

Planning fair tests and reading data

Grade 6 science (Year 7 · Class 6) · Worksheet answers

Check your answers after trying every problem. Pay attention to how each variable is named and to the units in the data, because those details earn marks in investigations.

Level: Grade 6 science (Year 7 · Class 6) · **Curriculum:** SEP 3-4

Problem 1 Put the steps in order

Ask a question, make a hypothesis, plan a fair test, collect the data, analyse the results, draw a conclusion.

Problem 2 Name the variables

1. Changes: **water temperature**. Measures: **dissolving time**.
2. Any two of: mass of sugar, volume of water, stirring, size of sugar crystals.

Problem 3 Question or hypothesis?

(b) is a hypothesis: it is a testable prediction with a reason. (a) is a question and (c) is a fact.

Problem 4 Choose the instrument

(a) **Stopwatch, seconds (s)**. (b) **Measuring cylinder, millilitres (mL)**. (c) **Ruler, centimetres (cm)**. (d) **Thermometer, degrees Celsius (°C)**.

Problem 5 A simple mean

Sum = $12 + 14 + 13 + 13 = 52$ cm. Mean = $52 \div 4 = 13$ cm.

Problem 6 Reading a table

The sunny window gave the tallest plant. $14 - 4 = 10$ cm taller.

Problem 7 Is it fair?

Two things change: wing length and paper type. We cannot tell which one affects the fall time. **Use the same paper for both and change only the wing length.**

Problem 8 Write a hypothesis

For example: **If the sail is larger, then the boat will move faster, because it catches**

more wind.

Problem 9 Absorbent towels

1. **B** absorbed the most (18 mL) and **C** the least (9 mL).
2. $18 \div 9 = 2$ **times**.

Problem 10 Spotting an anomaly

5.9 s is far from the others. Mean of the rest: $(3.4 + 3.6 + 3.5) \div 3 = 10.5 \div 3 = 3.5$ **s**.

Problem 11 Mean and range

Sum = $41 + 38 + 44 + 40 + 42 = 205$ m. Mean = $205 \div 5 = 41$ **m**. Range = $44 - 38 = 6$ **m**.

Problem 12 Choosing a scale

25 → 2.5 cm, 40 → 4.0 cm, 65 → 6.5 cm, 85 → 8.5 cm. **Heights: 2.5 cm, 4.0 cm, 6.5 cm and 8.5 cm.**

Problem 13 Faulty chart

1. No title: add a title. 2. No axis labels: label each axis with units. 3. Uneven scale (20 to 50 is a jump): use equal steps. **Three faults: title, labels, even scale.**

Problem 14 Seeds that germinate

1. Light: $18 \div 24 \times 100 = 75$ **%**. Dark: $12 \div 24 \times 100 = 50$ **%**.
2. $75 - 50 = 25$ **percentage points**.

Problem 15 Convert the volumes

1. 1.5 L = **1500 mL**. 250 mL = **0.25 L**.
2. $(245 + 250 + 255) \div 3 = 750 \div 3 = 250$ **mL**.

Problem 16 Insulated cups

1. Independent: **the wrapping material**. Dependent: **the water temperature after 10 minutes**.
2. Starting temperature, volume of water (200 mL), same cup, same room, same time (any three).
3. **Wool**, because it traps air and is a poor conductor of heat, so it slows heat loss.

Problem 17 Cooling graph

1. **49 °C.**
2. Fall: $80 - 56 = 24$ °C in 4 min. Rate = $24 \div 4 = 6$ °C/min.
3. From 6 to 10 min: $49 - 40 = 9$ °C in 4 min, so $9 \div 4 = 2.25$ °C/min. The cooling rate becomes slower as the tea gets closer to room temperature.

Problem 18 Bouncing balls

1. Grass: $63 \div 3 = 21$ cm. Carpet: $90 \div 3 = 30$ cm. Wood: $153 \div 3 = 51$ cm. Concrete: $174 \div 3 = 58$ cm. **Means: 21, 30, 51 and 58 cm.**
2. Wood (50-52 cm) and concrete (55-61 cm) do not overlap, and grass (20-22) and carpet (28-32) do not overlap either. **Grass and wood differ very clearly: 21 cm against 51 cm.**

Problem 19 Is one plant enough?

1. One plant each could differ by chance, for example one seed was healthier. More plants make the result reliable.
2. Sunlight: $40 \div 5 = 8.0$ cm. Shade: $25 \div 5 = 5.0$ cm. Difference: **3.0 cm**; the sunlight plants grew 1.6 times as much ($8.0 \div 5.0$).

Problem 20 Design your own test

1. **Question:** Does cloth colour change its temperature in sunshine? **Hypothesis:** If the cloth is darker, then it gets warmer, because it absorbs more light. Independent: cloth colour. Dependent: temperature after 15 min (°C) measured with a thermometer. Controlled: same cloth material and size, same time in sun, same starting temperature, same place. Repeat three times and take a mean.
2. **Headings: Colour | Trial 1 (°C) | Trial 2 (°C) | Trial 3 (°C) | Mean (°C).**