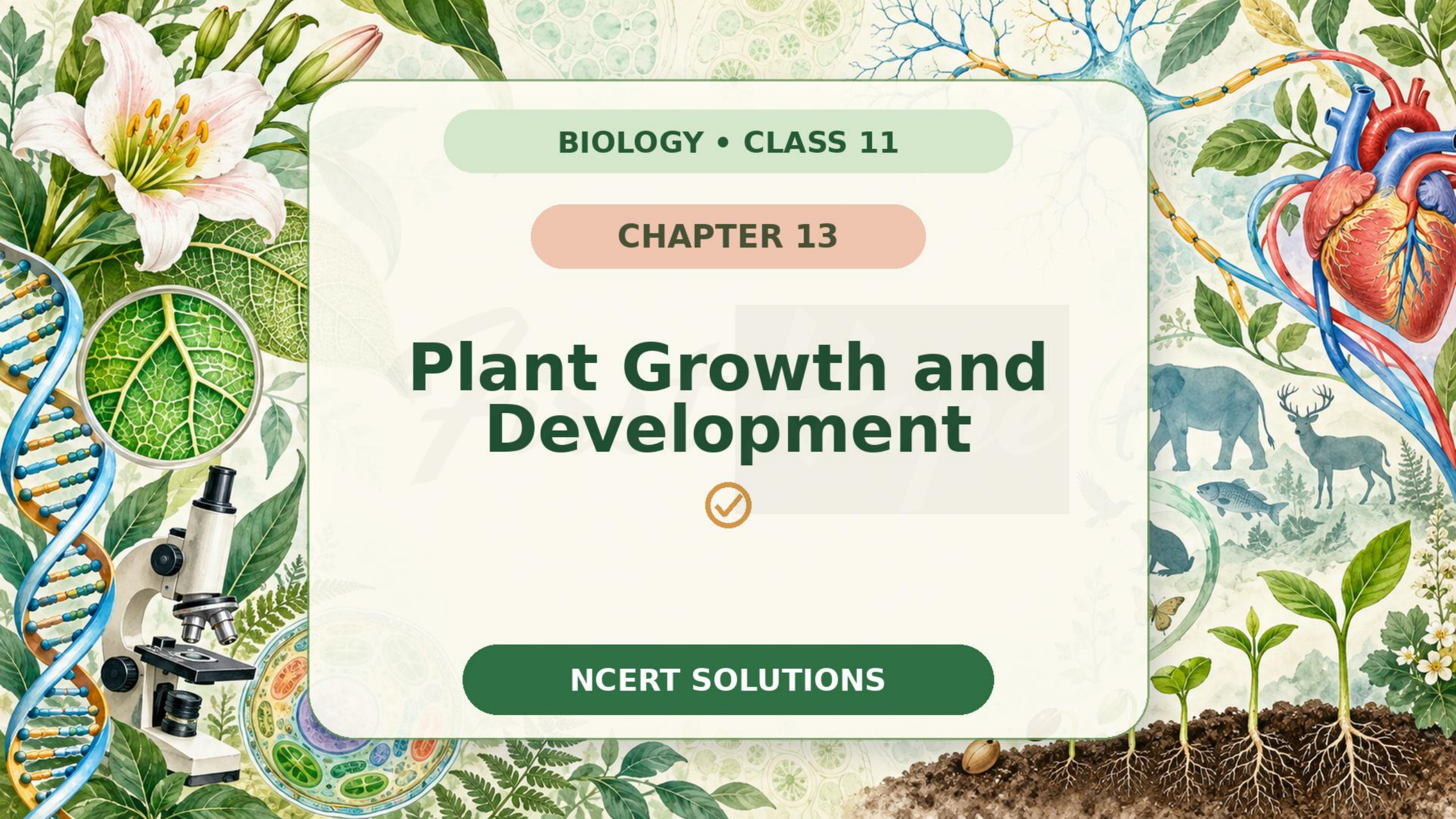


A vibrant collage of biological illustrations. On the left, a pink lily flower is in bloom, with green buds and leaves. Below it, a blue and orange DNA double helix is visible. A magnifying glass focuses on a green leaf's vein structure. A microscope is positioned in the lower-left corner. The background is filled with various green leaves and plant patterns. On the right, a detailed illustration of a human heart with red and blue blood vessels is shown. Below the heart, there are silhouettes of an elephant, a deer, and a fish. At the bottom, a small green seedling with roots is growing out of dark brown soil.

