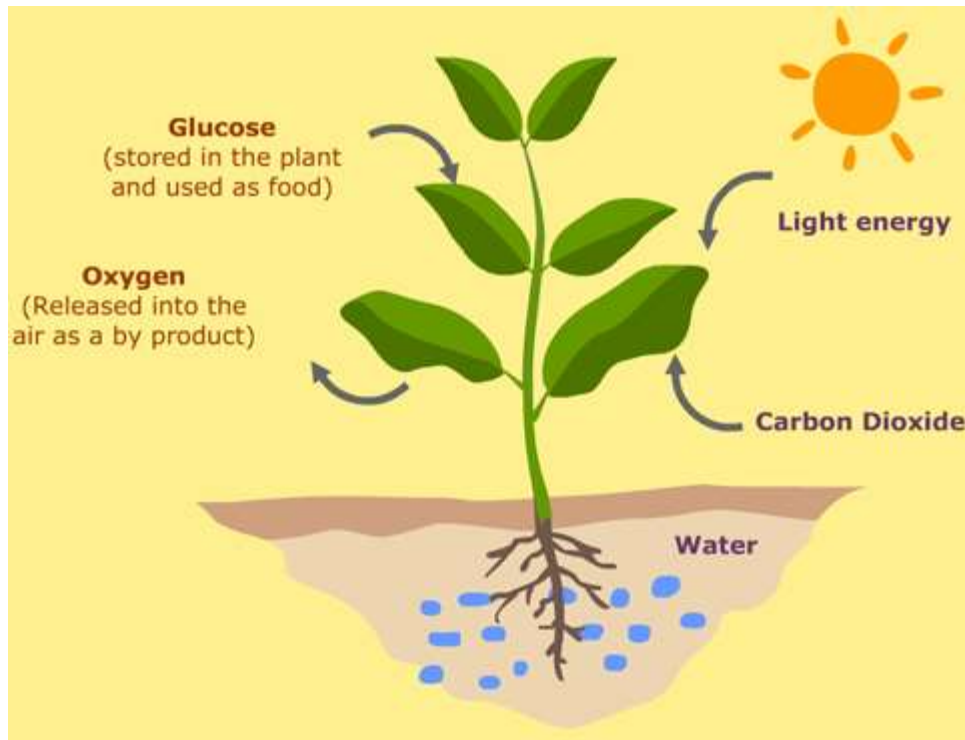




National 5 Biology

Unit 3. Life on Earth 3.3 Photosynthesis



Name _____

Class _____

Teacher _____

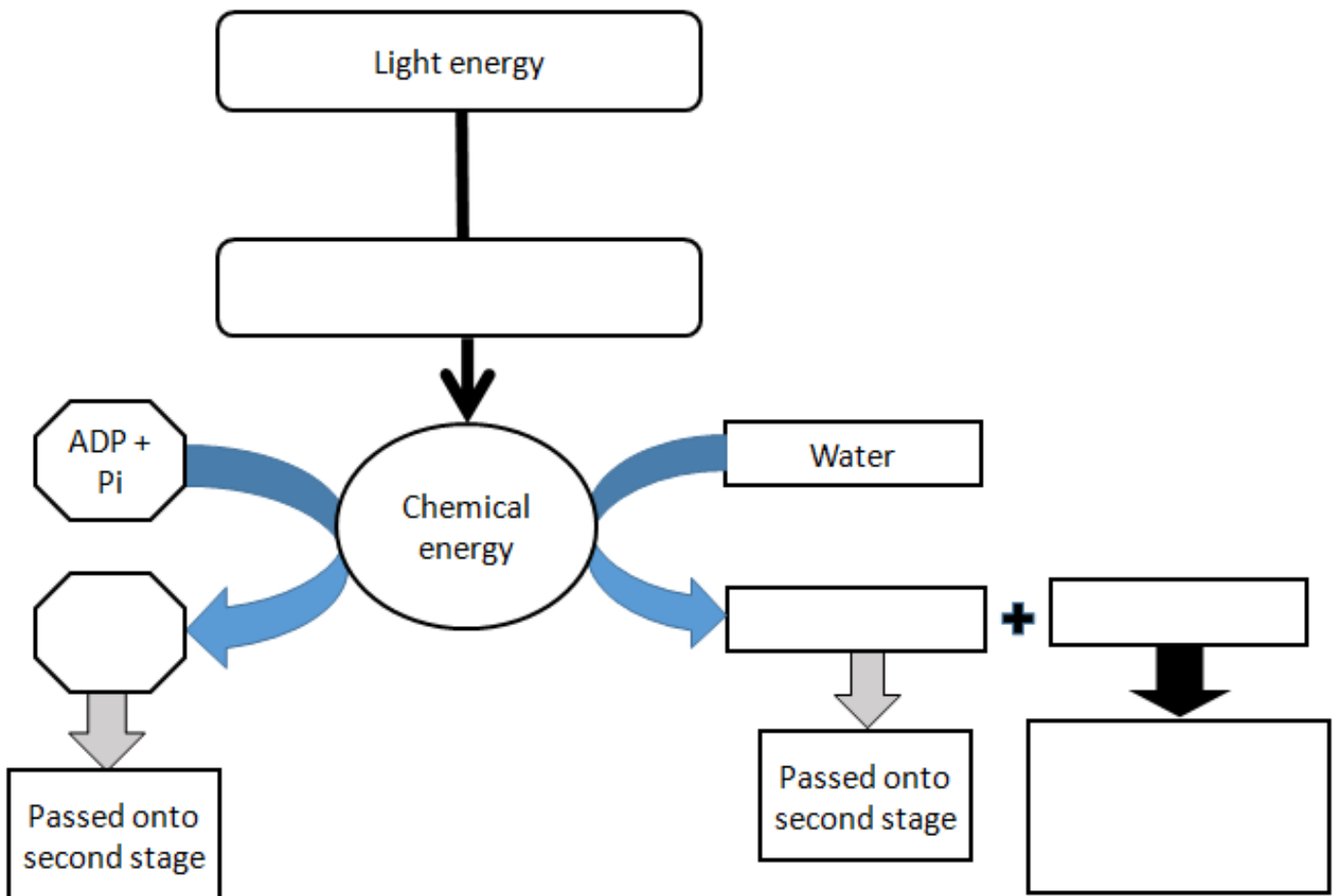
Learning intention

We are learning how to describe the first stage of photosynthesis.

First stage: The light reactions



The first stage of photosynthesis is dependent upon _____. Light energy from the sun is trapped by chlorophyll in the _____ of green plants. The light energy is then converted to _____ energy and stored in molecules of substance called adenosine triphosphate (ATP) which are passed to the second stage. In the same set of reactions, _____ molecules are split into hydrogen and _____ molecules. The _____ is passed onto the second stage of photosynthesis. Oxygen diffuses from cells and is eventually released from the plant into the _____. We can summarise this in a diagram, as shown below.



Learning intention

We are learning how to describe the second stage of photosynthesis.

