# Mathematics Level 4

# Practical and investigation tasks



**Aboriginal and Torres Strait Islander content** has been excluded as accuracy cannot be guaranteed, and it is better to be respectful than cover the entire curriculum inaccurately.

Significant effort has been made to ensure this content is legal. Please send any areas of concern to admin@vwx.au with appropriate document/legal references so errors can be verified and changes be made.

## Contents

## Task K1 — Measuring with scaled instruments (length, mass, capacity, duration, temperature)

**Mathematics 4 · Level 4 · Chapter 4 — Measurement · Task K1.** This is practical task **K1** from TOC §7, the task that evidences subtopic **4A** (TOC §4). It is a classroom instrument, **not an exam** (TOC §7).

**Content description scored — `VC2M4M01` (TOC §4), quoted verbatim from `maths_4.json` (authority file read 2026-08-07; VCAA export retrieved 2026-07-29):** "use scaled and digital instruments to interpret unmarked and partial units to measure and compare lengths, masses, capacities, durations and temperatures, using appropriate units"

**Achievement-standard extract (verbatim, same source):** "Students use appropriate scaled instruments and appropriate units to measure length, mass, capacity and temperature." The known CD/AS mismatch is recorded in TOC §1 and is not "fixed": the CD names durations and the extract does not. Station 4 (duration) is scored against the CD, and the reporting statement uses VCAA's wording as written (TOC §7).

**Elaborations drawn on:** `VC2M4M01.E01`, `.E02`, `.E03` and `.E04` — ids copied verbatim from §4. `.E05` and `.E06` are practised in subtopic 4A and are not scored here. `.E07` is not covered in this book; see the note at the front of the book about Aboriginal and Torres Strait Islander content.

**Format (TOC §7, row K1):** five measuring stations, one for each attribute named in the CD — length, mass, capacity, duration and temperature — 3 marks per station, **15 marks**. Students measure real objects with real scaled and digital instruments and write their readings on the sheet. The stations are deliberately set so that some readings sit between two marks — the unmarked and partial units that are the point of the CD.

**Administration rules, stated here as §7 specifies:** this is a classroom check, not an exam; it is untimed, with a guidance duration of about 40 minutes (one lesson) for a teacher planning; the materials §7 permits — rulers, measuring jugs, kitchen scales, thermometers and clocks — are used wherever the CD assumes them. **Calculator status:** `VC2M4M01` is silent on calculators, so no calculator rule is printed (TOC D7); every station is completed with the instruments at the station and a pencil.

Student-facing text runs from "What you will do" to the total line after Station 5; everything else in this file is teacher-facing.

---

### What you will do

You will work at five measuring stations. At each station you will measure with a real instrument, and you will write your answers on this sheet.

A **scaled instrument** is a measuring tool with a row or ring of marks, called a **scale**, that shows how much is being measured. Each mark stands for a **unit** — millimetres, grams, litres or minutes. A **digital** instrument shows the measure as a number on a screen.

Some readings in this task sit between two marks. There is no mark there, so you work the reading out yourself. You did all of this in subtopic 4A.

There is no time limit. Take the time you need, and walk between stations.

**Words you will use:**

- **length** — how long something is
- **mass** — how heavy something is
- **capacity** — how much a container can hold
- **duration** — how long something takes
- **temperature** — how hot or cold something is
- **degrees Celsius** — the unit we measure temperature in, written °C

## Station 1 — Length · 3 marks

**You need:** a ruler marked in millimetres, and two paper strips taped flat to the desk and labelled A and B. Do not move the strips.

1. Measure strip A. Line one end of the strip up with the 0 mark on the ruler, and read the mark at the other end. Write the length and its unit.

   Strip A: _____

2. Measure strip B the same way.

   Strip B: _____

3. Which strip is longer?

   _____ is longer.

## Station 2 — Mass · 3 marks

**You need:** an analog kitchen scale, a digital kitchen scale, and two objects labelled A and B.

An **analog** scale has a needle that moves around a dial. A **digital** scale shows the mass as a number on a screen.

1. Look at the analog kitchen scale. What mass does each small mark stand for?

   Each small mark stands for _____ .

2. Put object A on the analog scale. The needle stops between two marks. Write the mass and its unit.

   Object A: _____

3. Put object B on the digital scale. Write what the screen shows, with its unit. Then write which object is heavier.

   Object B: _____

   The heavier object is _____ .

## Station 3 — Capacity · 3 marks

**You need:** a measuring jug with water in it, sitting on the desk. The jug is marked in litres.

1. Stand so your eyes are level with the water. The water level sits between two marks. Write the capacity and its unit.

   The water: _____

2. Write what capacity each small mark on the jug stands for.

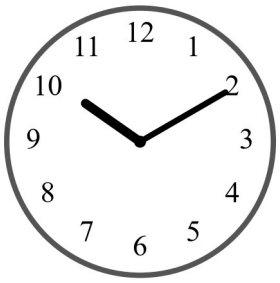
   Each small mark stands for _____ .

3. Write the two marks the water level sits between.

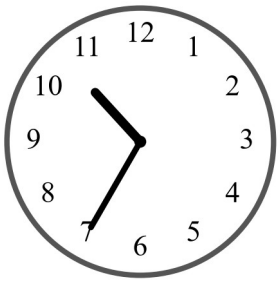
   The level is between _____ and _____ .

## Station 4 — Duration · 3 marks

**You need:** the two clocks below. They have no minute marks — only the numbers 1 to 12. Both clocks show times during the morning at school.




start




finish

*Two clocks with no minute marks, only the numbers 1 to 12. The first clock shows about 10:10 and is labelled start. The second clock shows about 10:35 and is labelled finish.*

A board-game challenge starts at the time on the first clock and finishes at the time on the second clock.

