

# Travelling Light

What do I need to know to write a scientific investigation so my results can be replicated?

## Academic Excellence

We will learn the knowledge on the 'recall page' and we will be mastering the following skills:

- To draw specific light diagrams
- To record data and results of increasing complexity.
- To use results to make predictions and set up further tests to investigate

## School value

What value am I focusing on and how will I demonstrate it?

Perseverance

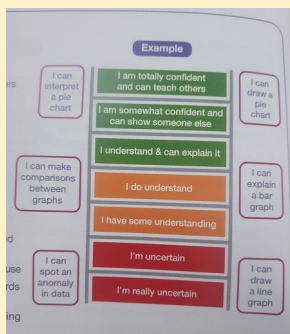
Children are encouraged to believe they can achieve anything they set their mind to, by not giving up and keeping going to achieve goals. The children will focus on knowing how to find alternative solutions to achieve a desired outcome.

## Outcome— How will our learning be used in real life?

We will write a scientific investigation to send to a different school in the federation so they can try and prove our results beyond a doubt.

## Learning to Learn

Our focus thinking tool is:  
The progression ladder



## Personalisation

What will help me in this experience?

## Rights Respecting

Article—13 the right to find out things and share what you have learnt with others.

We will learn more about this right by sharing our outcome with another federation school.

## Concept—Investigation

I understand that the results of an investigation can lead to further investigations.

# Recall Page

## Vocabulary

|             |                                                                                                                         |
|-------------|-------------------------------------------------------------------------------------------------------------------------|
| Opaque      | Opaque objects block light travelling through them; it is not possible to see through them.                             |
| Translucent | Translucent objects allow some light to pass through, there is partial visibility through these objects.                |
| Transparent | Transparent object allow all or most light to travel through them, it is possible to clearly see through these objects. |
| Periscope   | An apparatus used to see things out of a line of sight usually behind a high obstacle or a submerged submarine.         |
| Prism       | A piece of transparent material used for analysing and reflecting light.                                                |
| Rainbow     | A phenomenon caused by reflection, refraction and a dispersion of light in water droplets.                              |
| Shadows     | The absence of light                                                                                                    |
| Ray         | A line of column of light                                                                                               |
| Reflection  | When light bounces off an object.                                                                                       |
| Refraction  | The bending of light as it passes from one transparent substance to another.                                            |
| Spectrum    | The range of different colours the human eye can see.                                                                   |

## Knowledge

I will need to know:

- That light appears to travel in straight lines
- How objects can be seen
- How the human eye works
- That light cannot travel through opaque surfaces
- How to record results from an investigation
- Why shadows have the same shape as the object that casts them
- The impersonal and passive voice
- How to write a hypothesis
- How to write a method in chronological order
- How to read results and interpret them in different ways
- What a conclusion is and how results feed into predictions

## Key facts

|                                                                                      |                                                                                                                 |
|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Light waves travel out from sources of light in straight lines.                      | Light travels faster than sound                                                                                 |
| Light rays are reflected off of objects into our eyes in order for us to see them.   | The retina which is the lining at the back of your eye contains light receptors                                 |
| The colours of the spectrum are red, orange, yellow, green, blue, indigo and violet. | The retina is connected to an optic nerve ,which transmits visual information from the eye to your brain        |
| Shadows can be elongated or shortened depending on the angle of the light source.    | Once the electrical signals from the optic nerve reach your brain it processes the image in your visual cortex. |
| A shadow is larger the closer it is to the light source.                             |                                                                                                                 |

## Expert example

### The Role of Light in Photosynthesis

**Abstract:** Light is the original source of energy for plant photosynthesis and growth. A wide range of signals and information for morphogenesis and many other physiological processes is triggered by light ([Chen et al. 2004](#)). Different characteristics of light such as spectral composition (wavelengths), intensity, duration and direction can influence plant growth and development.

#### Aim:

The aim of the experiment is to test whether light is required for photosynthesis to occur.

