BIOLOGY SELF-STUDY MATERIALS
Senior Four

Topic: Growth and Development

Introduction
By the end of this topic, you should be able to conduct an experiment on plant growth over time. You should also be able to plot a growth-time graph on the growth observed.

You can easily determine the growth in plants by using a germinating seedling. The rate at which a seedling grows shows the availability of nutrients in the soil and the overall health of the plant.

Activity: Determining the growth rate of a seedling
In the activity below, you will germinate seeds and take measurements on the shoot of the seedlings to determine the rate of growth.

Things you will need: Maize grains, empty plastic water bottle, water, knife or razor blade, ruler, pen / pencil, graph paper

Procedure
1. Half way the length of the water bottle, make a mark with pencil / pen.
2. Cut the bottle using a knife or razor blade from the marked part.
3. Remove the top part of the bottle.
4. Put soil in the remaining part of the bottle.
5. Put maize grains in the soil but on the side nearer the wall of the bottle where you can see.
6. Sprinkle water onto the soil. Why is this so? Keep checking on the seeds.
7. Note down when the shoot appears. Record this as day 0 in the table.

Time (days)	Length of shoot (cm)
Day shoot appears (day 0)	0
Day 2	
Day 4	
Day 6	
Day 8	
Day 10	

8. Then after two days, measure the height of the shoot in millimeters. Continue with measurement and record the result after every two days for the next 5 days.
9. From the records obtained, plot a graph of growth rate against time (number of days).

Follow-up activity

During germination and growth of maize, the dry weight of the endosperm, the weight of the embryo and the total dry weight were determined at two-day intervals. The results are shown in the table below.

Time after planting (days)	Dry weight of endosperm (mg)	Weight of embryo (mg)	Total dry weight (mg)
0	43	2	45
2	40	2	42
4	33	7	40
6	20	16	37
8	10	25	35
10	6	33	39

1. On the same axes, draw a graph of the dry weight of the endosperm, weight of the embryo and the total dry weight against time.
2. Determine the total dry weight on day 5
3. Explain:
   i) the decrease in dry weight of the endosperm from days 0 to 10.
   ii) the increase in dry weight of embryo from days 0 to 10.
   iii) the decrease in total dry weight from day 0 to 8.
   iv) the increase in total dry weight after 8 days.