1. Write the start time.

   Start: _____

2. Write the finish time.

   Finish: _____

3. Write how long the challenge took, in minutes.

   Duration: _____

### Station 5 — Temperature · 3 marks

**You need:** two cups of water labelled A and B, each with a thermometer standing in it. The thermometers are marked in degrees Celsius.

Do not take the thermometers out of the cups. Do not drink the water.

1. Read the thermometer in cup A. If the red liquid stops between two marks, read the value in between. Write the temperature and its unit.

   Cup A: _____

2. Read the thermometer in cup B the same way.

   Cup B: _____

3. Which cup is hotter?

   Cup _____ is hotter.

---

**Total: 15 marks** — 3 marks at each of the five stations.

---

## Marking guide

This is a classroom instrument, not an exam (TOC §7). Award whole marks only. Every mark below is written as an observable student action — something the student writes on the sheet. Setup values are the ones you record when setting the stations up (Teacher note); mark against your recorded values. Three rules govern every station:

1. **Reading marks need the number and the unit.** Award a reading mark only when the number sits inside the accept range and the unit is written beside it — as a word (millimetres, grams, litres, minutes, degrees Celsius) or its usual short form (mm, g, L, min, °C). A right number with no unit scores nothing at that mark.
2. **Comparison marks follow the student's own readings.** The longer, heavier or warmer thing named must match the readings the student wrote on the sheet.
3. **Award only what the student writes unassisted.** If you have to show a student how to read an instrument, the reading at that station is assisted. Prompts are limited to repeating the station's own instructions.

**Coverage and marks — the row the coverage audit reads:**

| CD scored | Achievement-standard extract (quoted verbatim) | Items | Marks |
|---|---|---|---|
| `VC2M4M01` | "Students use appropriate scaled instruments and appropriate units to measure length, mass, capacity and temperature." | Stations 1–5 | 15 |
| | | **Total** | **15** |

Source: Victorian Curriculum F–10 Version 2.0, Mathematics (VCAA), Level 4, Measurement — the achievement-standard extract carried in `maths_4.json` for `VC2M4M01` (authority file read 2026-08-07; VCAA export retrieved 2026-07-29), quoted verbatim.

**Duration.** The CD names durations and the extract does not (TOC §1). Station 4 is scored against the CD: the student reads clocks without marked minutes to estimate the time to the nearest minute and determines the duration between events (`VC2M4M01.E04`). On reporting, use VCAA's wording as written: "Students use appropriate scaled instruments and appropriate units to measure length, mass, capacity and temperature."

### Station 1 rubric — length (3 marks)

| Item | Mark | Award |
|---|---|---|
| Strip A | 1 | Writes the length of strip A, with the unit (mm or cm), within 1 mm of the value recorded at setup. |
| Strip B | 1 | Writes the length of strip B, with the unit (mm or cm), within 1 mm of the value recorded at setup. |
| Longer strip | 1 | Names the strip that is longer, matching the student's own two readings. |

### Station 2 rubric — mass (3 marks)

| Item | Mark | Award |
|---|---|---|
| Small marks | 1 | Writes the mass each small mark on the analog dial stands for, as recorded at setup (100 g on the suggested scale), with the unit. |
| Object A | 1 | Writes a mass for object A that sits strictly between the two labelled marks either side of the needle, and |

| Item | Mark | Award |
|---|---|---|
| | | within 50 g of the value recorded at setup, with the unit g. On the suggested setup the needle sits between 600 and 700, so accept readings such as 650 g or "about 650 g" — not 600 g or 700 g, which are on the marks. |
| Object B, and heavier | 1 | Writes what the digital scale shows for object B, with the unit, and names the heavier object. The heavier named matches the student's own two readings. |

### Station 3 rubric — capacity (3 marks)

| Item | Mark | Award |
|---|---|---|
| The water | 1 | Writes the capacity of the water, with the unit (L or litres), inside the accept range recorded at setup. On the suggested setup the level is halfway between 1 L and 1.5 L: accept 1.2 L, 1.25 L or 1.3 L, or the same value in words, such as "1 and a quarter litres". |
| Small marks | 1 | Writes the capacity each small mark on the jug stands for, as recorded at setup (0.5 L on the suggested jug), with the unit. |
| Between marks | 1 | Writes the two marks the water level sits between (1 L and 1.5 L on the suggested setup). |

### Station 4 rubric — duration (3 marks)

| Item | Mark | Award |
|---|---|---|
| Start | 1 | Writes the start time within one minute of the time set — 10:10 am on the printed clocks. Accept the time with or without am/pm. |
| Finish | 1 | Writes the finish time within one minute of the time set — 10:35 am on the printed clocks. Accept the time with or without am/pm. |
| Duration | 1 | Writes the duration in minutes, consistent with the student's own start and finish times — 25 minutes when the printed clocks are read as 10:10 am and 10:35 am — with the unit minutes or min. |

If you draw your own hands on blank clock faces, record the two times you set and mark against them instead.

### Station 5 rubric — temperature (3 marks)

| Item | Mark | Award |
|---|---|---|
| Cup A | 1 | Writes the temperature of cup A, with the unit °C or degrees Celsius, within 0.5 °C of the value recorded at setup. |
| Cup B | 1 | Writes the temperature of cup B, with the unit °C or degrees Celsius, within 0.5 °C of the value recorded at setup. |
| Hotter cup | 1 | Names the hotter cup, matching the student's own two readings. |

## Teacher note

**Running the task.** One normal lesson; guidance duration about 40 minutes (TOC §7), and untimed — students work at their own pace. Set the five stations around the room. Students visit all five, one station at a time — small groups rotating, or the whole class moving together. Each student works their own copy of the sheet (the student-facing part of this file, from "What you will do" to the total line) and writes their own readings; students may share the instruments but not their answers. Before the lesson, record every setup value — the marks key off your recorded values.

