

Algebra Summary – SSC CGL Focus

Algebra primarily deals with **expressions, equations, identities, and simplification**. The SSC CGL asks questions mostly from:

Must-Know Algebraic Identities

1. $(a+b)^2=a^2+2ab+b^2$ $a^2+2ab+b^2=(a+b)^2$
 2. $(a-b)^2=a^2-2ab+b^2$ $a^2-2ab+b^2=(a-b)^2$
 3. $(a+b)(a-b)=a^2-b^2$ $a^2-b^2=(a+b)(a-b)$
 4. $a^3+b^3=(a+b)(a^2-ab+b^2)$ $a^3+b^3=(a+b)(a^2-ab+b^2)$
 5. $a^3-b^3=(a-b)(a^2+ab+b^2)$ $a^3-b^3=(a-b)(a^2+ab+b^2)$
 6. $(x+1/x)^2=x^2+2(x+1/x)+1=x^2+1/x^2+2$ $x^2+1/x^2+2=(x+1/x)^2$
 7. $(x-1/x)^2=x^2-2(x-1/x)+1=x^2+1/x^2-2$ $x^2+1/x^2-2=(x-1/x)^2$
 8. $x^3+1/x^3=(x+1/x)^3-3(x+1/x)x^2+1/x^3=(x+1/x)^3-3(x+1/x)x^2+1/x^3$ $(x+1/x)^3-3(x+1/x)x^2+1/x^3=(x+1/x)^3-3(x+1/x)$
 9. $x^3-1/x^3=(x-1/x)^3+3(x-1/x)x^2-1/x^3=(x-1/x)^3+3(x-1/x)x^2-1/x^3$ $(x-1/x)^3+3(x-1/x)x^2-1/x^3=(x-1/x)^3+3(x-1/x)$
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Short Tricks for SSC CGL

1. $x + 1/x$ Based

- If $x+1/x=ax+1/x=ax+1/x=a$, then:
 - $x^2+1/x^2=a^2-2x^2+1/x^2=a^2-2x^2+1/x^2=a^2-2$
 - $x^3+1/x^3=a^3-3ax^2+1/x^3=a^3-3ax^2+1/x^3=a^3-3a$
 - If $x-1/x=ax-1/x=ax-1/x=a$, then:
 - $x^2+1/x^2=a^2+2x^2+1/x^2=a^2+2x^2+1/x^2=a^2+2$
 - $x^3-1/x^3=a^3+3ax^2-1/x^3=a^3+3ax^2-1/x^3=a^3+3a$
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2. Common Patterns

- If $x+1/x=2x+1/x=2x+1/x=2$, then $x=1x=1x=1$
 - If $x+1/x=-2x+1/x=-2x+1/x=-2$, then $x=-1x=-1x=-1$
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3. Identity-Based Factorization

Use identities directly for simplification:

- Given: $x^2-9x^2-9x^2-9$, factor as $(x-3)(x+3)(x-3)(x+3)(x-3)(x+3)$

- Given: $x^3+8x^3 + 8x^3+8$, factor as $(x+2)(x^2-2x+4)(x+2)(x^2-2x+4)$
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 **4. Questions involving Rational Expressions**

Ex:

If $x+1/x=3$, find $x^2+1/x^2x^2 + 1/x^2x^2+1/x^2$:

Use: $x^2+1/x^2=(x+1/x)^2-2=9-2=7$

 **5. For equations like:**

If $x^2+1/x^2=ax^2 + 1/x^2 = ax^2+1/x^2=a$, find $x^4+1/x^4x^4 + 1/x^4x^4+1/x^4$:

Use: $(x^2+1/x^2)^2-2=(x^2 + 1/x^2)^2 - 2 = a^2 - 2(x^2+1/x^2)^2-2=a^2-2$