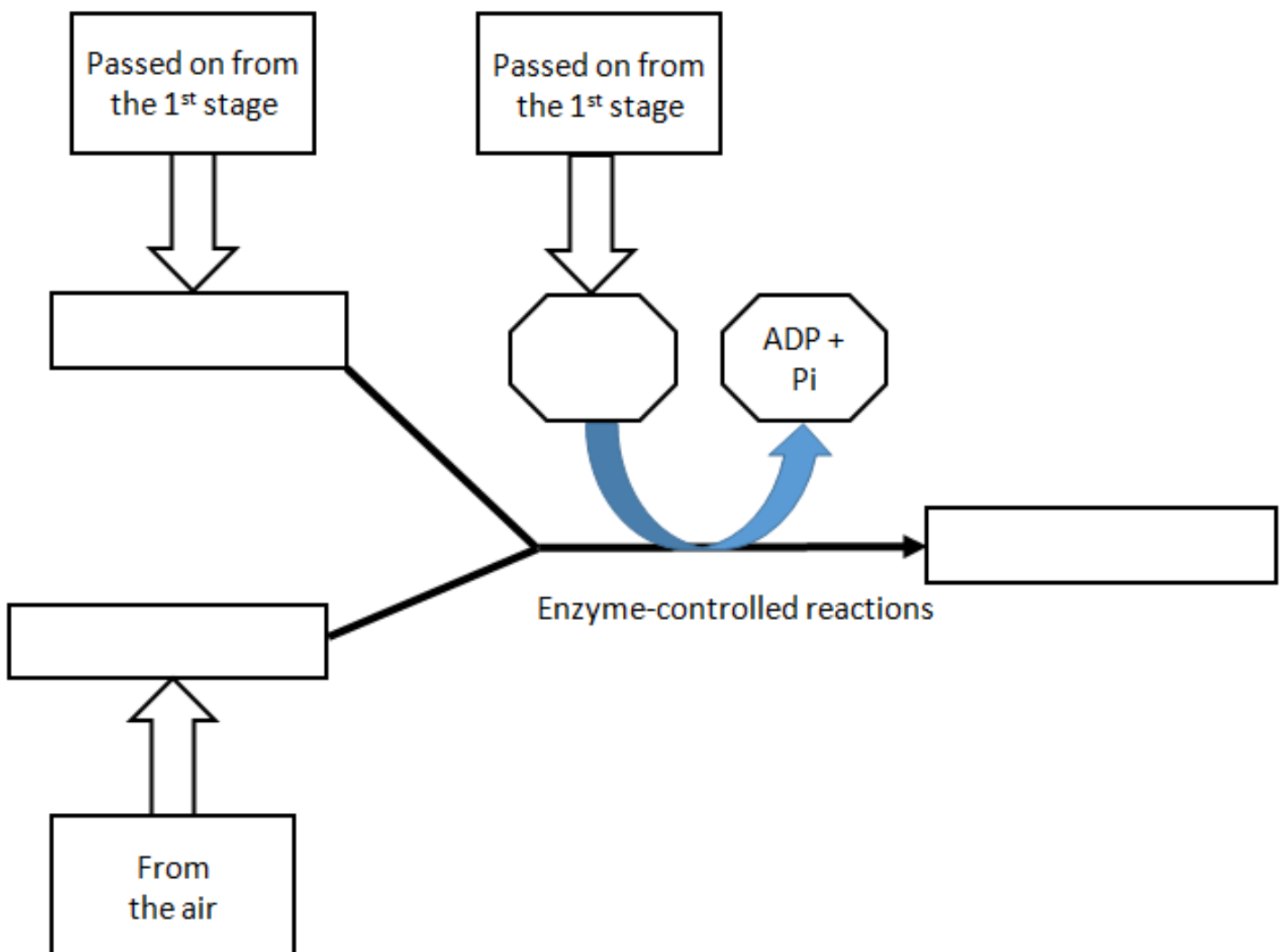
Second stage: Carbon fixation



The second stage of photosynthesis involves a series of _____-controlled reactions.

This makes carbon fixation completely _____ dependent because of the enzymes involved.

_____ and _____ (produced by the light reactions in the first stage) are combined with carbon dioxide (taken from the air) to produce _____ (glucose).



