

Algebra Questions PDF with detailed solutions

Algebra questions are a common type of questions asked in competitive exams. These questions carry a weightage of 3-4 questions (6-8 marks) in SSC exams and 1-2 questions(1-2 marks) in bank exams. To get a good rank in competitive exams, you should have the concepts of Algebra on your tips, especially, its formulas and identities

Here are some tips for solving Algebra questions: Understand the basic concepts of Algebra, Practice solving a variety of algebra questions, Use identities and formulas. Systematically simplify equations and solve.

So, we have attached 10 questions of Algebra for you to practice with. You should aim to solve these questions in less than half a minute for each.

Practice Questions on Algebra

You can also download the Algebra questions and answers pdf. Just click on the **Download PDF** button. So let's start with the very first question.

Q:1 If x and y are two positive integers such that $x^2 + 4x + 4 - y^2 = 23$, then what is the value of $3x - 2y$?

1. 6
2. 4
3. 8
4. 10

(**Difficulty: 3, Estimated Time: 20 Seconds**) Not an easy one, be ready for more

Q:2 If $(x + y + z) = 3a$ then find the value of the expression $(a - x)^3 + (a - y)^3 + (a - z)^3$.

1. $3xyz$
2. 0
3. $3(a - x)(a - y)(a - z)$
4. 1

(**Difficulty: 2, Estimated Time: 15 Seconds**) This was also an easy one. Did you guess it right?

Q:3 If $x^3 + 1/x^3 = 52$, then what is the value of $x^5 + 1/x^5$?

1. 720
2. 724
3. 728

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4. 732

(**Difficulty:** 3, **Estimated Time:** 20 Seconds) It is not an easy one but I think now you're prepared for it. Did you guess it right?

Q:4 If $a^2 - b^2 = 72$ & $ab = 27$, find $\frac{b}{a} - \frac{a}{b}$.

1. 8/3

2. 3/8

3. -8/3

4. -3/8

(**Difficulty:** 3, **Estimated Time:** 20 Seconds) This was a test of your concepts!

Q:5 If $x + 1/x = \sqrt{2}$ then what will be the value of $x^{64} + x^{48} + x^{32} + x^{16}$?

1. -1

2. 16

3. 4

4. 0

(**Difficulty:** 3, **Estimated Time:** 20 Seconds) We're halfway through. Have you got all your questions correct so far?

Q:6 If $(3x + 7y - 3)(x + y - 15)$ is equivalent to $(ax^2 + by^2 + 2hxy + 2gx + 2fy + c)$, then what will be the value of $\{hc + f - a\}/gbh$?

1. -0.5

2. -0.5

3. 0.2

4. -0.2

(**Difficulty:** 4, **Estimated Time:** 30 Seconds) This was a hard nut to crack, be prepared for such questions in exam!

Q:7 The roots of the quadratic equation $64x^2 - mx = -49$ are equal. Find the value of 'm'.

1. 56

2. 112

3. 124



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4. 84

(Difficulty: 4, Estimated Time: 25 Seconds) This was also a tricky one, but I think now you're prepared for it.

Q:8 If $x = \sqrt{12 + \sqrt{12 + \sqrt{12 + \dots}}}$. Find the value of $2x + 3$.

1. 8

2. 5

3. 11

4. 3

(Difficulty: 4, Estimated Time: 25 Seconds) This was a hard question!

Q:9 If $3^{x+2} - 3^x = 72$, find the value of $x^2 + 2x + 2$.

1. 5

2. 2

3. 10

4. 12

(Difficulty: 2, Estimated Time: 15 Seconds) Another easy one! Let's score more...

Q:10 If $2a^2 + 3ab + ca + b^2 = 14$, $b^2 + c^2 + 3bc + 2ca = 24$, $c^2 + ab + bc + ca = 12$, ($a, b, c > 0$), What is the value of $(a + b + c)$?

1. 4

2. 6

3. 5

4. 8

(Difficulty: 2, Estimated Time: 15 Seconds) Did you guess them all correctly?

Answer Key

Let's check out your score in this test.