**Equipment (per class) and setup.** All of it comes from the §7 materials list: rulers, measuring jugs, kitchen scales, thermometers and clocks.

| Station | Equipment | Setup — record before the lesson |
|---|---|---|
| 1 — length | a 30 cm ruler marked in millimetres; two paper strips taped flat to a desk, labelled A and B | Cut the strips between 15 cm and 25 cm, at least 5 mm apart; measure and record both lengths. |
| 2 — mass | an analog kitchen scale with a 0 to 1 kg dial; a digital kitchen scale set to grams; two objects labelled A and B, each 1 kg or less | Choose object A so the needle stops between two labelled marks — about 650 g on a dial with 100 g marks; record what each small mark stands for and where the needle sits. Weigh object B on the digital scale and record the display and which object is heavier. |
| 3 — capacity | a 2 L measuring jug marked every 0.5 L; water; a flat desk; a cloth | Set the water level halfway between 1 L and 1.5 L; a drop of food colouring makes the level easier to see. Record the level and what each small mark stands for. |
| 4 — duration | a copy of the two printed clocks for each student, or two blank paper clock faces with the hands drawn on | The printed clocks show about 10:10 am and about 10:35 am. If you draw your own hands, record the two times you set. |
| 5 — temperature | two cups of water labelled A and B; two spirit-filled (alcohol) thermometers marked every 1 °C | Make cup B at least 2 °C warmer than cup A, using cold tap water and warm tap water only, both under 40 °C. Record both temperatures. |

No external data is used in this task. The readings are whatever the instruments show on the day, and the marking guide keys off the values you record at setup.

**Safety controls.**

- Water: cold and warm tap water only. Never heat water for this task, and keep every cup under 40 °C.
- Thermometers: spirit-filled (alcohol) thermometers only — no mercury thermometers. If one breaks, students move away and tell you; you clear it up.
- Nothing at the stations is eaten or drunk.
- Wipe spills at once — a wet floor is slippery.
- Everything weighed is 1 kg or less and safe to lift.
- Students walk between stations, and the instruments stay at their station.

**Scope guardrails honoured.** Readings stop at hundredths — the decimal work of 2B; no thousandths (Level 5, `VC2M5N01`, D3). No metric unit conversion: each station reads in one unit only, and length/mass/capacity conversion is Level 6 (`VC2M6M01`, D3). No 12-hour to 24-hour conversion (Level 5, `VC2M5M03`, D3). No degrees of angle and no protractor — Station 4 reads a clock, not an angle; degrees and protractors are Level 5 (`VC2M5M04`, D3). No formulae, no perimeter, no area.

**What is not assessed.** Choosing instruments from scratch is not scored — each station names its instrument. `VC2M4M01` is also assessed in written form in Test T4 (TOC §7). The timer work of `VC2M4M01.E05` and the instrument-making activity of subtopic 4A (`VC2M4M01.E06`) may be used as practice before this task; they are not what K1 scores.

**Data note.** Every referent is a real classroom object or instrument — paper strips, a ruler, kitchen scales, household objects, a measuring jug, water, printed clock faces, cups and thermometers. The labels A and B are labels, and no child is named. Curriculum text is quoted verbatim from `maths_4.json` (authority file read 2026-08-07; VCAA export retrieved 2026-07-29). Elaboration `VC2M4M01.E07` is not drawn on, per CONTENT_POLICY Rule 1 (Aboriginal and Torres Strait Islander content is excluded from this book).

**Vocabulary gate record (2026-08-23).** Student-facing text — everything from “What you will do” to the total line after Station 5, including the figure alt text — is at or below the Yr4 ladder ceiling (rank 4), verified with `load_ladder/check_text/tokenize` from `S:\Files\projects\mcq-system\reports\vocab_level_check.py` on the same basis as `gate_4a.py`. Result: CLEAN. Every ladder flag in the student-facing region resolves to an exempt word: *analog* and *capacity* are the curriculum’s own words (VOCABULARY_LEVEL exemption 1, verbatim in the content description and elaborations of `VC2M4M01`; *analog* retained per the §6 spelling rule), and *degrees* is a subject term defined at first use in the “Words you will use” list (exemption 2, as in gate_4a.py). The preface blockquote above (verbatim curriculum quotation plus citation) is exempt as curriculum quotation and proper-noun metadata (exemptions 1 and 3); this Marking guide and this Teacher note are teacher-facing and are not vocabulary-gated (WORD_LEVEL_POLICY Rule 3).

## Task

*Task K2 — Perimeter by string and side lengths; area by tiling with part units · Practical task · 10 marks · Chapter 4 (4B)*

**Code:** VC2M4M02 (.E01–.E04) · subtopic 4B · **10 marks**

> *recognise ways of measuring and approximating the perimeter and area of shapes and enclosed spaces, using appropriate formal and informal units* — VC2M4M02

.E05 is not covered in this book; see the note at the front of the book about Aboriginal and Torres Strait Islander content.

**Task K2** is a practical task. It is not a test or an exam. You will work with string, a ruler and paper tiles, and you will show what you can do with them. You will measure two things about shapes:

- the distance **around** a shape — its **perimeter**
- the space **inside** a shape — its **area**

The **boundary** of a shape is its edge — the line that goes around the outside of the shape. Perimeter is a length, so it is measured in length units such as centimetres and metres. Area is measured by covering the space with equal squares, and the count of squares is written in **square units**.