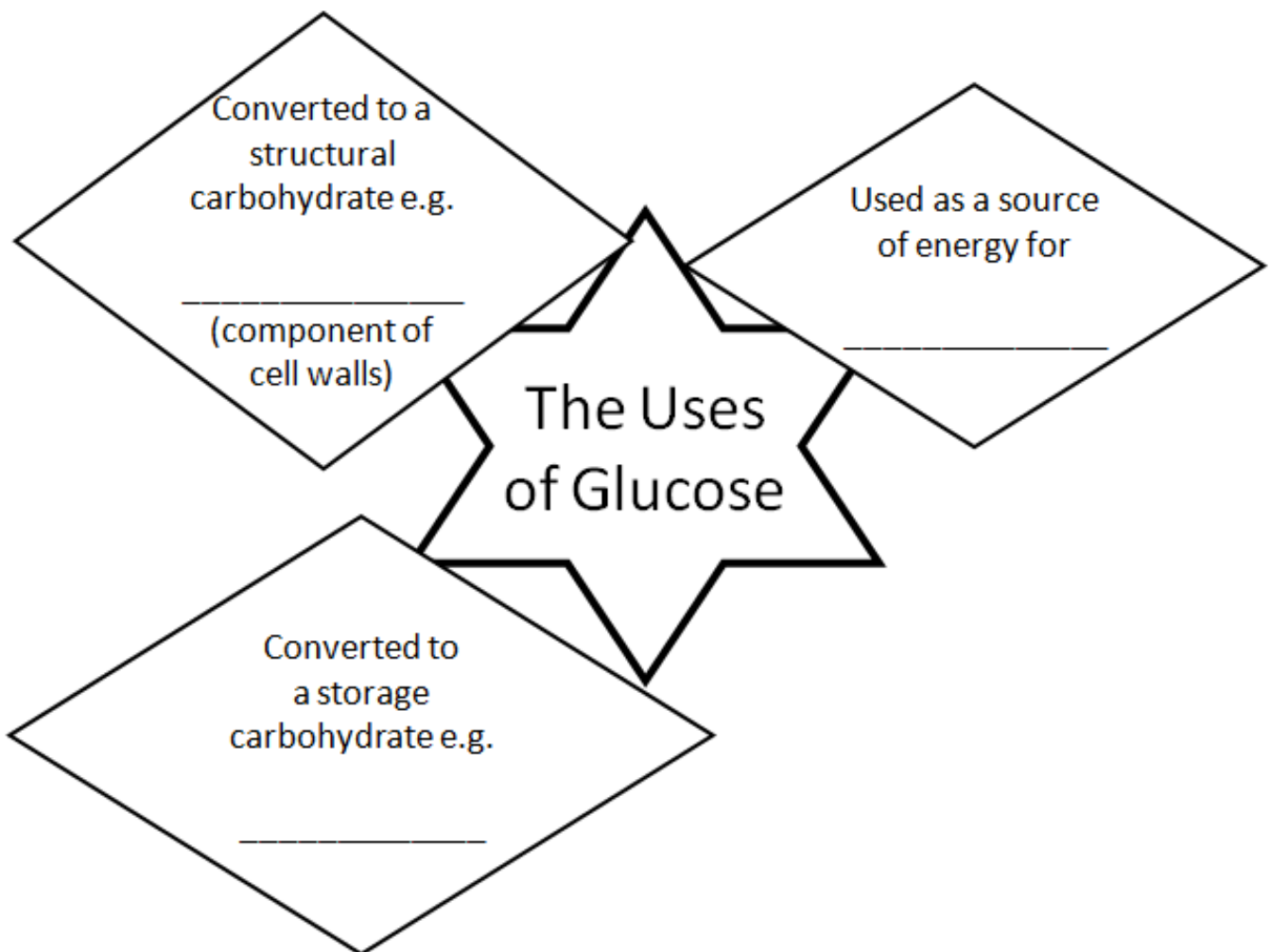
Learning intention

We are learning how to describe the uses of sugar by plants.

Uses of sugar



Photosynthesis produces sugar in the form of _____. The chemical energy in this sugar can then be used for _____ or the sugar can be converted into other useful substances in the plant, such as starch and cellulose.



Learning intention

We are learning how to describe the impact of limiting factors on photosynthesis.

Limiting factors



A limiting factor is a factor that slows down or stops a process because it is in short supply.

