

BLESSED VICTORS SS BUWALULA
END OF TERM 2 ASSESSMENT 2025
S5 PRINCIPAL MATHEMATICS

Item 1:

In Kabulasoke village, a large conical water tank with a vertical angle of 120° is steadily filling at $18\pi \text{ cm}^3$ per minute. After 12 minutes of rain, villagers wonder how deep the water is inside.

Nearby, an old merchant struggles with a complex fraction below hoping to break it down into simpler parts to solve a coin-sharing puzzle;

$$\frac{3x^3 + 5x^2 + 7}{(x + 1)(x^2 + 1)(x - 2)^2}$$

Down by the riverbend, 7 men and 5 women find seats on a straight long bench, sometimes making sure no two women sit side-by-side, other times sitting all women together.

A young scribe uses the letters of "SUCCESSFUL" to create three-letter words for the upcoming festival.

Task:

- a) Find the water depth after 12 minutes and its rate of change then.
- b) Simplify the merchant's fraction to reveal hidden parts.
- c) Count the seating arrangements with no two women adjacent. Count the seating arrangements with all women together.
- d) Find how many ways can the letters of the word "SUCCESSFUL" be arranged in a row. How many three-letter words can be arranged from the word "SUCCESSFUL."