**BIOLOGY • CLASS 11**

**CHAPTER 13**

# **Plant Growth and Development**



**NCERT SOLUTIONS**

# EXERCISE SOLUTION: QUESTION 1

Define growth, differentiation, development, dedifferentiation, redifferentiation, determinate growth, meristem and growth rate.

**Answer:**

**Growth** : an irreversible, permanent increase in size of an organ, part or cell, usually accompanied by metabolic activity.

**Differentiation** : the process by which cells become structurally and functionally specialised.

**Development** : the sum of growth and differentiation during the life cycle.

**Dedifferentiation** : the regaining of the capacity to divide by living differentiated cells.

**Redifferentiation** : the maturation and specialisation of cells produced by dedifferentiated tissue, with loss of the power to divide.

**Determinate growth** : growth that stops after a definite size or stage is reached.

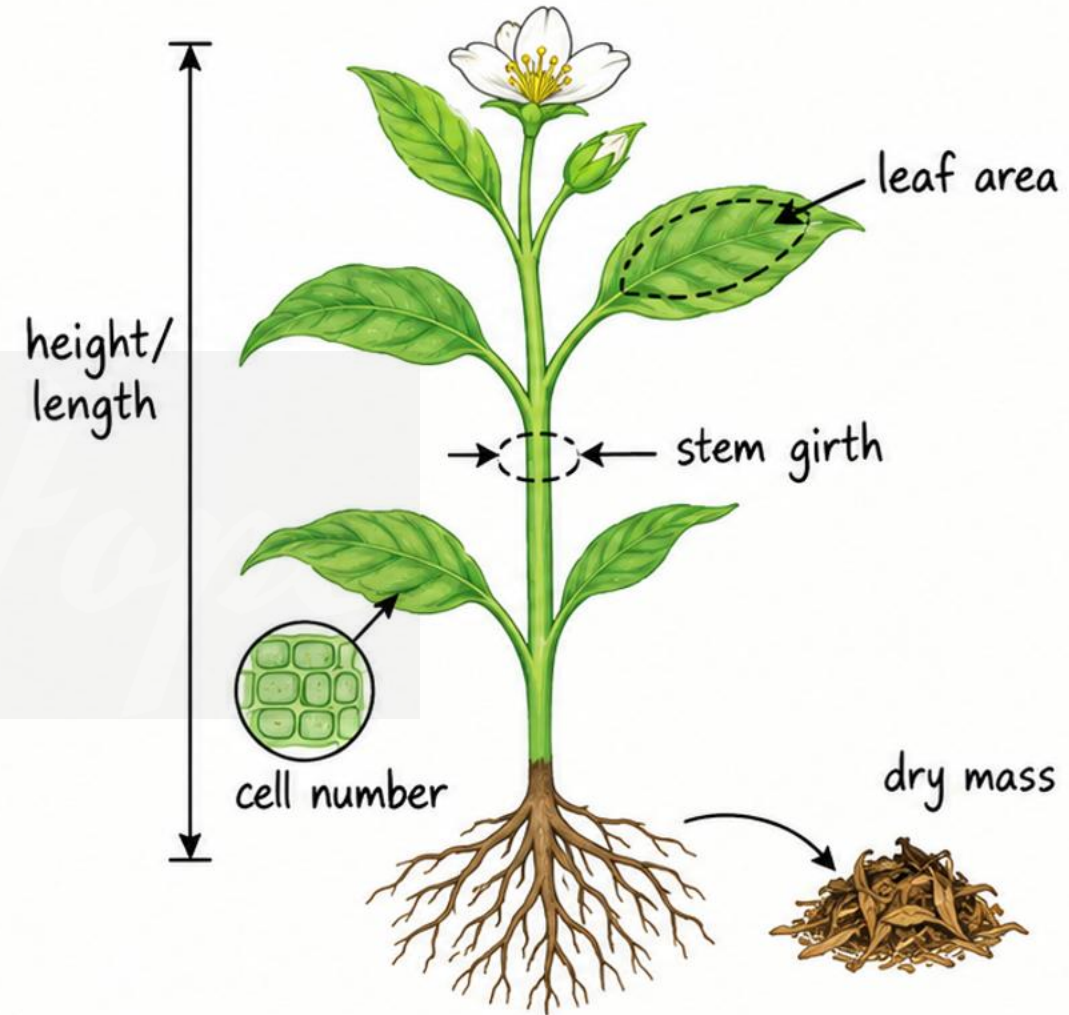
**Meristem** : a tissue of actively dividing, relatively undifferentiated cells.