A **formal unit** is a unit everyone agrees on, like the metre and the centimetre. An **informal unit** is an everyday object used as a unit, like a paper tile. Both kinds of unit are used in this task. When a whole tile does not fit at the edge of a shape, you use a **part unit** — half a tile, for example.

The marks are shown next to each step. Your total is out of 10.

**Rules for this task.** This is a classroom task, not an exam, and it is untimed — there is no time limit. The equipment you may use is listed under *Equipment*. VC2M4M02 does not name a calculator or a digital tool, and no calculator is needed in this task — the calculations are counts and small additions. Any instruction on this task may be read aloud by the teacher.

---

### How to run K2

*Teacher-facing. K2 is a classroom check, not an exam.*

- **When** — after section 4B of Chapter 4 has been taught.
- **Format** — students work in pairs. Score what you see and hear as you move between the pairs, and check each student's recording sheet at the end. Each student keeps their own recording sheet.
- **Timing** — nothing is timed. There is no time limit on the students. The guidance here is for you, planning the lesson: about 30 minutes for both parts, or two shorter lessons.
- **Equipment** — permitted. VC2M4M02 assumes measurement with formal and informal units, so the materials are part of the task, not an aid.
- **Calculator** — not needed. VC2M4M02 does not name a calculator or a digital tool, and the task follows the CD (D7). The calculations are counts and small additions.
- **Recording** — each student fills in the recording sheet. You record the observable actions from the Marking guide as you see them.
- **If a student is absent** — VC2M4M02 is also assessed in written form in Test T4, so no student is left with an unassessed content description.

---

### Equipment

One kit per pair, unless noted.

- a centimetre ruler
- a piece of string about 50 cm long
- a pencil, to mark the string
- an object with straight sides, like a book or a pencil case
- about 30 small square paper tiles, all the same size
- scissors, to cut tiles in half
- a measuring tape, to measure the string (one between two pairs)

Cut from cardboard for each pair, before the lesson:

- a small rectangle, 9 cm by 6 cm
- a small square, 6 cm by 6 cm
- a shape with a curved edge, like a leaf shape or an oval, about 4 tiles wide — check that whole tiles fit inside it and half tiles fit at its edge

Tiles that are 3 cm by 3 cm work well with these shapes. Check that every tile is the same size — the count is only fair when the unit never changes.

---

## Safety

*Controls at the point of use. Read these to the class before the task starts.*

1. **Scissors.** Sit while you cut. Cut only the paper tiles. Pass the scissors handles first, points down.
2. **String.** The string stays on the desk and around the shapes. Do not wrap it around people, and do not flick it.
3. **Rulers and tapes.** Carry them pointing down. No waving.
4. **Moving around.** Walk in the room. Keep the space around your desk clear of bags.
5. **Stopping.** Everyone stops working when the teacher says stop.

---

## Part A — Perimeter by string and side lengths (4 marks)

The **perimeter** is the total length around the boundary of a shape.

**A1. Measure the sides.** Take your object with straight sides. Use the ruler to measure each side. Record each side length with its unit on your recording sheet. *(1 mark)*

**A2. Add the side lengths.** Add the side lengths of your object to find the perimeter. Adding the sides is faster than counting every side one by one. Record the perimeter with its unit. *(1 mark)*

**A3. A big space: the netball court.** Netball is played on a rectangular court. The court is 30.5 m long and 15.25 m wide. A rectangle has two long sides that are the same length and two short sides that are the same length. Which unit fits this job — centimetres or metres? Write the lengths of the four sides of the court, and add them to find the perimeter. Record the perimeter with its unit. *(1 mark)*

Source: World Netball, *Rules of Netball*, worldnetball.org, retrieved 2026-08-20.

**A4. The curved shape: use a string.** Take the cardboard shape with a curved edge. A ruler is straight, so it cannot follow the curve. A piece of string can.

1. Lay the string along the boundary, all the way around the shape.
2. Mark the spot on the string where it meets the start.
3. Straighten the string and measure it with the ruler or the tape measure.

Record the perimeter with its unit. *(1 mark)*

---

## Part B — Area by tiling with part units (6 marks)

The **area** of a shape is the space enclosed by its boundary. To measure area, cover the space with equal squares and count them. When you tile a shape, the tiles must fit with no **gaps** and no **overlaps** — no empty spaces between the tiles, and no tiles sitting on top of other tiles.

**B1. Tile the rectangle.** Cover the small cardboard rectangle with the square paper tiles, with no gaps and no overlaps. *(1 mark)*

**B2. Count the tiles.** Count all the tiles that cover the rectangle. Record the area in square units. *(1 mark)*

**B3. Use one unit again and again.** Take the small cardboard square. You do not need a pile of tiles for this one. Use **one** square tile, move it into place again and again, and count each new place. Record the area in square units. *(1 mark)*

**B4. Whole squares inside.** Take the cardboard shape with a curved edge. Cover it with the square tiles. Count the whole tiles that fit inside the shape. Record the count. *(1 mark)*

**B5. Part units at the edge.** At the edge of the shape, a whole tile does not always fit. Cut a tile in half where you need to. Count the half tiles at the edge. Put the halves together to make whole units: 2 halves make 1 whole. Record how many whole units the halves make. *(1 mark)*

**B6. The total area, and why the tiles must fit.** Add the whole units and the combined halves, and record the area of the curved shape in square units. The answer is close to the true area, because the edge is curved. Then tell your teacher: why must there be no gaps and no overlaps when you tile a shape? *(1 mark)*

---

## Recording sheet

Name: …… Date: ……..

