SAM LABS education

invent samthing...

PHOTOSYNTHESIS

COMPUTER SCIENCE, BIOLOGY

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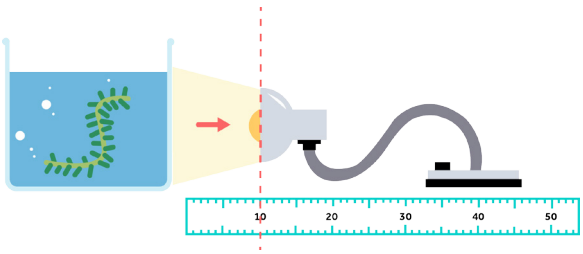
COMPUTER SCIENCE, BIOLOGY



Photosynthesis is the process whereby plants use sunlight to generate oxygen as a by-product. In this lesson the students will experiment with the intensity of light to determine the amount of oxygen generated.

SUBJECTS

Biology, Computer Science

GRADE LEVEL

KS3, KS4

LEARNING OBJECTIVES

- Investigate the rate of photosynthesis
- Practise teamwork and collaborate together to navigate through problems
- Reflect on and review the process, their product and that of their peers

LEARNING OUTCOMES

To use pondweed to see how light intensity affects the rate of photosynthesis using SAM

RECOMMENDED PRIOR KNOWLEDGE

- Basic understanding of SAM

GROUP SIZE

2-3 students

COMPUTATIONAL THINKING FRAMEWORK

AL, GE, AB

TIME REQUIRED

20 minutes to create

30 minutes to observe and record

10 minutes to reflect, peer review and plenary

MATERIALS REQUIRED

- SAM Button
- SAM Buzzer
- Computer
- Tank/glass container (beaker) with pond water
- Pondweed
- Lamp
- Ruler
- Camera to record stages and progress

ACTIVITIES

- Set up an experiment that will measure the effect light has on photosynthesis.
- Storyboard and take a photo of each stage of the process.
- Peer review and teacher feedback on the final product/results.
- Student reflection: strengths, weakness, difficulties, suggested modifications.
- Plenary, including other ways this system can be used.

STAGE 1

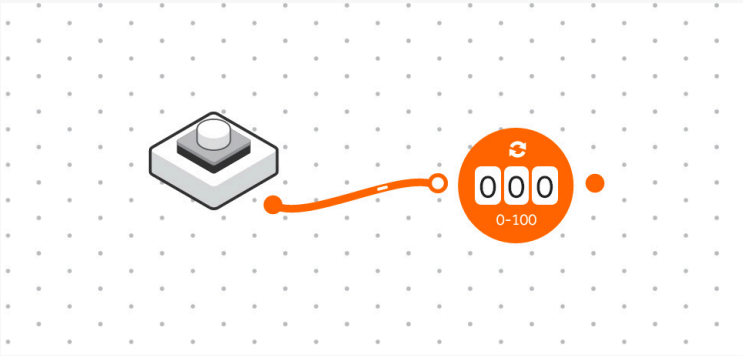
Gather the materials.

STAGE 2

Open SAM Space Education app.
Turn on and drag the SAM Button and SAM Buzzer onto the canvas.

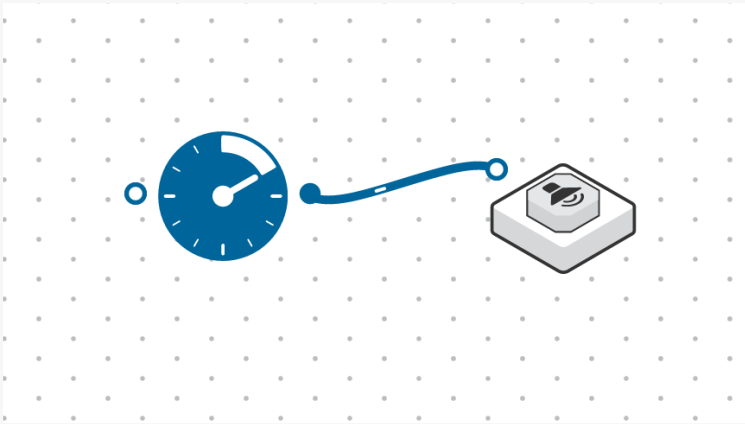
STAGE 3

Attach the SAM Button to a SAM counter software block.



