Of course. Here are the steps and formulas to build the logic for your "Irrigation Calculator" feature, presented in plain text without LaTeX.

### ​Steps and Formulas for the Irrigation Calculator

​The process involves three main steps: calculating the water needed, calculating the pump's output, and finally, calculating the time.

​**Step 1: Calculate the Required Water Volume**

​This step determines the total volume of water the farmer needs to apply to their field for one irrigation session.

1. ​**Find the Crop Water Need (ETc)**
   * ​**Formula:** ETc = ET₀ \* Kc
   * ​**Where:**
     + ​ET₀ (Reference Evapotranspiration): Fetch this from a weather API for the farmer's location. It's usually given in mm/day.
     + ​Kc (Crop Coefficient): Get this from a database you create in your app. The value depends on the **Crop Type** and **Growth Stage** selected by the farmer.
2. ​**Find the Net Irrigation Requirement (NIR)**
   * ​**Formula:** NIR (mm) = ETc - Effective\_Rainfall
   * ​**Where:**
     + ​ETc: The value calculated above.
     + ​Effective\_Rainfall: Fetch recent rainfall data from the weather API. You can assume this is about 70% of the total rainfall in the last few days.
3. ​**Calculate the Total Volume to Apply**
   * ​**Formula:** Volume\_to\_Apply (in m³) = (NIR \* Area\_m2) / (1000 \* Application\_Efficiency)
   * ​**Where:**
     + ​NIR: The value calculated above in mm.
     + ​Area\_m2: Convert the farmer's input from acres to square meters (Area\_acres \* 4047).
     + ​Application\_Efficiency: This is a factor based on the **Soil Type** selected by the farmer. Use a default value based on flood irrigation:
       - ​Sandy Soil: 0.6
       - ​Loam Soil: 0.75
       - ​Clay Soil: 0.75

​**Step 2: Calculate the Pump's Flow Rate**

​This step estimates how much water the farmer's pump can supply per hour.

* ​**Formula:** Flow\_Rate (in m³/hour) = (Pump\_Power\_HP \* Pump\_Efficiency \* 367) / Total\_Head\_m
* ​**Where:**
  + ​Pump\_Power\_HP: The horsepower (HP) of the pump, entered by the farmer.
  + ​Pump\_Efficiency: Use an average value, like **0.65** (for 65% efficiency).
  + ​367: A conversion constant.
  + ​Total\_Head\_m: The total height the water is lifted. It is calculated as:
    - ​Total\_Head\_m = Suction\_Head + Delivery\_Head
    - ​Suction\_Head: This is the **depth to the water level** in the well, which your app can pull from its main dashboard.
    - ​Delivery\_Head: The height from the ground to the field. You can use a default value of **2 meters**.

​**Step 3: Calculate the Pumping Time**

​This is the final step where you provide the answer to the farmer.

* ​**Formula:** Pumping\_Time (in hours) = Volume\_to\_Apply (m³) / Flow\_Rate (m³/hour)

​The result of this calculation is the final output. You can then format it for the user (e.g., convert 5.5 hours to "5 hours and 30 minutes").