**Part A — perimeter**

| What you measured | Your unit (cm or m) | Side lengths | Perimeter |
|---|---|---|---|
| the object with straight sides | | | |
| the netball court | | four sides: 30.5 m, ……..., ……..., ……. | |
| the shape with a curved edge (string) | | — | |

**Part B — area**

| Shape | Whole squares | Half squares | Area (square units) |
|---|---|---|---|
| the small rectangle | | — | |
| the small square (one tile, moved) | | — | |
| the shape with a curved edge | | | |

Why must there be no gaps and no overlaps when you tile a shape?

……

---

## Marking guide

*Teacher-facing. Score only what you see the student do, or hear the student say. Award each mark once, for an action you can see or hear — each row is 1 or 0, with no half marks. If you have to tell a student what to do first, do not give the mark for that action; record the prompt instead, so you know what to teach next. Any instruction may be read aloud, and a student may try a step once more before you record it.*

Task K2 carries **10 marks**, all assessing `VC2M4M02` (owned by subtopic 4B): **4 marks** for perimeter by string and side lengths (Part A) and **6 marks** for area by tiling with part units (Part B).

The guide is written in the language of the achievement-standard extract carried on `VC2M4M02` in the authority file (`maths_4.json`), quoted verbatim:

> "They measure and approximate perimeters and areas for regular and irregular shapes."

### Part A — perimeter by string and side lengths — 4 marks

| Mark | Observable student action |
|---|---|
| A1 (1) | The student measures each side of the straight-sided object with the ruler, and records each side length with its unit. Award too if the student measures two sides of a rectangular object and says the other two sides are the same length. |
| A2 (1) | The student adds the side lengths and records the perimeter with its unit. The total matches the student's own side lengths. Adding the side lengths is the efficient method (`VC2M4M02.E02`), rather than counting sides one by one. |
| A3 (1) | The student chooses metres for the court, writes the four side lengths — 30.5 m, 15.25 m, 30.5 m, 15.25 m — and finds the perimeter: 30.5 + 15.25 + 30.5 + 15.25 = 91.5, recorded with its unit (91.5 m). Award for a correct total reached any way, for example 30.5 + 15.25 = 45.75, then 45.75 + 45.75 = 91.5. Choosing a unit that fits the context is from `VC2M4M02.E01`. |
| A4 (1) | The student lays the string along the curved boundary all the way around the shape, marks the string where it meets the start, straightens the string, measures it with the ruler or the tape measure, and records the perimeter with its unit. Accept "about" in the recorded value. A string around a boundary with curved parts is from `VC2M4M02.E01`. |

Notes for Part A:

- Award A1 and A2 on the student's own measurements. A side length read a little off a line does not lose the mark, so long as the recorded perimeter matches the recorded sides.
- For A3, centimetres is not a suitable unit for a court this size — the count would be very large. The mark needs metres.

### Part B — area by tiling with part units — 6 marks

| Mark | Observable student action |
|---|---|
| B1 (1) | The student covers the small rectangle with square tiles so that there are no gaps and no overlaps. Award too if the student finds and fixes a gap or an overlap without being told (`VC2M4M02.E03`). |

| Mark | Observable student action |
|---|---|
| B2 (1) | The student counts the tiles that cover the rectangle and records the area in square units. The count matches the tiling. Any correct counting way counts — one by one, skip counting, or by rows. |
| B3 (1) | The student uses one square tile, moves it into place again and again, and counts each new place to find the area of the small square — one unit used repeatedly (VC2M4M02.E04). |
| B4 (1) | The student counts the whole tiles that fit inside the shape with a curved edge, and records the count (VC2M4M02.E03). |
| B5 (1) | The student uses half tiles at the edge of the shape, counts the halves, and combines them into whole units — 2 halves make 1 whole — and records the combined count (VC2M4M02.E03, .E04). |
| B6 (1) | The student records the total area of the curved shape — whole units plus combined halves — in square units, and says why the tiles must fit with no gaps and no overlaps: a gap leaves space uncovered, so the count is too small; an overlap covers space twice, so the count is too big. Award when both the total and the reason are given. Accept the reason in the student's own words (VC2M4M02.E04). |

Notes for Part B:

- The area of the curved shape is an approximation, and pairs may get counts that are a little different. Award B4–B6 on a count that matches the student's own tiling, not on a set number.
- If a pair's tiles are not all the same size, the count is not fair — fix the tiles first, then score.

### Score

| Part | Marks |
|---|---|
| Part A — perimeter by string and side lengths (VC2M4M02) | 4 |
| Part B — area by tiling with part units (VC2M4M02) | 6 |
| **Task K2 total** | **10** |

### Teacher recording sheet

| Part | Marks | Action notes |
|---|---|---|
| Part A — perimeter | /4 | |
| Part B — area | /6 | |
| **Total** | **/10** | |

### What the marks say

Both parts sit under the one achievement-standard extract: *"They measure and approximate perimeters and areas for regular and irregular shapes."* A student who adds side lengths, uses a string to measure around a curved boundary, and chooses metres for the court measures perimeters of regular and irregular shapes. A student who tiles a shape with no gaps and no overlaps, uses one unit again and again, and combines half tiles at the edge measures and approximates areas. A mark not scored here is a gap to teach next, and VC2M4M02 is assessed again in written form in Test T4.