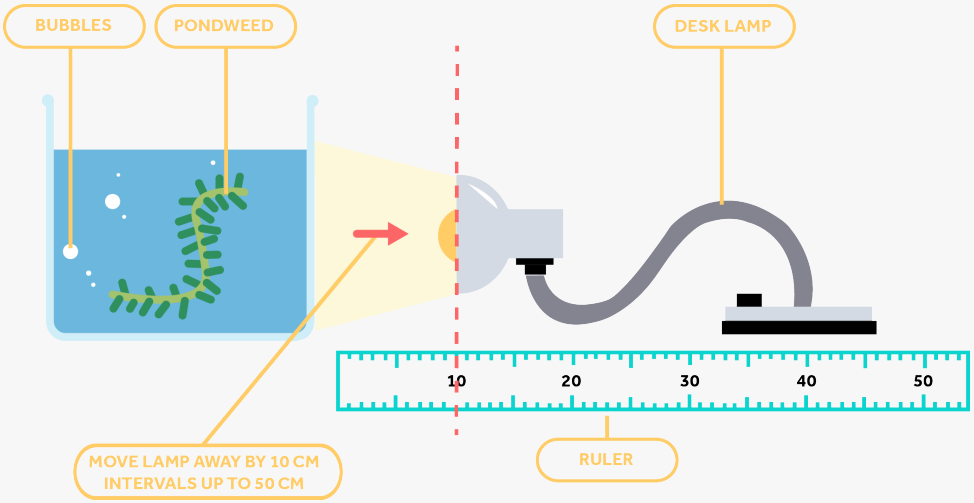
STAGE 4

Attach the SAM Buzzer to a SAM Timer software block.



STAGE 5

Experiment Method
1.Set up the apparatus as in the diagram.
2.Leave for five minutes for the pondweed to acclimatise to the new light intensity.
3.Count the number of bubbles given off in one minute with the SAM Button and SAM counter software block.
4.Move the light 10 cm further back.
5.Leave for five minutes for the pondweed to acclimatise again.
6.Count the number of bubbles given off in one minute, again using the SAM Button and SAM counter software block.
7.Repeat by moving the lamp away by 10 cm intervals until 50 cm is reached.



STAGE 6

- Students report back to the class on their task.
- What do the results mean?
- Peer review (students comment on each other's work)

eg. Were there any difficulties encountered during the experiment?
Did each group get the same results? If not, why not?

DIFFERENTIATE

Extension task:
Alter some of the variables.
Variables:
Independent variable - the light intensity (how close the light is).
Dependant variable - the number of oxygen bubbles given off (the rate of photosynthesis).
Controlled variables - the size of the pondweed, the volume of water used and its temperature.

TEACHER FEEDBACK AND PLENARY

Successes - weaknesses - future modifications

Please contact SAM Labs at:
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APPENDIX

COMPUTER SCIENCE, BIOLOGY

NATIONAL CURRICULUM EDUCATIONAL STANDARDS

SCIENCE

KS4

The key ideas include:

The use of conceptual models and theories to make sense of the observed diversity of natural phenomena.

The assumption that every effect has one or more cause.

That change is driven by interactions between different objects and systems.

That many such interactions occur over a distance and over time.

That science progresses through a cycle of hypothesis, practical experimentation, observation, theory development and review.

That quantitative analysis is a central element both of many theories and of scientific methods of inquiry.

The sciences should be taught in ways that ensure students have the knowledge to enable them to develop curiosity about the natural world, insight into working scientifically, and appreciation of the relevance of science to their everyday lives, so that students:

Develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physic.

Develop understanding of the nature, processes and methods of science, through different types of scientific enquiry that help them to answer scientific questions about the world around them.

Develop and learn to apply observational, practical, modelling, enquiry, problem-solving skills and mathematical skills, both in the laboratory, in the field and in other environments.

Develop their ability to evaluate claims based on science through critical analysis of the methodology, evidence and conclusions, both qualitatively and quantitatively.

NATIONAL CURRICULUM EDUCATIONAL STANDARDS

BIOLOGY

KS4

Photosynthesis

Photosynthesis as the key process for food production and therefore biomass for life the process of photosynthesis factors affecting the rate of photosynthesis.

https://www.gov.uk/government/publications/national-curriculum-in-england-science-programmes-of-study/national-curriculum-in-england-science-programmes-of-study

PROGRESSION PATHWAYS/ COMPUTATIONAL THINKING CONCEPT

Hardware and Processing

Knows that processors have instruction sets and that these relate to low-level instructions carried out by a computer. (AB) (AL) (GE)

https://community.computingatschool.org.uk/resources/1692

Computational Thinking Concept: AB = Abstraction; DE = Decomposition; AL = Algorithmic Thinking; EV = Evaluation; GE = Generalisation