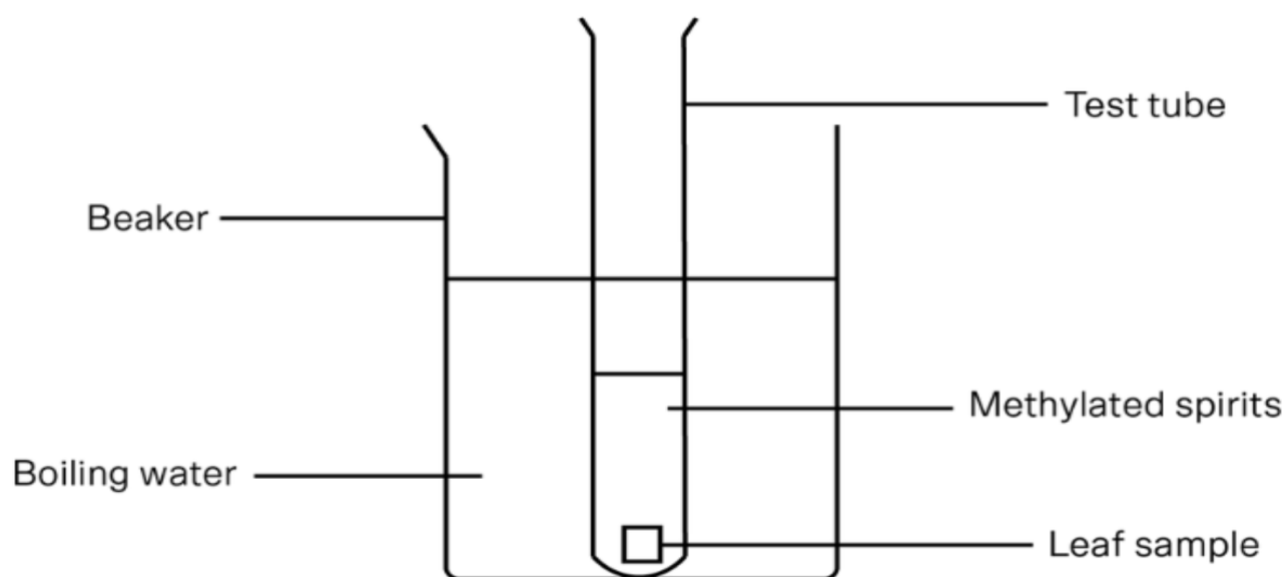
#### Hypothesis:

It is predicted that photosynthesis will occur only in leaves that are exposed to light and not in leaves that are not exposed to light. This will be indicated by the presence or absence of starch in the leaves.

#### Method:

1. Aluminium foil was used to fully cover a leaf of the geranium plant. The plant was left in the sun for three days.
1. On the third day, the covered leaf and 1 non-covered leaf were collected from the plant. The foil was removed from the covered leaf, and a 1 cm square was cut from each leaf using a pair of scissors.
2. 150 mL of water was boiled in a kettle and poured into a 250 mL beaker.
3. Using forceps, the 1 cm square of covered leaf was placed into the beaker of boiling water for 2 minutes. It was then placed in a test tube labelled "dark".
4. The water in the beaker was discarded and replaced with 150 mL of freshly boiled water.

5. Using forceps, the 1 cm square non-covered leaf was placed into the beaker of boiling water for 2 minutes. It was then placed in a test tube labelled "light"
6. 5 mL of methylated spirit was measured with a measuring cylinder and poured into each test tube so that the leaves were fully covered.
7. The water in the beaker was replaced with 150 mL of freshly boiled water and both the "light" and "dark" test tubes were immersed in the beaker of boiling water for 5 minutes.
8. The leaves were collected from each test tube with forceps, rinsed under cold running water, and placed onto separate labelled Petri dishes.
9. Three drops of iodine solution were added to each leaf.
10. Both Petri dishes were placed side by side and observations were recorded.
11. The experiment was repeated 5 times, and results were compared between different groups.



## Results

Observations of the effects of light on the amount of starch in plant leaves.