## Task

*acquire data for categorical and discrete numerical variables to address a question of interest or purpose using digital tools; represent data using many-to-one pictographs, column graphs and other displays or visualisations; interpret and discuss the information that has been created* — VC2M4ST01

*conduct statistical investigations, collecting data through survey responses and other methods; record and display data using digital tools; interpret the data and communicate the results* — VC2M4ST03

*Ask a question. Survey your class. Tally the answers. Make displays where one square or symbol stands for more than one answer. Then say what the data show.*

| | |
|---|---|
| **Task** | K3 — Statistical investigation: survey, digital recording, display and report |
| **Assesses** | `VC2M4ST01` (subtopic 6A) and `VC2M4ST03` (subtopic 6C) |
| **Marks** | **15** — Part A 3, Part B 3, Part C 4, Part D 5 (Marking guide below) |
| **Timing** | This is a classroom task, not an exam. It is untimed. Guidance duration for planning: two lessons of about 30 minutes each. It may be split across more than one session. |
| **Equipment** | Supplied by the teacher — see the list below. |
| **Calculators** | Not needed — nothing in this task uses a calculator. Neither CD says "without a calculator" (D7). |
| **Digital tools** | Permitted, not required (D7). A spreadsheet is one way to make Display 2. Every mark can be earned on paper. |
| **Read aloud** | Any instruction on this task may be read aloud by the teacher. |

### Equipment

- One copy of this task for each student. Part B has a chart on it for recording the survey answers with tally marks.
- Pencils.
- Grid paper, for Display 1 in Part C.
- A ruler, and coloured pencils or crayons, if you have them.
- Optional: a computer or tablet with a spreadsheet program — a program that keeps data in a grid of small boxes — set up by the teacher (Microsoft Excel or Google Sheets), for Display 2 in Part C, and a printer, if the school has one, to print the graph. Display 2 can be made by hand instead, so every mark can be earned without a device.

Source: Microsoft, *Microsoft Excel*, retrieved 2026-08-23. Source: Google, *Google Sheets*, retrieved 2026-08-23.

### Safety — at point of use

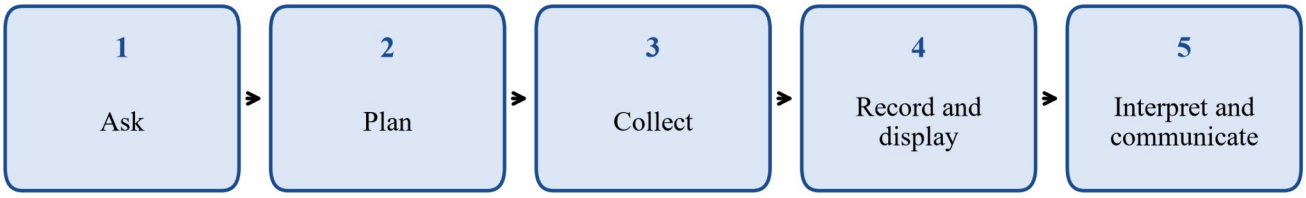
- Students walk when they move around the room to survey. No running.
- The survey asks about favourite things and counts only. It does not ask for names. Student names are not written on the tally chart and are not typed into any spreadsheet — only the answer choices and the counts.
- If a student writes their own question in Part A, the teacher checks it before the survey starts.
- The teacher sets up any computer or tablet. Students carry a device with two hands. Food and drink stay away from devices.
- Students survey their own class, in the room, with the teacher present.

### Words you know

These words were taught in Chapter 6. They are used in this task.

- A **statistical investigation** answers a question by collecting data and finding out what the data show.
- **Data** are the information you collect, like the answers people give in a survey.
- A **survey** is a question you ask a group of people. Each person answers once.
- **Categorical data** — the answers are categories, or groups, like *apple* or *blue*. The answers are words.
- **Discrete numerical data** — the answers are counts, like 0, 1, 2 or 3. A count is always a whole number.
- **Tally marks** record each answer as a mark. The fifth mark goes across the group of four, like this: 𝙸𝙸𝙸𝙸/.
- A **table** shows data in rows and columns. A **display** is a way to show data, like a pictograph or a column graph.
- In a **many-to-one display**, one symbol or square stands for more than one answer. The **key** tells you what one symbol stands for. The **scale** is the numbers up the side of a column graph.
- A **spreadsheet** is a program that keeps data in a grid of small boxes called **cells**, in columns going down and rows going across.
- To **interpret** data means to work out what they show. To **communicate** means to share what you found.

## What you will do




*Five numbered boxes joined by arrows from left to right, showing the five steps of a statistical investigation in order: 1 ask, 2 plan, 3 collect, 4 record and display, 5 interpret and communicate.*

You will follow the five steps of a statistical investigation. You will ask a question, survey your class, and make two displays where one square or symbol stands for more than one answer. Then you will say what the data show. The four parts are worth 15 marks altogether.

## Part A — Ask and plan (3 marks)

Pick one question to ask. Choose one of these real questions, or write your own question with four answer choices.

1. *Which Victorian AFL club do you support most?* Choices: Carlton, Collingwood, Geelong, Richmond. These are real Victorian AFL clubs.

Source: AFL, AFL.com.au, afl.com.au, retrieved 2026-08-23.

2. *How do you usually get to school?* Choices: walk, ride, car, bus.
3. *How many pets do you have?* Choices: 0, 1, 2, 3 or more.

Questions 1 and 2 collect **categorical data** — the answers are words. Question 3 collects **counts** — the answers are whole numbers. Your own question can be either kind.

**A1.** Write the question you will ask, and your four answer choices. Each person you ask must be able to pick exactly one choice.

My question: _____

My four choices:

1. _____ 2. _____
2. _____ 4. _____

**A2.** Who will you ask, and how many people is that?

I will ask: _____

How many people: ▢

**A3.** What kind of data will your survey collect? Tick one box.

▢ categorical data — the answers are words

▢ counts (discrete numerical data) — the answers are whole numbers

How do you know?

---

## Part B — Collect (3 marks)

Now survey the group you planned for.

- Ask each person your question. Each person answers once. Check that nobody is missed and nobody answers twice.
- Record each answer as it comes. Put one tally mark in the right row.