**Growth rate** : the increase in a growth parameter per unit time.

# EXERCISE SOLUTION: QUESTION 2

2. Why is no single parameter good enough to demonstrate growth throughout the life of a flowering plant?

Answer: Growth is multidimensional and different organs grow in different ways and at different times. A flowering plant may increase in height, length, area, volume, fresh mass, dry mass, cell number or protoplasmic content. One parameter may stop changing while another continues; for example, mature height does not show continuing secondary thickening or formation of new leaves, roots, flowers and fruits. Therefore growth must be assessed with suitable parameters for the organ and stage being studied.



Growth cannot be represented by one universal measurement.

# EXERCISE SOLUTION: QUESTION 3

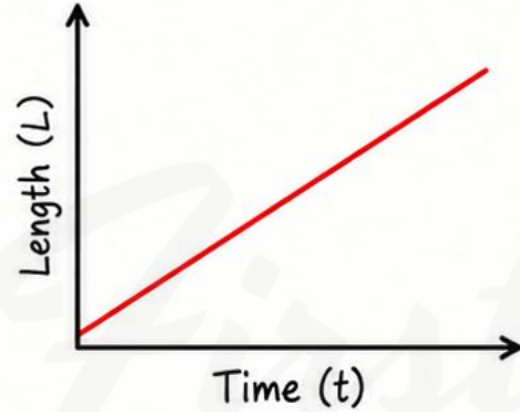
3. Briefly describe (a) arithmetic growth, (b) geometric growth, (c) sigmoid growth curve, and (d) absolute and relative growth rates.

## (a) Arithmetic growth

### Answer:

In arithmetic growth, after mitosis one daughter cell continues to divide while the other differentiates. Increase is constant and the graph is linear.

$$L_t = L_0 + rt$$

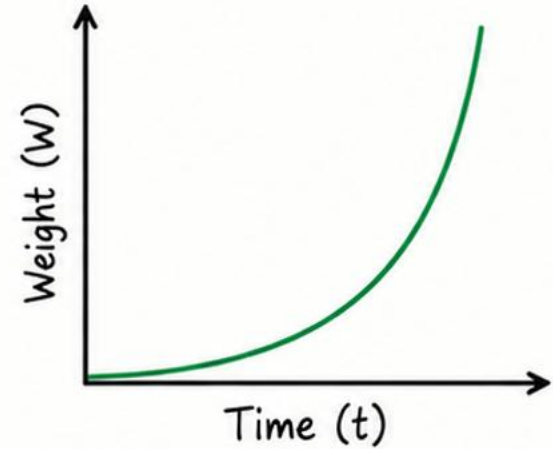


## (b) Geometric growth

### Answer:

In geometric growth, both daughter cells continue to divide. With unlimited resources, increase is exponential.

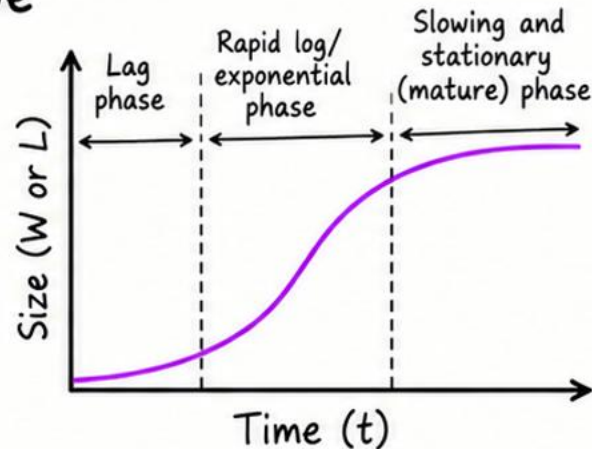
$$W_t = W_0 e^{rt}$$



## (c) Sigmoid growth curve

### Answer:

Under natural limited conditions, growth is sigmoid (S-shaped): lag phase → rapid log/exponential phase → slowing and stationary/mature phase.



## (d) Absolute and relative growth rates

### Answer:

Absolute growth rate = total increase per unit time.

Relative growth rate = increase per unit initial size per unit time.



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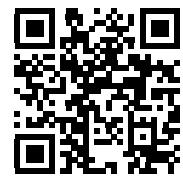


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