

## Investigation 2: The effect of sunlight on biomass

### Moderator comments

Personal engagement x/2	Exploration x/6	Analysis x/6	Evaluation x/6	Communication x/4	Total x/24
1	2	3	2	2	10

### Personal engagement

Mark	Descriptor
1	<ul style="list-style-type: none"> <li>The justification given for choosing the research question and/or the topic under investigation does not demonstrate <b>personal significance, interest or curiosity</b>. 0</li> <li>There is little evidence of <b>personal input and initiative</b> in the designing, implementation or presentation of the investigation. 1</li> </ul>
<b>Moderator's award</b> 1	<b>Moderator's comment</b> There is little sign of personal engagement. Though there is some sign of initiative in designing the investigation it is minimal.

### Exploration

Mark	Descriptor
1–2	<ul style="list-style-type: none"> <li>The topic of the investigation is identified and a research question of some relevance is <b>stated but it is not focused</b>. 2</li> <li>The background information provided for the investigation is <b>superficial</b> or of limited relevance and does not aid the understanding of the context of the investigation. 2</li> <li>The report shows evidence of limited awareness of the significant <b>safety</b>, ethical or environmental issues that are <b>relevant to the methodology of the investigation</b>. 1</li> </ul>
3–4	<ul style="list-style-type: none"> <li>The methodology of the investigation is mainly appropriate to address the research question but has limitations since it takes into consideration only some of the significant factors that may influence the relevance, reliability and sufficiency of the collected data.</li> </ul>
<b>Moderator's award</b> 2	<b>Moderator's comment</b> The research question is presented though it is not focused. The background presented is relevant but incomplete. There is a method presented that is concise and random sampling is used. There is no consideration of the environmental impact of the investigation and working in the sun could be a safety issue.

## The effect of sunlight on biomass

### Introduction

**Biomass** is the weight of living organisms in a given area. Biomass can differ due to a variety of factors, such as exposure to sunlight, proximity to human activity, mineral nutrient levels and water availability. The first, sunlight exposure, will be the subject for this investigation.

Ex: Definition limited, here it should be referred to as above ground biomass. Limited scientific context. Research question not focused.

**Research Question:** How does sun exposure affect above ground dry biomass of grass?

In this experiment, the independent variable is sun exposure and the dependent variable is dry biomass, measured in grams (g).

PE: Investigation remains trivial in content. Not much sign of engagement by the candidate.

There are other variables that affect the biomass of grass, other than sun exposure. These include the amount of water each area of grass receives, proximity to footpaths and sidewalks, and the amount and mass of water in the grass. To control the last two variables, both areas sampled were the same distance from the main sidewalk and were left to dry before being measured.

Ex: Limited explanation of the method. How long? Where?

### Materials

- 1 meter squared quadrat
- 10 centimeter squared quadrat
- 10 plastic resealable bags
- Scale

### Method

1. Two 1-meter<sup>2</sup> grass areas around the school campus were chosen; one exposed to the sun throughout the day and one under the shade of a tree throughout the day. Each meter squared area was 5 meters from the front sidewalk of the school, controlling the variable of proximity to sidewalks.
2. Once the areas were chosen, 1 meter<sup>2</sup> quadrat was placed in each area.
3. Each meter<sup>2</sup> was divided into 100 quadrats, each being 10cm x 10cm. Once it was divided into 100 quadrats, they were numbered 1-100, left to right, starting from the upper left corner.
4. Using a random number generator, 5 numbers were picked for each site (5 for the meter<sup>2</sup> in the sun and 5 for the meter<sup>2</sup> in the shade).
5. The numbers generated represented the numbered quadrats. Samples of grass were taken from the quadrat numbers that were randomly generated and placed resealable plastic bags. A standard for collecting the sample was established; the grass was pinched at the stem right above the ground, and then plucked, leaving the roots intact in the soil.
6. Once 5 samples were collected from each square meter, the grass was then left to dry for two days. Drying out the grass allows the dry biomass to be taken. This controls the variable of different amounts of water in the grass.
7. After two days of drying, the mass of each sample of grass was taken.
8. Once the masses were recorded, the t-test was performed to determine the average mass of grass in each area and to determine if the difference in masses were statistically significant, or due to chance.

Comm: Method could be repeated though some details are missing.

Ex: No consideration of safety ethics or environmental impact

Ex: Sample area controlled

Ex: No details of the distance of the tree or what species it is?

Ex: Sampling shows some elements of control.

Ex: OK though cutting with scissors would probably be more consistent.

Ex: The sample size is limited and small. Insufficient data collected.

Ex: This is better than the fresh mass but it ought to have been specified that it is above ground biomass.

An: Appropriate method of analysis chosen.