1. Three-Week Healthy Plantlets

Aim	This is a mini-competition where teams of pupils identify key factors needed for healthy plant growth and brainstorm strategies to grow the largest and healthiest plants in 3 weeks.
Recommended for	All pupils
Subject Links	Science: photosynthesis (Primary 5 & 6), physical characteristics (Primary 5 & 6), IT
Horticultural Skills	Growing healthy plants
Process Skills	Observing, comparing, measuring, communicating, analysing, generating, evaluating
Equipment/Materials	Pots or containers (reuse Styrofoam boxes), soil/potting mix, seeds, gardening tools, data loggers from school (with temperature and light sensors); Optional: prizes, 'Community In Bloom: A Concise Guide to Tropical Gardening' (National Parks Board)
Duration	Total: approximately 3-4 hours (project can be completed in 3 weeks)

Preparation	• Photocopy the handouts 1a and 1b for every pupil. Handout 1c is optional.
	• Book the computer room (web research).
	• Decide the start and end date for the project.
	• Decide on the type of plants. We suggest annuals (plants which complete their lifecycle in a growing season of 2-5 months). Suggested species include Balsam (*Impatiens balsamina*), Plume Celosia (*Celosia argentea var plumosa*) and Sunflower (*Helianthus annuus*).
	• Decide on the type of containers for planting (pots, reuse Styrofoam boxes etc.), soil or potting mix and get the materials.

Suggested schedule

1. Introduce the activity. Announce the competition and the start and end dates. (distribute Handout 1a). Pupils brainstorm what plants need for growth.
2. Planting date (distribute Handout 1b and 1c).
3. Submission date.

Procedure

1. Introduce the 'Community In Bloom' Programme.

2. Explain to pupils that this activity is a competition (within the class or for the whole level) to grow the largest and healthiest plant in 3 weeks.

Briefing Points for Introduction

• Pupils form teams of 3-4 members. Each team plants a few plants and will select their largest and healthiest for the competition.

• After 3 weeks, plants will be judged according to their size (height) and health (having no pests or disease, large well-formed leaves with no leaf damage etc.).

• The class will start planting on this date ⬚⬚⬚⬚⬚⬚⬚⬚ .

• The competition will end on this date ⬚⬚⬚⬚⬚⬚⬚⬚ . On that day, each team chooses just one plant and submits it with both Handouts 1a and 1b (all filled in).

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Briefing Points for Planting Date

Distribute Handout 1a
- In groups of 3-4 members, brainstorm what factors plants need to grow and write them into handout 1a.
- Based on these factors, think of ideas to maximise your plants' growth (make your plants grow as fast as possible).

Distribute Handout 1b
- Throughout the 3 weeks, your team needs to take turns to check your plants, measure the length and count the leaves at least once every week.
  Record your measurements on Handout 1b.

Optional: Distribute Handout 1c
- Read the instructions on planting the seeds and start.

3. Check on teams and their plants once each week until the project ends.
   Give teams or pupils some advice if their plants are not growing well.
   Should the plants die, get the pupils to start planting again.

4. At the end of the 3 weeks, pick out the largest and healthiest plants and announce the top 3 winning teams. Optional: give out prizes (if any).

5. Ask the winning teams to share with the class how they grew such a large and healthy plant.

6. After the competition, get the pupils to transplant their plants into a plot in the school garden. For information on transplanting plants from a pot to the ground, see page 26 of the 'Community In Bloom: A Concise Guide to Tropical Gardening'.

7. Debrief the activity.

8. Encourage pupils to post pictures of their plants and/or their reflections on your school blog or the NParks Gardening blog 'Young Gardeners' (http://www.nparks.gov.sg/blogs/young_gardeners/).

9. Extensions:

   - Pupils may plot the growth of their plants (length or height of plant or number of leaves) using MS Excel. Comment on the graph of pupils' plant growth.

   - Have more than one class compete at the same time and have winners for the entire level.

   - Do an experiment or investigation – place plants under different conditions (e.g. different amounts of light) .

Debrief/Background Knowledge

§   Help pupils analyse why their plants grew well, showed growth or died. Check if their plant received the main elements needed for growth. Often seedlings rot and die because of over-watering or poor soil (insufficient drainage).

- The main factors which affect growth (what plants need to survive) are **sunlight**, **water**, **good soil** and **nutrients** and the **right temperature** to grow well.

- **Sunlight** – different plants need different amounts and intensities of sunlight. Give sun-loving plants as much sunlight as possible during the day. The annuals like Balsam, Sunflower etc that were suggested are all sun-loving plants. Extend the time for photosynthesis by providing artificial lighting during the night. However the plants need to be given sufficient water and nutrients. Pupils can measure the amount of light full sun plants and plants in the shade receive using the data loggers.

