Window to the Tropics
Instructions and Answer Sheet for Teachers

Gardens by the Bay Avatar:

- Horticulturist

Level/ Subject(s):

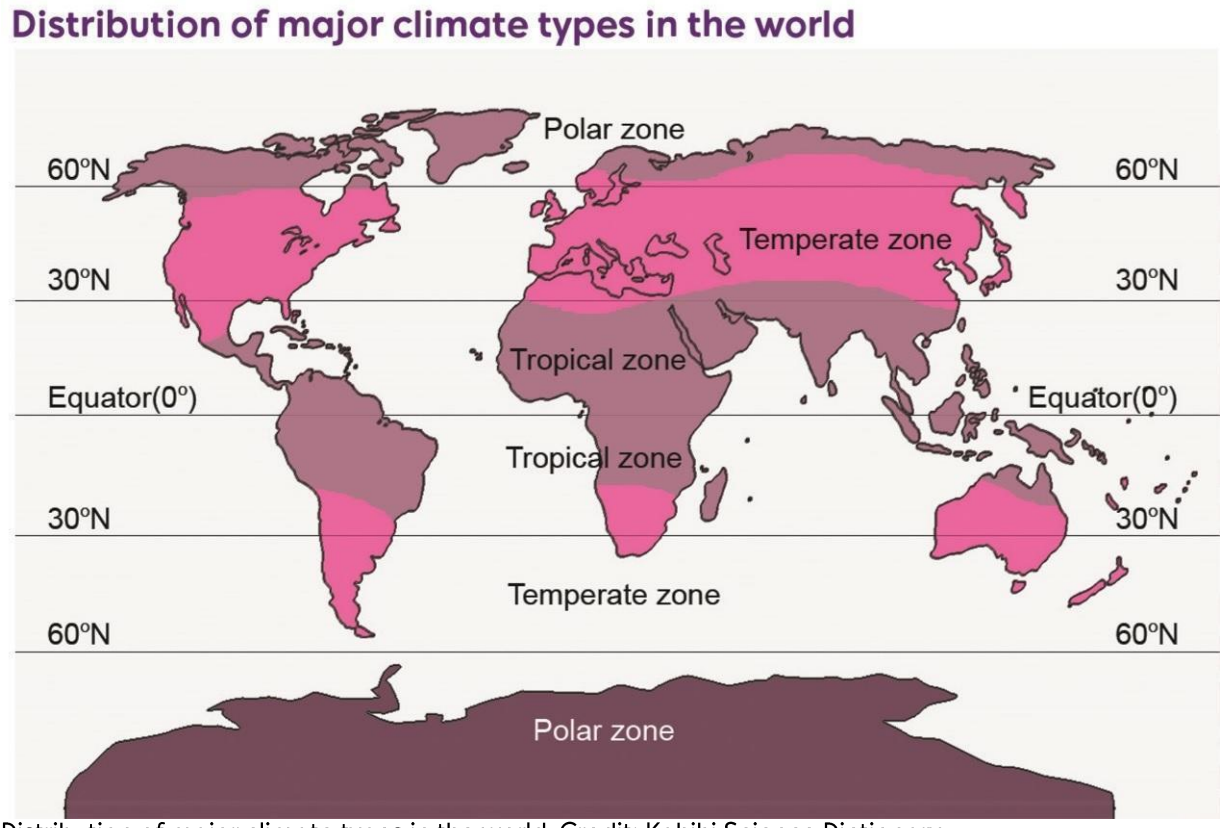
- Upper Secondary/ Science, Geography

Learning Objectives:

- Describe and explain the characteristics of a tropical rainforest.
- State how plants adapt to their environment.

Activity 1: Where Are We?

First things first, let's see if you can locate Singapore on the map! Mark an "**X**" on the map below to show where Singapore is.



Distribution of major climate types in the world. Credit: Kahihi Science Dictionary

1a) According to the map, which climatic zone is Singapore located?

[Student to look at the map and mark an "X" where Singapore is located.]

Tropical / Equatorial

(b) In the box below, list the characteristics of this climatic zone.

Hot, humid, rainy, wet, little fluctuations in temperature at ground level

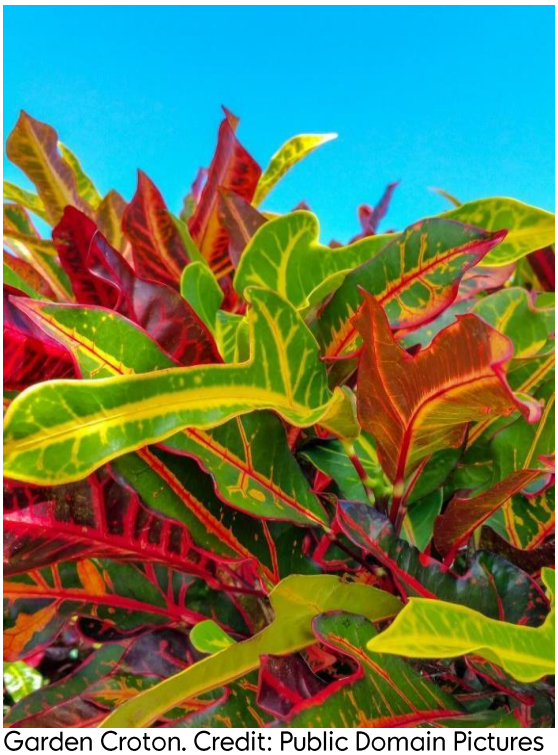
Activity 2 - Stories in the Understorey

Refer to the picture of the Chinese Croton provided below.

Chinese Croton. Credit: Dave's Garden

2a) Observe the Chinese Croton (*Excoecaria cochinchinensis* 'firestorm'). It usually grows under shade. Explain how it adapts to grow under shade by first describing the colour of its leaves and then discussing its adaptation. Pen your ideas in the box provided.

Chlorophyll is critical in photosynthesis which allows plants to absorb sunlight. In the case of the Chinese Croton, the red pigments on the underside of the leaves help the plant to capture light of different wavelengths, allowing it to capture maximum sunlight. Accept any other suitable response.



Garden Croton. Credit: Public Domain Pictures

Refer to the picture of the Garden Croton provided above.

(b) Variegated leaves have green and non-green parts due to cell mutation. This results in the lack of chlorophyll in the non-green parts of the leaf. The Garden Croton (*Codiaeum variegatum*) is an example of a plant with variegated leaves. Do you think these parts are able to carry out photosynthesis? Why or why not?

Variegated leaves are able to carry out photosynthesis as even the non-green parts contain chlorophyll. The red leaves of the Garden Croton contain the colour pigment anthocyanin, which also contains chlorophyll.

Accept any other suitable response. Additional information: Variegation in leaves is actually a condition that occurs when there is cell mutation. This cell mutation (termed 'cytological chimera') results in cells that lack green pigment which gives green leaves their colour.