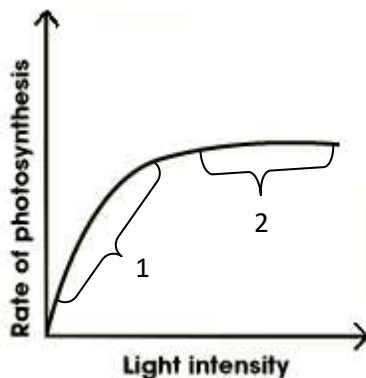
There are three limiting factors in photosynthesis:

1. _____
2. _____ concentration and
3. _____.

Remember: It is better to write about light **energy** or light **intensity** rather than simply using the word light!

1. Light intensity

Without enough light, a plant cannot photosynthesise very quickly, even if there is plenty of water and carbon dioxide. Increasing the light intensity will _____ the rate of photosynthesis.



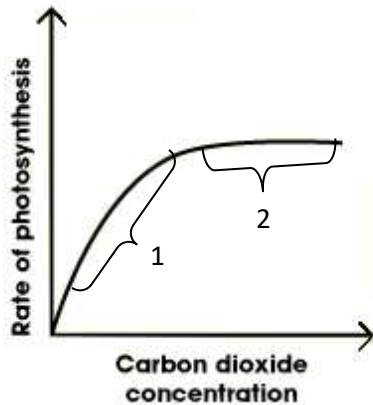
The limiting factor at 1 is _____.

The limiting factor at 2 is _____.

Remember: On limiting factor graphs, watch for the slope of the line-if the line slopes, then the factor on the X axis is limiting the rate; where the line is level, some other factor is limiting the rate.

2. Carbon dioxide concentration

Sometimes photosynthesis is limited by the concentration of carbon dioxide in the air. Even if there is plenty of light, a plant cannot photosynthesise if there is insufficient carbon dioxide.

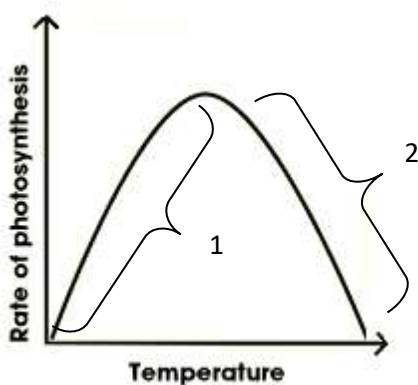


The limiting factor at 1 is _____.

The limiting factor at 2 is _____.

3. Temperature

If it gets too cold, the rate of photosynthesis will _____. Plants cannot photosynthesise if it gets too hot, as enzymes essential to the process are _____.












The limiting factor at 1 is _____.

The limiting factor at 2 is _____.

Plant growth

Plant growth is limited by how much sugar is available for _____, so the more sugar available for respiration the greater the _____ of a plant. As a plant makes its own sugar, the greater the rate of photosynthesis, the _____ sugar produced, so more energy is available for plant growth.

I can:	
State that photosynthesis is a two-stage process; The light reactions and carbon fixation.	
State that in the light reaction, light energy from the sun is trapped by chlorophyll in the chloroplasts and is then converted into chemical energy, which is used to generate ATP.	
State that some of this chemical energy is used to split water to produce hydrogen and oxygen.	
State that hydrogen passes onto the second stage of photosynthesis and oxygen diffuses from the cell.	
Describe how carbon fixation consists of a series of enzyme-controlled reactions, which use hydrogen and ATP (produced by the light reactions) with carbon dioxide to produce sugar.	
State that the summary word equation for photosynthesis is: Carbon dioxide + Water $\xrightarrow[\text{Chlorophyll}]{\text{Light energy}}$ Sugar + Oxygen	
State that the chemical energy in sugar is available for respiration or the sugar can be converted into other substances, such as starch (storage) and cellulose (structural).	
State that limiting factors in photosynthesis are; carbon dioxide concentration, light intensity and temperature.	
Describe the impact of limiting factors on photosynthesis and plant growth.	
Analyse and explain graphs on limiting factors.	