

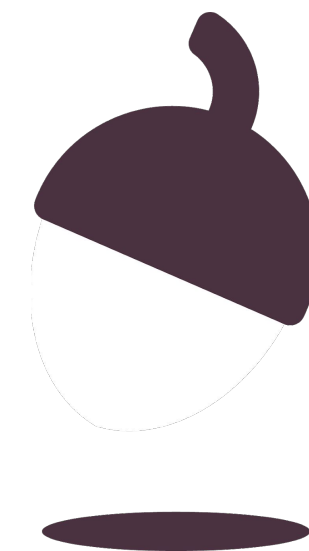
Biology - KS4

Homeostasis and Response

# Required Practical

## Plant Hormones - Part 1

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**OAK**  
NATIONAL  
ACADEMY

# Quick questions

1. What is the name of the hormone that controls the plants response to light and gravity?
2. When a plant shoot grows towards the light this is known as.....
3. When a plant root grows away from the light this is known as....
4. What is an independent variable?
5. What is a dependent variable?
6. What is a control variable?



# Answers

1. What is the name of the hormone that controls the plants response to light and gravity? **Auxins**
2. When a plant shoot grows towards the light this is known as.....**Positive phototropism**
3. When a plant root grows away from the light this is known as..... **Negative phototropism**
4. What is an independent variable? **The factor that you change in an experiment**
5. What is a dependent variable? **The factor that you measure in an experiment**
6. What is a control variable? **The factors that remain the same in an experiment**



# Investigating the effect of light on seedling growth

1. State a hypothesis
2. State the independent, dependent and control variables
3. Write a method for this experiment
4. Draw a diagram of this experiment



# Investigating the effect of light on seedling growth

1. State a hypothesis

**Increasing the light intensity will increase seedling growth as it will increase the rate of photosynthesis.**

1. State the independent, dependent and control variables

**Independent - Light intensity**

**Dependent - Height of seedlings (mm)**

**Control - Times measured, number of seeds, volume of water supplied, temperature, carbon dioxide concentration.**



# Investigating the effect of light on seedling growth

## 3. Write a method for this experiment

1. Place an even mass of cotton wool into 3 petri dishes
2. Add 5 ml of water to each petri dish
3. Place 10 seeds into each petri dish, spreading them out evenly
4. Leave the seeds to germinate. Remove ungerminated seeds and ensure there are still the same number of seeds in each petri dish.
5. Place one petri dish in full sunlight, one in partial sunlight and one with no sunlight
6. Measure the height of the seedlings at the same time each day and record your results
7. Repeat for 5 days and calculate a mean height for each day in each petri dish.



**Complete the sentences to form your hypothesis.**

The plants in ..... sunlight will grow fastest.  
This will happen because .....



**Complete the sentences to form your hypothesis.**

The plants in ..... sunlight will grow fastest.  
This will happen because .....

**Model hypothesis:**

The plants in full sunlight will grow fastest. This will happen because the plant is able to photosynthesis faster.



**Using the method, identify the independent, dependent and control variables.**



**Independent variable - Light intensity**

**Dependent variable - Growth of seedlings (mm)**

**Control variables -**

- Left for the same length of time**
- Same temperature**
- Same water volumes**
- Same number of seeds**



# Full sunlight

	Height of seedlings (mm)					
Time (days)	1	2	3	4	5	Mean
1						
2						
3						
4						
5						



# Partial sunlight

	Height of seedlings (mm)					
Time (days)	1	2	3	4	5	Mean
1						
2						
3						
4						
5						



# No sunlight

	Height of seedlings (mm)					
Time (days)	1	2	3	4	5	Mean
1						
2						
3						
4						
5						



# Full sunlight

	Height of seedlings (mm)					
Time (days)	1	2	3	4	5	Mean
1	5	7	2	5	4	4.6
2	9	11	7	10	9	
3	12	16	11	12	10	
4	15	18	13	13	13	
5	17	20	15	15	14	

$5 + 7 + 2 + 5 + 4 = 23$

$23 \div 5 = 4.6$



# Full sunlight

	Height of seedlings (mm)					
Time (days)	1	2	3	4	5	Mean
1	5	7	2	5	4	4.6
2	9	11	7	10	9	9.2
3	12	16	11	12	10	12.2
4	15	18	13	13	13	14.4
5	17	20	15	15	14	16.2

$5 + 7 + 2 + 5 + 4 = 23$

$23 \div 5 = 4.6$



# Partial sunlight

	Height of seedlings (mm)					
Time (days)	1	2	3	4	5	Mean
1	3	4	2	5	4	3.6
2	4	6	5	7	6	
3	7	9	6	8	8	7.6
4	9	12	8	10	10	
5	10	13	9	12	12	11.2



# Partial sunlight

	Height of seedlings (mm)					
Time (days)	1	2	3	4	5	Mean
1	3	4	2	5	4	3.6
2	4	6	5	7	6	5.6
3	7	9	6	8	8	7.6
4	9	12	8	10	10	9.8
5	10	13	9	12	12	11.2



# No sunlight

	Height of seedlings (mm)					
Time (days)	1	2	3	4	5	Mean
1	2	1	2	1	2	1.6
2	3	2	2	2	2	2.2
3	3	3	2	3	3	2.8
4	4	4	3	4	3	3.6
5	5	4	3	4	3	3.8



# Conclusion

## 1. Do your results support your hypothesis?

Yes/No

## 1. What can you say about the effect of light intensity on the length of the seedlings?

The seedlings grew the fastest when in \_\_\_\_\_ sunlight. This is because they were able to \_\_\_\_\_ quickly, producing glucose. Glucose can then be used in \_\_\_\_\_ which releases energy, used for growth.



# Conclusion

## 1. Do your results support your hypothesis?

Yes/No

## 1. What can you say about the effect of light intensity on the length of the seedlings?

The seedlings grew the fastest when in full sunlight. This is because they were able to photosynthesise quickly, producing glucose. Glucose can then be used in respiration which releases energy, used for growth.



## Conclusion

### **3. Looking at the photograph on the slide, what can you say about the effect of light intensity on the direction of growth of the seedlings?**

The plant shoots grow towards the light stimulus. This is because \_\_\_\_\_ are highly concentrated on the \_\_\_\_\_ side of the shoot and increase cell growth. The shaded side of the shoot grows \_\_\_\_\_ than the unshaded side. This causes the shoot to bend and grow in the direction of the light. This is known as \_\_\_\_\_ phototropism.



## Conclusion

### 3. Looking at the photograph on the slide, what can you say about the effect of light intensity on the direction of growth of the seedlings?

The plant shoots grow towards the light stimulus. This is because **auxins** are highly concentrated on the **shaded** side of the shoot and increase cell growth. The shaded side of the shoot grows **faster** than the unshaded side. This causes the shoot to bend and grow in the direction of the light. This is known as **positive** phototropism.



## Conclusion

### **4. Looking at the photograph on the slide, what can you say about the effect of gravity on the direction of root growth?**

The plant roots grow in the direction of gravity. This is because \_\_\_\_\_ are highly concentrated on the \_\_\_\_\_ side of the root and \_\_\_\_\_ cell growth. The underside of the root grows slower than the upper side. This causes the root to bend and grow in the direction of gravity. This is known as positive \_\_\_\_\_.



## Conclusion

**4. Looking at the photograph on the slide, what can you say about the effect of gravity on the direction of root growth?**

The plant roots grow in the direction of gravity. This is because **auxins** are highly concentrated on the **under**side of the root and **decrease** cell growth. The underside of the root grows slower than the upper side. This causes the root to bend and grow in the direction of gravity. This is known as positive **geotropism**.

