

# AI Tutor for CBSE Class 9 – Linear Equations in One Variable

## Screening Task Submission

### 1. README.md

#### Chosen Subject & Class

- Subject: Mathematics
- Class: Class 9 (CBSE)
- Topic: Linear Equations in One Variable
- NCERT Alignment: Class 9 Mathematics (NCERT)

#### Overview of the AI Tutor Idea

This AI Tutor is a conversational learning assistant designed to help CBSE Class 9 students understand and practice Linear Equations in One Variable. The goal is not to replace teachers, but to act as a patient, judgment-free personal tutor that students can use outside classroom hours. It focuses on explaining why each step works, not just what steps to follow.

#### Student Profile

- Age Group: 14–15 years
- Skill Levels: Beginner to Average
- Common challenges: sign mistakes, losing equation balance, bracket and division errors, skipping verification, low confidence

#### Learning Context

- Students follow NCERT textbooks and CBSE examinations
- Learning happens through school and self-study
- Most students have access to smartphones

#### What the AI Tutor Does

- Explains concepts using simple language and balance-scale analogy with Indian daily-life examples
- Uses Socratic questioning to guide thinking instead of giving answers
- Provides unlimited NCERT-style practice with step-by-step hints
- Adapts difficulty and pace based on student performance
- Supports student confidence with encouraging, non-judgmental feedback

#### Why AI / LLMs Are Useful

- Static textbooks cannot answer individual doubts or adapt difficulty
- LLMs enable personalized explanations, follow-up questions, and dynamic practice generation
- AI can adjust tone based on confidence and provide a safe space for mistakes

## **Assumptions**

- Student has completed Class 8 mathematics basics
- AI tutor is supplementary support, not a replacement for teachers
- Content strictly follows NCERT syllabus
- No personal data is collected

## **2. PROMPTS\_USED.md**

**Concept Explanation Prompt:** Explains linear equations using balance-scale analogy, simple language, Indian examples, and checks understanding.

**Guided Practice Prompt:** Uses Socratic method, one hint at a time, never reveals final answer directly.

**Personalization Prompt:** Adapts teaching based on confidence level and repeated mistake patterns.

## **3. AI / ML Explanation**

- Large Language Models generate explanations, questions, and hints
- Prompt engineering controls tone, safety, and syllabus limits
- Optional RAG can ground answers in NCERT content

## **Personalization Logic**

- Student responses (correct / incorrect)
- Repeated mistake patterns
- Language indicating confidence or frustration
- Adjusts difficulty, pace, tone, and examples accordingly

## **Accuracy & Safety**

- Strict syllabus boundaries (Class 9 only)
- No exam cheating or off-topic discussion
- Age-appropriate language
- Optional NCERT-based validation

## **Evaluation Metrics**

- Reduction in common mistakes
- Improved confidence
- Higher engagement
- Independent problem-solving ability

## **4. Optional Bonus: LLM Pipeline**

Student Input → Prompt Selection → LLM Response → Safety & Accuracy Check → Student Feedback → Continuous Improvement

## Summary

This case study demonstrates how an LLM-powered AI Tutor can improve conceptual understanding, encourage independent thinking, support students emotionally, and remain safe and NCERT-aligned. The focus is on learning quality, personalization, and responsible AI use.

**Prepared for:** AI / ML Engineer Intern Screening

**Date:** January 2026

**Topic:** Linear Equations in One Variable