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1. (3)	2. (3)	3. (2)	4. (3)	5. (3)
6. (4)	7. (2)	8. (3)	9. (3)	10. (3)

Comment below your score, considering each question has 1 mark only. If you scored 8 to 10, congratulations! You are one step closer to selection. If you have scored 5 to 8 marks, then you are doing well, keep it up. If you have scored less than 5 marks then you need to work a little harder on this subject. But don't worry, we are here to help you master the subject.

Let's check the answers and solutions and try to find out what went wrong.

Answers and Solutions

Q:1 The correct answer is **option 3** i.e. **8**

$$x^2 + 4x + 4 - y^2 = 23$$

$$(x + 2)^2 - y^2 = 23 \quad [\because a^2 + 2ab + b^2 = (a + b)^2]$$

$$(x + 2 + y) \times (x + 2 - y) = 23 \quad [\because a^2 - b^2 = (a + b)(a - b)]$$

Since x and y are integers, $x + y + 2$ and $x - y + 2$ are also integers

$$\text{Integer factors of } 23 = 23 \times 1$$

$$x + y + 2 = 23$$

$$x - y + 2 = 1$$

Adding both the equations,

$$2x + 4 = 24$$

$$\therefore x = 20/2 = 10$$

Substituting in equation 1

$$12 + y = 23$$

$$y = 11$$

$$3x - 2y = 30 - 22 = 8$$

Q:2 The correct answer is **Option 3** i.e. **$3(a - x)(a - y)(a - z)$**

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Given, $(x + y + z) = 3a$

$$\Rightarrow (a - x) + (a - y) + (a - z) = 3a - (x + y + z) = 0$$

Since $P^3 + Q^3 + R^3 = 3PQR$ if $(P + Q + R) = 0$

So,

$$(a - x)^3 + (a - y)^3 + (a - z)^3 = 3(a - x)(a - y)(a - z)$$

Q:3 The correct answer is **Option 2** i.e. **724**

Let $x + 1/x = t$

Cubing on both sides

$$\Rightarrow x^3 + 1/x^3 + 3(x + 1/x) = t^3$$

$$\Rightarrow 52 + 3t = t^3$$

$$\Rightarrow t^3 - 3t - 52 = 0$$

Trial and error $t = 4$ is a root

$$\Rightarrow (t^3 - 3t - 52) \div (t - 4) = t^2 + 4t + 13 = \text{No real roots}$$

$$\Rightarrow x + 1/x = 4$$

Squaring on both the sides

$$\Rightarrow x^2 + 1/x^2 + 2 = 16$$

$$\Rightarrow x^2 + 1/x^2 = 14$$

$$\Rightarrow (x^3 + 1/x^3) \times (x^2 + 1/x^2) = 52 \times 14$$

$$\Rightarrow x^5 + x + 1/x + 1/x^5 = 728$$

$$\Rightarrow x^5 + 1/x^5 + 4 = 728 [\because (x + 1/x) = 4]$$

$$\Rightarrow x^5 + 1/x^5 = 724$$

Q:4 The correct answer is **option 3** i.e. **-8/3**.

$$a^2 - b^2 = 72 \text{ \& } ab = 27$$

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By hit and trial method:

$$ab = 9 \times 3$$

i.e. $a = 9$ and $b = 3$

$$a^2 - b^2 = 81 - 9 = 72$$

Then, $\frac{b}{a} - \frac{a}{b} = (b^2 - a^2)/ab = -(a^2 - b^2)/ab = -72/27 = -8/3$

Q:5 The correct answer is **option 3** i.e. **4**

$$x + 1/x = \sqrt{2}$$

On squaring both sides,

$$\Rightarrow x^2 + 1/x^2 + 2 = 2$$

$$\Rightarrow x^2 + 1/x^2 = 0$$

$$\Rightarrow x^2 = -1/x^2$$

$$\Rightarrow x^4 = -1$$

$$\Rightarrow x^{64} + x^{48} + x^{32} + x^{16}$$

$$\Rightarrow (x^4)^{16} + (x^4)^{12} + (x^4)^8 + (x^4)^4$$

$$\Rightarrow 1 + 1 + 1 + 1 = 4$$

Q:6 The correct answer is **Option 4** i.e. **-0.2**

$$(3x + 7y - 3)(x + y - 15) = 3x^2 + 7y^2 + 10xy - 48x - 108y + 45$$

On comparing with $(ax^2 + by^2 + 2hxy + 2gx + 2fy + c)$:

$$a = 3, b = 7, h = 5, g = -24, f = -54 \text{ and } c = 45$$

Hence,

$$\{hc + f - a\}/gbh$$

$$= ((45 \times 5) - 54 - 3)/(-24 \times 7 \times 5)$$

$$= 168/(-840) = -0.2$$

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Q:7 The correct answer is **option 2** i.e. **112**.

If the roots of the quadratic equation $ax^2 + bx + c = 0$ are equal then,

The condition for roots is equal to $b^2 - 4ac = 0$

Given quadratic equation is $64x^2 - ax + 49 = 0$

The condition for roots are equal

$$\Rightarrow a^2 = 4 \times 64 \times 49$$

$$\Rightarrow a^2 = 2 \times 2 \times 8 \times 8 \times 7 \times 7$$

$$\Rightarrow = 2 \times 8 \times 7 = 112$$

Q:8 The correct answer is **option 3** i.e. **11**

Given :

$$x = \sqrt{12 + \sqrt{12 + \sqrt{12} + \dots}}$$

Calculations :

$$\Rightarrow x = \sqrt{12 + \sqrt{12 + \sqrt{12} + \dots}}$$

The above equation can be written as

$$\Rightarrow x = \sqrt{12 + x}$$

Squaring both sides

$$\Rightarrow x^2 = 12 + x$$

Using the factorization method, we get

$$\Rightarrow x^2 - x - 12 = 0$$

$$\Rightarrow x^2 - 4x + 3x - 12 = 0$$

$$\Rightarrow x(x - 4) + 3(x - 4) = 0$$

$$\Rightarrow (x - 4)(x + 3) = 0$$

$$\Rightarrow x = 4, -3$$

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We will take the positive value of x

$$\Rightarrow 2x + 3$$

$$\Rightarrow 2 \times 4 + 3$$

$$\Rightarrow 8 + 3 = 11$$

Q:9 The correct answer is **option 3** i.e. **10**

Given :

$$3^{x+2} - 3^x = 72$$

Concept used :

$$A^{m+n} = A^m \cdot A^n \quad \text{---- (1)}$$

$$A^x = A^y \text{ then } x = y \text{ because base of the number is same.} \quad \text{---- (2)}$$

Calculations :

Using concept (1) in the given equation

$$\Rightarrow 3^x \cdot 3^2 - 3^x = 72$$

$$\Rightarrow 3^x (9 - 1) = 72$$

$$\Rightarrow 3^x \times 8 = 72$$

$$\Rightarrow 3^x = 72/8$$

$$\Rightarrow 3^x = 9$$

$$\Rightarrow 3^x = 3^2$$

Using concept (2), we get

$$\Rightarrow x = 2$$

$$\Rightarrow x^2 + 2x + 2. \quad \text{---- (3)}$$

Put the value of x in equation (3)

$$\Rightarrow 4 + 4 + 2 = 10$$

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Q:10 The correct answer is **option 3** i.e. **5**

$$2a^2 + 3ab + ca + b^2 = 14$$

$$b^2 + c^2 + 3bc + 2ca = 24$$

$$c^2 + ab + bc + ca = 12$$

Adding the three equations

$$2a^2 + 2b^2 + 2c^2 + 4ab + 4bc + 4ca = 50$$

$$2 \times (a^2 + b^2 + c^2 + 2ab + 2bc + 2ca) = 50$$

$$a^2 + b^2 + c^2 + 2ab + 2bc + 2ca = 25$$

$$(a + b + c)^2 = 25 [\because a^2 + b^2 + c^2 + 2ab + 2bc + 2ca = (a + b + c)^2]$$

$$\therefore a + b + c = 5$$

So, this is it for today. We will meet again with another new topic. Till then, you can practice the questions again by downloading the PDF of Algebra.