



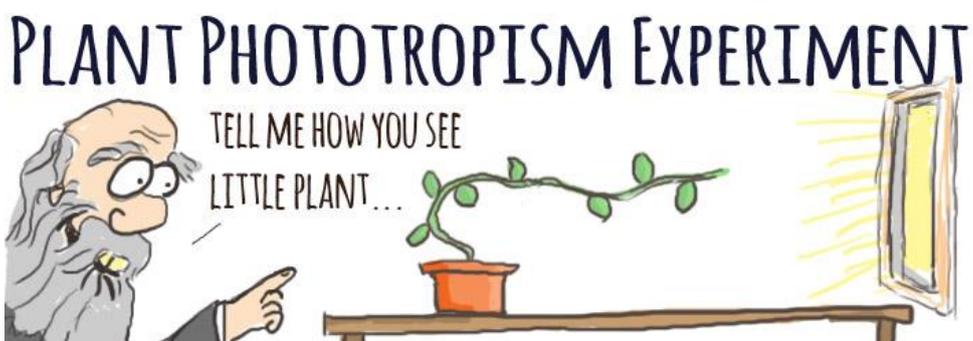
# JENN

Training and Consultancy

The path to enlightened education

**SUBJECT: LIFE SCIENCES  
GRADE 12  
SCIENTIFIC INVESTIGATION  
(PLANT RESPONSE TO THE ENVIRONMENT)  
SPRING CLASSES  
2023**

**ANSWERS**



## ACTIVITY 1

- 1.1 Growth of plant shoots ✓ growth response/bending of the tip (1)
- 1.2 Auxins ✓ (1)
- 1.3 - Same environment in which the shoots are placed ✓/same intensity of the light  
- Same type of shoot used ✓  
- Same age of the shoot ✓(mark first 2) (any 2) (2)
- 1.4 (a) **In investigation A:**  
- Light from the right ✓/from one side/unilateral light caused auxins to move to shaded side of the shoot ✓  
- leading to increased cell elongation and division ✓ on the shaded side/There was therefore greater growth on the shaded side ✓  
- thus bending the shoot in the direction of the source of light ✓ (3)
- (b) **In investigation C:**  
- Since there is no light stimulus ✓ from the side (because of the cap) there is no influence on the distribution of auxins ✓/auxins evenly distributed below the cap (3)  
- therefore the shoot grew upright ✓
- 1.5 - Repeat the investigation ✓ (2)  
- Use more than one plant for each treatment ✓/increase sample size (2)

## ACTIVITY 2

- 2.1 (a) Auxin concentration ✓ (1)  
(b) Plumule growth ✓ (1)
- 2.2 For measurement of the plumule length ✓ (1)
- 2.3 - To simulate the same conditions ✓ under which germination takes place for the normal growth ✓ of the seedlings  
- To expose the seedlings to uniform light ✓ so that no other variable is introduced/to ensure validity/ to allow upward growth of the plumule for easy measuring ✓  
**(MARK FIRST ONE ONLY)** (Any 1 x 2) (2)
- 2.4 - They used seven seedlings in each group ✓/35 seeds in total/a large sample  
- They calculated the average ✓ increase in plumule length  
**(MARK FIRST ONE ONLY)** (Any 1) (1)

- 2.5
- Same species of beans✓
  - Seedlings of the same age✓
  - Seedlings of the same size✓
  - Same temperature✓
  - Identical apparatus (beakers/petri-dishes/graph paper/grid/volume of solution) ✓ (Any 3) (3)
- (MARK FIRST THREE ONLY)**
- 
- 2.6 An increase in auxin concentration up to an optimum stimulates the growth rate of the plumule/stem. With further increase in auxin concentration there is an inhibition of plumule/stem growth ✓ (1)

### ACTIVITY 3

- 3.1
- (a) Presence or absence of auxins✓/(position of) the stem tip (1)
  - (b) Growth✓/elongation of the stem (1)
  - (c) - Repeat the investigations✓
    - Increase the sample size✓/use more than one stem tip per investigation (2)
- 3.2
- To eliminate the influence of light✓ on stem growth
  - therefore improving the validity of the results✓/in order to eliminate any other influencing factors (2)
- 3.3
- Because the tip was replaced on the left✓/one side of the shoot
  - auxins will accumulate on the left✓/that side
  - Cell elongation will be stimulated on the left✓/one side causing the stem to bend towards the right✓/other side (2 x 2) (4)

### ACTIVITY 4

- 4.1 Stem growth✓ (1)
- 4.2
- To remove the source of auxins✓
  - The tip produces auxins✓ (Any 1) (1)
- 4.3 To increase the reliability✓/validity of the results (1)
- 4.4 B✓ and C✓ (2)
- 4.5
- The presence of auxins✓ in the tip of the stem
  - stimulate upward growth✓
  - and inhibit development of lateral branches✓ (3)
- 4.6
- (a) Gibberellins✓ (1)
  - (b) Abscisic acid✓ (1)

## ACTIVITY 5

- 5.1 - So that the plant hormone✓/ auxins from the apical tip  
- could diffuse into the block of agar jelly✓ (2)
- 5.2 - The stem stopped growing upwards✓  
- Lateral branches developed✓ (2)
- 5.3 - (Lateral) branches develop✓  
- that can bear more fruit✓/increased yield  
**OR**  
- Shorter trees✓ /development of lateral branches  
- makes harvesting of fruit easier✓ Any (1 x 2) (2)
- 5.4 - Auxins✓in the block of agar jelly  
- move downwards ✓into the stem  
- causing (cell) elongation✓/growth resulting in  
upward growth of the stem (3)

## ACTIVITY 6

- 6.1 - High/low levels of abscisic acid in the seeds  
inhibits/promotes germination✓✓  
- **OR**  
- Abscisic acid has no effect on germination✓✓  
- **OR**  
- Low/high levels of abscisic acid in the seeds inhibits/promotes  
germination✓✓ (2)
- 6.2 a) The percentage germination of seeds✓ (1)  
b) Presence /absence of abscisic acid✓ (1)
- 6.3 - Equal number of seeds used in tray A and B✓  
- Same soil used in both trays✓  
- - Seeds were exposed to same environmental conditions ✓/  
examples of same environmental conditions  
- Data collected from both trays at the same time✓  
**(Mark the first TWO only)** (Any 2) (2)
- 6.4 0 ng/g ✓ / anything less than 10 ng/g (1)

## ACTIVITY 7

- 7.1 Treatment✓ of plant shoot (1)
- 7.2
- Same type of plant✓
  - Placed in the same environment✓
  - Same amount of time✓
  - Tip removed at the same length✓
  - Same concentration of auxins✓
  - Same type of agar✓
- (Mark first TWO only)** (Any 2) (2)
- 7.3 (a) - Shoot B would show upward growth✓
- Auxins in the agar gel diffused downwards✓ into the shoot
  - leading to cell elongation✓
- (3)
- (b) - No growth in shoot C✓
- Shoot tip contains NO auxins✓
- (2)
- 7.4
- Repeat the investigation✓
  - Use more than 1 plant per investigation✓/increase sample size
- (2)