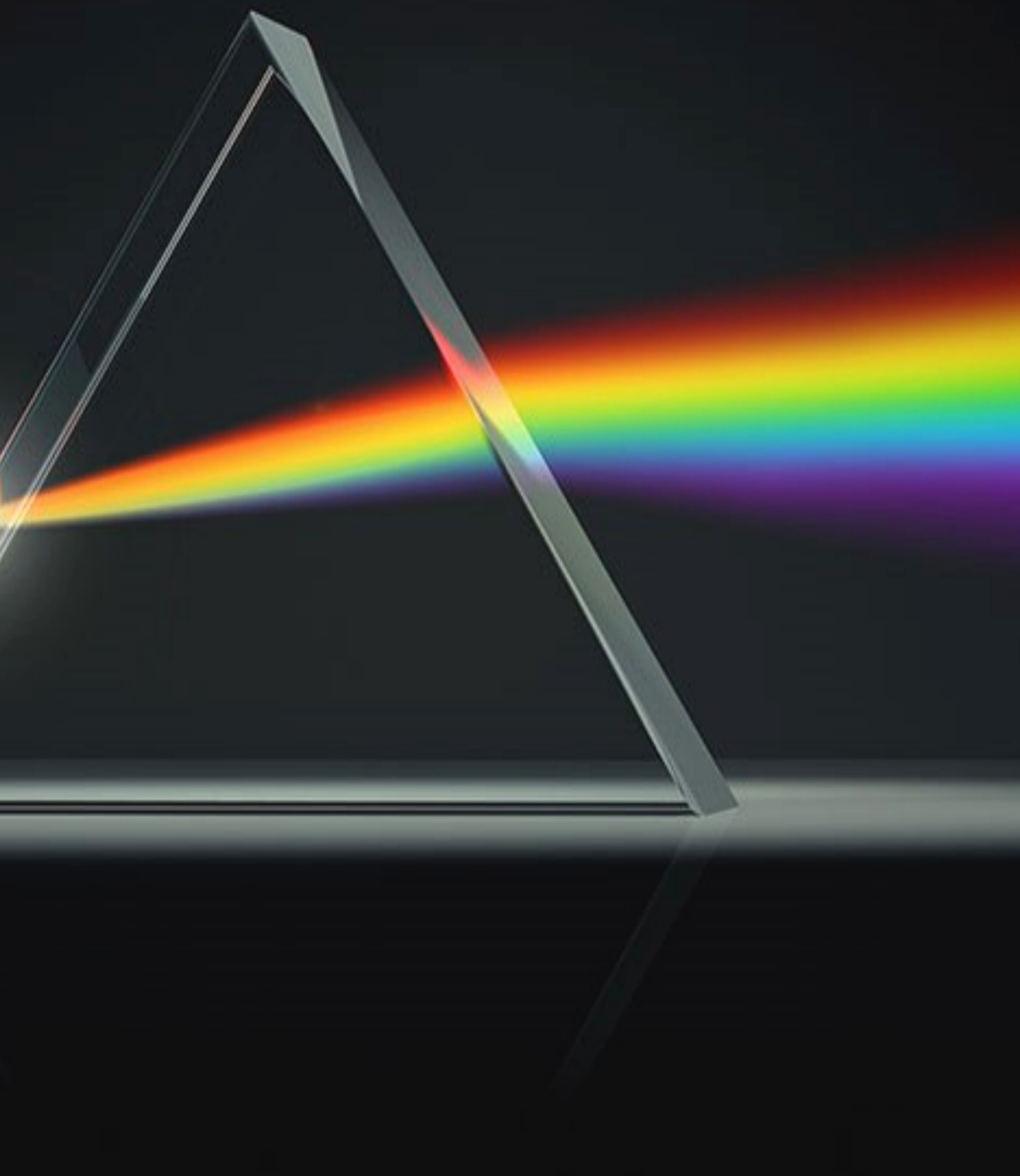
|                                     | Observations (colour)       | Presence of starch (yes/no) |
|-------------------------------------|-----------------------------|-----------------------------|
| Uncovered leaf (exposed to light)   | Dark blue, purple and black | Yes                         |
| Covered leaf (not exposed to light) | Light-yellow                | No                          |

## Conclusion:

In conclusion, it was found that light is required for photosynthesis to occur. This was evidenced by the presence of starch in leaves that had been exposed to light, and the absence of starch in leaves that had been unexposed. These results support the proposed hypothesis.

## Possible improvements:

Possible improvements could be made by including control experiments. For example, testing whether the iodine solution turns dark purple when added to water or methylated spirits. This would help to ensure that the purple colour observed in the experiments is due to the presence of starch in the leaves rather than impurities.



# Experience Name (Unit of Study)

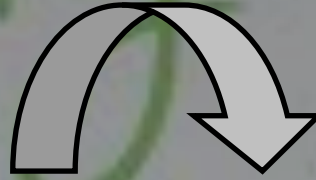
## Academic Excellence

We will learn the knowledge on the 'recall page' and we will be mastering the following skills:

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## Character

What value am I focusing on and how will I demonstrate it?



## Outcome

We will be able to...(NC content)



## Learning to Learn

Our focus thinking tool is:

## Concept



## Personalisation

What will help me in this experience?

## Representations



Recall Page

## Vocabulary

[illegible]

## Knowledge

[illegible]

## Sentence Stems

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### Key Facts

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