- **Water** - Give the optimum amount of water (too much causes root rot, too little water limits growth).

- **Good soil** - Promote healthy root growth by ensuring that the soil is not water-logged. Mix clay-based soil with compost (organic matter) and some sand to increase drainage.

- **Nutrients** - Give plants the right amount of nutrients/ fertilisers (remember not to over-fertilise as this can kill a plant). It is not recommended that the seedlings be fertilised for the 3 weeks of the activity. However, fertilise plants after they have been transplanted to the school garden.

- **Temperature** - In Singapore, our tropical climate has temperatures in the range of 24 – 34° C. The data logger reading should be within this range.
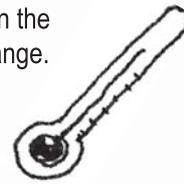
Other tips which promote healthy plant growth:

- Check plants regularly.

- Ensure that plants are not over-crowded. As seedlings develop, remove weaker seedlings (to another pot) to give the biggest seedling room to grow.

- Remove pests and diseased parts.

§   Ask the class to evaluate their project using the lower portion of Handout 1a.

§   Ask pupils what they have learnt through this activity. Alternatively, you could ask them to fill in the reflection sheet in Annex 3.

§   Discuss their evaluations and reflections.

Pupil's Handout

Name :

Members of your team :

1a. Three-Week Healthy Plantlets

Planning Your Project

- What are the factors that affect a plant's growth?
- What can your team do to increase the effect of one or more of these factors, to make your plant grow faster?

Factors that affect plant growth	How do you maximise this factor to maximise your plants' growth?
Factor 1:	
Factor 2:	
Factor 3:	
Factor 4:	
Factor 5:	

Evaluating your Project

1. Was your team's plan successful? Why do you say this?

2. What were some problems you faced and how would you solve them?

Problem with my plant:	What could have caused this?	How do I solve this problem?

Pupil's Handout

Name :

Members of your team :

1b. Three-Week Healthy Plantlets

Plant Growth Chart

Date when seeds were planted: | | Date for Submission: | |

	Week 1	**Week 2**	**Week 3**
Date checked			
Physical Conditions			
Temperature Measure the air temperature around the plant.			
Light Measure the light level around the plant. Record the weather conditions at the time of measuring.	Light reading: Weather:	Light reading: Weather:	Light reading: Weather:
Water Record how often and how much water the plant is given each day.			
Fertiliser Record what type and how much fertiliser was added.			
Plant Growth			
No of leaves Count the number of leaves on the plant.			
Length Measure the height of the plant using a measuring tape.			
Plant Growth			
Pests Record any pests on the plant and remove them.			
Other observations			

HANDOUT 1B

Pupil's Handout

Name :

Members of your team :

1c. Three-Week Healthy Plantlets

Planting your seeds

1. Place the netting into an empty pot.

2. *Cut the bottom part of the bag (with the potting mix) and pour the potting mix into the pot.

3. Use your finger to make 5 shallow holes (less than 1cm deep) into the potting mix.

4. *Cut open the section of plastic bag with the seeds. Sprinkle a few seeds into each hole. Cover the holes with potting mix.

5. Water your seeds with a fine spray of water (from a sprayer or watering can).

6. Place the pot where your new plants can get sunlight.

*use scissors
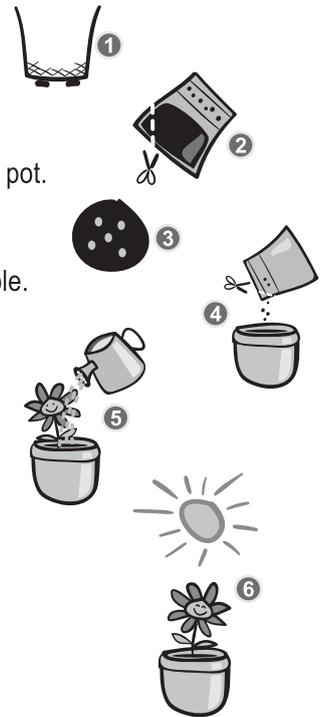
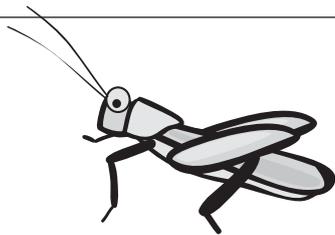|	
Don't plant your seeds too close to each other! Give them space to grow!	Wash your hands thoroughly with soap after gardening!

Plant Care Tips!

Check your plants everyday:

- Water them so they do not dry out (keep the soil damp, but do not over-water!)
- Check how they are growing
- Remove any weeds
- Look out for pests and remove them

Beetles, grasshoppers, caterpillars, snails	Leaf hoppers, mealy bugs, aphids