### Record your survey results

| Category | Tally | Count |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| Total | | |

*A blank tally chart titled Record your survey results, with the columns Category, Tally and Count, four empty rows to write in, and a Total row.*

My survey:

| _____ | Tally | Count |
|---|---|---|
| | | ▢ |
| | | ▢ |
| | | ▢ |
| | | ▢ |
| **Total** | | ▢ |

Count your tally marks and write the counts. Then check: the total must equal the number of people you asked.

▢ people answered my survey. Does your total match? ▢ yes ▢ no

If it does not match, check the tally marks one by one.

## Part C — Record and display (4 marks)

**Display 1 — by hand**

On grid paper, draw a column graph of your data. Your graph is a **many-to-one display**: let one square stand for **more than one** answer.

- Let 1 square stand for 2 answers. If your biggest count is large, you can let 1 square stand for 5 answers.
- Draw one column for each answer choice. Each column must be as tall as its count. A count of 3 ends halfway between the 2 line and the 4 line.
- Write a title. Name each choice. Write the scale on your graph.

You may draw a pictograph instead, with a key like *1 symbol = 2 answers*. For an odd count, use a half symbol, because half of 2 is 1.

My Display 1

**Display 2 — with a digital tool, or by hand**

If your teacher says you may use a computer:

1. Open a spreadsheet program — Microsoft Excel or Google Sheets.
2. Type your answer choices in column A, one in each row.
3. Type the counts next to them, in column B.
4. Select the data and choose a column graph from the program's graph tools. Give the graph a title.
5. Print the graph, or copy it in the box below.

If you do not use a computer, make Display 2 by hand: show the same data in a different way. If Display 1 is a column graph, make Display 2 a pictograph. If Display 1 is a pictograph, make Display 2 a column graph.

My Display 2

## Part D — Interpret and communicate (5 marks)

Look at your table and your displays.

**D1.** Which answer choice got the most? Which got the least? Write the counts.

Most: _____ ( ▢ )

Least: _____ ( ▢ )

**D2.** How many more people chose the most popular choice than the least popular choice? Write the number sentence.

▢ − ▢ = ▢

**D3.** Answer your question from Part A. Write one sentence that tells what you found. Use a number in your sentence.

**D4.** Look at your displays. What do you notice about the answers? For example: did most people choose the same choice, or were the answers all different?

---

**D5.** Which of your two displays shows your data better? Why?

Display ▢ shows my data better, because

---

## Marking guide

**Task K3 — Statistical investigation: survey, digital recording, display and report · 15 marks · VC2M4ST01 (subtopic 6A) and VC2M4ST03 (subtopic 6C)**

This guide is for the teacher. It is not student-facing. Judgements are written in the language of the achievement-standard extracts carried on the two CDs in the authority file (`maths_4.json`):

- VC2M4ST01: *"Students create many-to-one data displays, assess the suitability of displays for representing data and informally discuss the shape of distributions and variation in data."*
- VC2M4ST03: *"They use surveys and digital tools to generate categorical or discrete numerical data in statistical investigations and communicate their findings in context."*

**Administration**

- This is a classroom task, not an exam. It is untimed (guidance: two lessons of about 30 minutes each, may be split). Nothing in the task uses a calculator, and neither CD says "without a calculator" (D7), so calculators are not banned. The teacher may read any part aloud.
- Digital tools are permitted, not required (D7). Every mark can be earned on paper. Where a device is used, the named programs are Microsoft Excel and Google Sheets.
- Award 1 mark for each observable action listed below. Marks are whole marks — no half marks. Student data will differ. Score the action, not any particular numbers.
- Parts B and C include actions that are only visible while students work (running the survey, typing data into a spreadsheet). Note what you observe on this sheet. Keep each student's task sheet — the tally chart, the displays and the written answers — with this guide as evidence.
- The teacher may set up devices and help with printing, but must not correct a student's tally marks, counts, table, displays or answers. Where the teacher corrects an error, award the mark only for what the student did unaided. The student must do the tallying, the typing and the drawing themselves.
- If a student writes their own question in Part A, check it before the survey starts: it must have four fixed choices, each person must be able to pick exactly one, and it must be safe and kind (see Safety on the task sheet).
- Accept spoken or written answers for A3's "How do you know?", D3, D4 and D5. Where an answer is spoken, record what the student said on the task sheet.

### Use surveys to generate categorical or discrete numerical data — Part A, ask and plan (3 marks; VC2M4ST03)

| Mark | Observable student action |
|---|---|
| A1 (1) | The student chooses or writes a survey question and lists four fixed answer choices. Each person in the group can pick exactly one choice. |
| A2 (1) | The student names the group they will survey — for example, everyone in the class — and states how many people that is. |
| A3 (1) | The student says correctly whether the answers will be categorical data (words) or counts (discrete numerical data, whole numbers), and gives a correct reason. This action also evidences VC2M4ST01 (data for categorical and discrete numerical variables). |

### Collect data through survey responses — Part B (3 marks; VC2M4ST03)

| Mark | Observable student action |
|---|---|
| B1 (1) | The student asks each person in the planned group the same question, once each: nobody is missed and nobody answers twice. Observed while the student works. |

| Mark | Observable student action |
|---|---|
| B2 (1) | The student records each answer as it comes, with one tally mark in the correct row. Observed while the student works. |
| B3 (1) | The student counts the tally marks, writes the count for each choice and the total, and checks that the total equals the number of people surveyed. |

