

From results to a justified conclusion

1 / Read the task and notice the model

Use the supplied illustrative results to write a short investigation report about water temperature and the time taken for sugar to dissolve. Do not carry out the practical from this worksheet alone: teachers must provide an approved method and local safety guidance.

Illustrative dataset - not practical instructions.

Water / °C	Trial 1 / s	Trial 2 / s	Trial 3 / s	Mean / s
20	120	124	119	121
40	78	75	78	77
60	43	41	42	42

State the question and variables

Question: How does water temperature affect the time taken for 5.0 g of sugar to dissolve?

The independent variable was water temperature. The dependent variable was dissolving time. The water volume, sugar mass and stirring procedure were kept the same.

Report the evidence

At 20 °C, the mean dissolving time was 121 s. At 40 °C, it was 77 s, and at 60 °C, it was 42 s. In this dataset, mean dissolving time decreased as water temperature increased.

Explain and conclude

These results support the conclusion that higher water temperature reduced dissolving time under these conditions. Faster particle motion at higher temperatures can help explain the quicker dissolving. The results do not show that more sugar can dissolve overall, because this investigation measured time rather than maximum solubility.

Evaluate the evidence

The three repeats at each temperature were close together, which suggests the timing was reasonably consistent in this dataset. However, deciding when the final sugar crystal disappeared involved judgement. A more consistent endpoint and a controlled stirring procedure would improve the comparison.

2 / Notice, talk and plan

Which sentences describe results without explaining them?

Why does the conclusion avoid a claim about solubility?

Why are close repeat measurements not enough to prove accuracy?

Plan your response

Question: what changes and what is measured?

Results: what trend do the means show? Use two values.

Explanation: what scientific idea explains this trend?

Evaluation: what limitation affects the evidence? Improve it.

3 / Write independently

Apply the same report structure to teacher-supplied data on light intensity and photosynthesis. Identify what the new data support and what they do not show.

Useful language - choose what serves your meaning

As ... increased, ... decreased. / At ... the mean was ..., compared with ... at ... / These results support ... under these conditions. / A limitation was ...; this could affect ... / To improve the comparison, ...

Check and revise

- ☐ Variables are named correctly
- ☐ Means and units are accurate
- ☐ Evidence supports the trend
- ☐ Explanation uses a relevant scientific idea
- ☐ Evaluation links a limitation to an improvement

4 / Teacher guide

Suggested sequence

Separate the moves · 8 min

Sort the model statements into question, results, explanation and evaluation.

Read the data · 10 min

Calculate the means, include units and describe the pattern without adding a cause.

Talk through a claim · 10 min

State a conclusion, point to the data and explain a scientific reason. Discuss what the data cannot show.

Write · 20 min

Use the planning prompts to produce a report. Fade the frames for students ready to write independently.

Evaluate · 7 min

Identify one limitation that affects the comparison and explain how an improvement would help.

Discussion answers

1. The values and downward trend in mean dissolving time describe the data.
2. Only time was measured; the maximum mass that can dissolve was not tested.
3. Repeats can share the same systematic error, such as an inaccurate thermometer.

Model annotations

State the question and variables: Naming what changes, what is measured and what is controlled makes the comparison interpretable.

Report the evidence: Report the trend with values and units. This describes the measurements; it does not yet explain them.

Explain and conclude: Connect the claim to evidence and a scientific explanation. Distinguish dissolving rate from solubility.

Evaluate the evidence: Evaluate a specific source of uncertainty and link it to an improvement. Close repeats do not prove accuracy.

All data are invented for writing and data-handling practice. Mean times are 121 s, 77 s and 42 s. Accept alternative well-reasoned evaluations; distinguish precision, accuracy and validity. This pack does not provide a practical risk assessment or a complete experimental method.