1. A student investigates the volume of hydrochloric acid solution that reacts with 25.0 cm^3 of sodium hydroxide solution.
   a. Which piece of equipment could the student use to measure 25.0 cm^3 of sodium hydroxide most accurately?

      Tick (✓) **one** box.

      Beaker ☐

      Evaporating basin ☐

      Pipette ☐

      Test tube ☐

      This is the method used:

      1. Pipette 25.0 cm^3 of sodium hydroxide solution into a conical flask.
      2. Add a few drops of thymol blue indicator to the sodium hydroxide solution.
         Thymol blue is blue in alkali and yellow in acid.
      3. Add hydrochloric acid solution from a burette until the end-point was reached.

   b. Explain what would happen at the end-point of this titration. You should mention the acid, the alkali and the indicator in your answer.

      _____

      _____

      _____

      _____

      _____

      _____

   c. Complete the word equation for the reaction:

Sodium hydroxide + hydrochloric acid → _____ + _____

d. Explain why a pipette is used to measure the volume of sodium hydroxide solution but a burette is used to measure the volume of hydrochloric acid.

The pipette was labelled as $25.0 \pm 0.05\ cm^3$.

e. State the resolution of the pipette.

f. Calculate the percentage uncertainty in the volume measured using the pipette.
Use the equation:

$$\text{percentage uncertainty} = \frac{\text{uncertainty}}{\text{volume measured}} \times 100$$

g. The higher the concentration of a sample of hydrochloric acid, the greater the volume of sodium hydroxide will be needed to neutralise the sample of acid.

Describe how titrations could be used to find out which of two samples, X or Y, is a more concentrated acid.