$
- LHS is a perfect square: $(2ax + b)^2 = b^2 - 4ac$
- Take square root: $2ax + b = \pm\sqrt{(b^2 - 4ac)}$
- So $2ax = -b \pm \sqrt{(b^2 - 4ac)}$

$x = (-b \pm \sqrt{(b^2 - 4ac)}) / 2a$

Q2. **The product of two consecutive positive integers is 306. Find the integers.**

Answer:

Let the integers be x and x + 1.

- $x(x + 1) = 306$
- $x^2 + x - 306 = 0$
- $x^2 + 18x - 17x - 306 = 0$
- $(x + 18)(x - 17) = 0$
- $x = -18$ (rejected, not positive) or $x = 17$

The integers are 17 and 18.

Q3. **The length of a rectangle exceeds its width by 8 cm and its area is 240 sq. cm. Find the dimensions.**

Answer:

Let width = x cm, so length = (x + 8) cm.

- $x(x + 8) = 240$
- $x^2 + 8x - 240 = 0$
- $(x + 20)(x - 12) = 0$
- $x = 12$ ($x = -20$ rejected)

Width = 12 cm, Length = 20 cm.

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