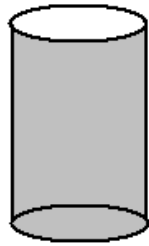


Grade 8 Natural Science Worksheet

Investigation into surface area

A farmer wants to build an open reservoir for water on his farm. The building contractor draws two possible designs for the reservoir, Design A and Design B:



Design A is 6 metres deep and has a diameter of 3 metres.



Design B is 3 metres deep and has a diameter of 6 metres.

The farmer asks you to advise him as to which design he should build. The amount of space available for the reservoir on his farm is not limiting, and each design will cost the same to build. The farmer is concerned, however, about conserving water.

Which design should he build? He wants scientific proof!

1. Predict what effect changing the surface area of a liquid will do to the speed of evaporation.
2. Devise a simple test to see whether your prediction will be upheld or disproven.

Note:

- a) You must actually perform the test to ensure its reliability.
- b) Record your test under the following headings:

Prediction

Materials I used

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Point-form outline of my methods

Detailed descriptions of my observations (these may take the form of notes, diagrams or any other means by which you accurately record what you observe)

Interpretations of my observations

[24 marks]

Rubric to assess investigation

Criteria	Level 4 [4]	Level 3 [3]	Level 2 [2]	Level 1 [1]
Prediction	Well stated as a hypothesis with a possible outcome given.	Fairly well stated as a hypothesis with a possible outcome given.	Poorly stated as a hypothesis with an unclear outcome given.	Unable to state the prediction.
Materials	List of materials is complete.	List of materials is mostly complete.	List of materials is fairly complete.	List of materials is significantly incomplete.
Methods	Methods comprehensively and accurately described in point form, logical procedure followed.	Methods well described in point form, fairly logical procedure followed.	Methods fairly well described, procedure needs greater logic.	Unable to logically and clearly describe methods.
Observations	Accurately and scientifically recorded using most appropriate means such as drawings, tables, etc.	Well recorded using means such as drawings, tables, etc.	Fairly well recorded using means such as drawings, tables, etc.	Poorly recorded.
Interpretation of observations	Astute and scientific interpretation of results which link back to prediction.	Good interpretation of results which make some reference to prediction.	Fair interpretation of results but need a link back to prediction.	Poor interpretation of results which do not link back to prediction.
Practical investigation	Able to manipulate apparatus and conduct the	Able to manipulate apparatus and conduct the	Needs assistance to manipulate apparatus and	Unable to manipulate apparatus and conduct the

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	investigation well, cleaned up after experiment.	investigation fairly well, cleaned up after experiment.	conduct the investigation, needed to be reminded to clean up after experiment.	investigation, failed to clean up after experiment.
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3. Was your prediction upheld or disproved? Does it matter if your prediction was disproved? Comment on whether you have 'performed science according to the scientific method' or not. [6marks]

4. How did you ensure reliability in your test? [5 marks]

[Total: 35 marks]

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Suggested Solutions

Question number	Possible marks	Solution
1	Incorporated into rubric.	A prediction is a statement, not a question. Learners needed to make a prediction as to what they thought would happen when surface area was decreased – would evaporation rate decrease or increase? E.g. as the surface area increases, the rate of evaporation also increases.
2	See rubric.	List all materials used including water and a measuring jug or cups. List materials under each other. In Methods , make a point form list of ALL actions taken, right to the end of the investigation. State procedural steps logically and describe actions in full. Observations need to be as accurate as possible. Avoid vague comments such as “The water level dropped”. Encourage far more accuracy and get specifics: By how much did the water level drop? How many millilitres of water were lost? Remind learners that they are doing science – they need to be as accurate and empirical as possible. Provide evidence for conclusions. Interpretation of observations: Try and account for or explain what was observed. Use theoretical knowledge to interpret/explain practical observations. Learners should try and say why certain things were observed, use the evidence to justify claims made.
3	6	Remember that simply upholding a prediction does not necessarily mean that one has performed science. “Doing science” according to the scientific method, means setting up a hypothesis or prediction, testing it, and showing that the hypothesis/prediction was true or upheld, or disproved. In this investigation, learners were involved with questioning, predicting, performing practical manipulation skills, making observations and interpreting observations – these activities show they were doing science.
4	5	Reliability is NOT ensured by simply upholding the prediction. Reliability is ensured by not introducing bias or other variables into the investigation, which could ‘skew’ or distort results. Ways to ensure reliability: Learners could use containers made of the same material, measure accurately, use the same volume of water in each vessel, time the experiment carefully, and repeat the investigation to see if results can be repeated. If they say that they did this in their investigation – make sure that they show evidence of this repeated work.

For your general information – design A would be a better design for the reservoir - as the rate of evaporation is less from a smaller surface area.

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