

Dissolving sugar

Plan a fair test, collect data and write it up like a real scientist.



NAME _____ CLASS _____ DATE _____

LEARNING GOAL

I can plan and carry out a fair test, then use my results to answer a scientific question.

SUCCESS CRITERIA

- ☐ I can name the independent, dependent and control variables.
- ☐ I can write a hypothesis using **If ... then ... because ...**
- ☐ I can calculate a mean and plot my results on a graph.
- ☐ I can write a conclusion backed by evidence and suggest improvements.



OUR QUESTION

Does the temperature of water affect how quickly sugar dissolves?

You will add the same mass of sugar to water at different temperatures, stir it the same way each time and time how long it takes until no crystals are left.

1 Identify the variables

4 marks

Remember: you **change** the independent, **measure** the dependent and keep the controls **the same**.

I INDEPENDENT VARIABLE

The one thing I change on purpose:

The values I will use:

D DEPENDENT VARIABLE

The thing I measure:

Its unit and the instrument I use:

C CONTROL VARIABLES

Things I keep the same (one is done for you):

1. **the mass of sugar (5 g)**

2. _____

3. _____

2 Write a hypothesis

3 marks

Predict what will happen and give a scientific reason. Use the frame and the word bank.

If _____
then _____
because _____

WORD BANK

temperature

increases

particles

move faster

energy

collide

dissolve



Check it: does yours name **both** variables and give a reason about **particles**?



Method, results and observations

3 Equipment

- | | |
|---|--|
| ☐ 250 cm ³ beaker | ☐ measuring cylinder |
| ☐ thermometer | ☐ stopwatch |
| ☐ granulated sugar | ☐ balance and spatula |
| ☐ stirring rod | ☐ eye protection |



STAY SAFE

- Wear **eye protection** the whole time and report any spill straight away.
- Use water **no hotter than your teacher allows**. Your teacher fills hot water for you.
- Use an accessible working position approved by the teacher; keep hot beakers stable and away from edges.

4 Method

3 marks

Some steps are written for you. **Complete steps 3, 5 and 7** so another scientist could repeat your test exactly.

1 Measure **100 cm³** of water with the measuring cylinder and pour it into the beaker.

2 Put the thermometer in the water and record the starting temperature.

3 *Weigh out the sugar: how much, and how?*

4 Tip all the sugar into the water and **start the stopwatch** at the same moment.

5 *How will you stir, so it is the same every time?*

6 **Stop the stopwatch** when you can no longer see any sugar crystals. Record the time in seconds.

7 *How will you make your results repeatable, and what changes next?*

5 Results and observations

6 marks

Record every time in **whole seconds**, then work out the mean for each temperature.

Water temp. (°C)	Time for sugar to dissolve (s)			Mean time (s)
	Repeat 1	Repeat 2	Repeat 3	
20				
30				
40				
50				
60				

WORKED EXAMPLE: THE MEAN

$$\text{mean} = (R1 + R2 + R3) \div 3$$

Times of 48, 52 and 50 s: $48 + 52 + 50 = 150$, then $150 \div 3 = 50$ s.

Retain all readings. Flag unusual results, investigate and repeat. Exclude only with a stated justified reason; report its effect.

OBSERVATIONS

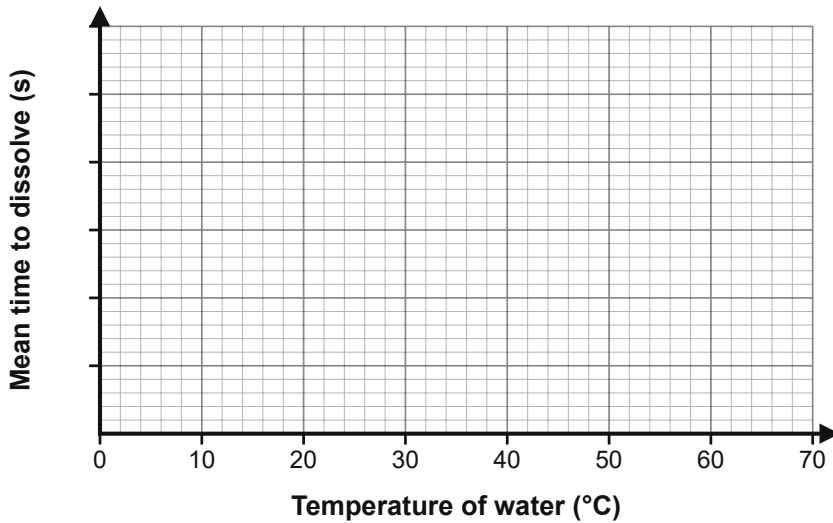
Where did the crystals go? Any swirls? Did any repeat look odd?



Graph, conclusion and evaluation

6 Draw a graph

4 marks



The x-axis is done. **Choose a scale for the y-axis** and write the numbers on the tick marks.

- ☐ Even y-axis scale using over half the grid
- ☐ Each mean plotted as a neat cross (×)
- ☐ Best-fit line/curve if supported

Describe the pattern your graph shows:

7 Conclusion: claim, evidence, reasoning

3 marks

C Claim *As the temperature of the water increases, the time ...*

E Evidence: At ____ °C the mean was ____ s; at ____ °C it was ____ s.

R Reasoning *This happens because the water particles ...*

8 Evaluate your investigation

4 marks

SOURCES OF ERROR

What made your results less accurate or less repeatable?

IMPROVEMENTS

How would you fix each one next time?



GO FURTHER

Estimate from graph at 45 °C: ____ s. Tell a partner why this

How confident do you feel?

- ☐ Not yet
 ☒ Getting there
 ☒ Got it