### Create many-to-one data displays — Part C (4 marks; VC2M4ST01)

| Mark | Observable student action |
|---|---|
| C1 (1) | Display 1 is many-to-one: one square or symbol stands for more than one answer — for example, 1 square = 2 answers, or a scale counting in 2s or 5s — and the key or scale is written on the display. |
| C2 (1) | Display 1 matches the student's table: each column or row shows its count correctly when read against the key or scale. An odd count with a key of 2 is shown with a half symbol, or with the top of the column between two scale lines. |
| C3 (1) | Display 1 has a title, and each answer choice is named. |
| C4 (1) | Display 2 is made, by one of two routes. Digital route: the student is observed typing the answer choices and counts into a spreadsheet (Microsoft Excel or Google Sheets), and the program draws a titled column graph. Paper route: Display 2 is a second display by hand, of a different kind from Display 1, showing the same data. The digital route also evidences VC2M4ST03 ("record and display data using digital tools"). |

### Interpret the data and communicate the results — Part D (5 marks; VC2M4ST01 and VC2M4ST03)

| Mark | Observable student action |
|---|---|
| D1 (1) | From their own display or table, the student names the choice with the most and the choice with the least, with both counts. Where choices tie, accept the student naming all the tied choices. |
| D2 (1) | The student writes a correct comparison number sentence from their own counts, for example, for counts of 12 and 4: $12 - 4 = 8$. |
| D3 (1) | The student answers the question they posed in Part A in one sentence, in context, backed by at least one number, for example "Most of our class supports Geelong, with 11 votes." This action evidences VC2M4ST03 ("communicate their findings in context"). |
| D4 (1) | The student makes a correct informal statement about the shape of their data or the variation in them, for example "most people chose one choice", "the answers were all different" or "two choices got most of the answers". The statement must agree with the student's own data. This action evidences VC2M4ST01 ("informally discuss the shape of distributions and variation in data"). |
| D5 (1) | The student picks one of their two displays as better for |

| Mark | Observable student action |
|---|---|
| | showing their data and gives a reason tied to the data or the displays, for example “the column graph makes it quick to see the biggest count” or “the pictograph is easy to read because our counts are small”. This action evidences VC2M4ST01 (“assess the suitability of displays for representing data”). |

Notes:

- For B3, accept a student who counts the rows and checks the total by adding the counts.
- For C2, accept a display whose columns are read correctly against the scale, including columns that end between two scale lines.
- If all choices get the same count, accept “they are all the same” for D1, and a sentence such as 5 − 5 = 0 for D2.

## Score

| Part | Marks |
|---|---|
| Part A — ask and plan (VC2M4ST03; A3 also evidences VC2M4ST01) | 3 |
| Part B — collect (VC2M4ST03) | 3 |
| Part C — record and display (VC2M4ST01; C4’s digital route also evidences VC2M4ST03) | 4 |
| Part D — interpret and communicate (VC2M4ST01 and VC2M4ST03) | 5 |
| **Task K3 total** | **15** |

**Mark:** ▢ / **15**

A student who plans a survey, asks everyone once, records every answer and checks the total is conducting a statistical investigation. A student whose display lets one square or symbol stand for more than one answer is creating a many-to-one data display. A student who reads their own display, says what the data show, answers the question they posed, and says which display works better is interpreting the data, communicating the results and discussing the information. Together these are the two achievement standards: *“Students create many-to-one data displays, assess the suitability of displays for representing data and informally discuss the shape of distributions and variation in data,”* and *“They use surveys and digital tools to generate categorical or discrete numerical data in statistical investigations and communicate their findings in context.”*

**Coverage:** every mark evidences VC2M4ST01 (6A), VC2M4ST03 (6C) or both, as shown above. Both CDs are also assessed in written form in Test T6 (TOC §7), so the CDs stay covered in writing for a student absent for this task.

## Task K4 — Repeated chance experiment with a named random generator

*conduct repeated chance experiments to observe relationships between outcomes in games and other chance situations, and identify and describe the variation in results* — VC2M4P02

*Choose one of the random generators. Use it again and again. Record the results, order them, and say what the variation shows.*

| | |
|---|---|
| **Task** | K4 — Repeated chance experiment with a named random generator |
| **Assesses** | `VC2M4P02` (subtopic 7B) |
| **Marks** | **10** — Part A 3, Part B 3, Part C 3, Part D 1 (Marking guide below) |
| **Timing** | This is a classroom task, not an exam. It is untimed. Guidance duration for planning: about 25 minutes — about 5 minutes to plan Part A, about 10 minutes to conduct and record the 20 trials, and about 10 minutes for Parts B, C and D together — run as a table task in pairs while the teacher checks each pair in turn. It may be split across more than one session. |
| **Equipment** | Supplied by the teacher — see the list below. |
| **Calculators** | Not needed. Nothing on this task needs a calculator. |
| **Read aloud** | Any instruction on this task may be read aloud by the teacher. |

### Equipment

Per pair of students:

- 2 coins.
- 1 die.
- 1 spinner with four equal parts coloured red, blue, green and yellow.
- 4 cards — one spade, one heart, one diamond and one club.
- Paper and pencil for the recording.

Each pair uses only what its experiment needs.

For the teacher:

- Spare coins, dice, spinners and cards.
- One prepared set of 20 results for each of the five experiments, to give to any pair that has no other pair to compare with in Part C. An earlier pair's results may be used.
- Paper and pencil, to record marks with the Marking guide.

### Safety — at point of use

- Keep the table clear of everything not needed for the task. Bags stay on the floor.
- Coins and dice stay on the table. They are for tossing and rolling, not for throwing or flicking, and they never go in a mouth.
- Spin the spinner flat on the table, away from the edge, so it cannot fly onto the floor. If a spinner's pointer comes loose, give it back to the teacher.
- The cards stay with your pair and stay whole: no bending and no marks on them. A marked card is not fair for a chance experiment.
- Everyone stops, and hands stay still, when the teacher says stop.
- Pack up the way the teacher says: coins and dice back in the bag, cards in their envelope, spinners on the pile.

## Part A — Plan and conduct

*A **chance experiment** is a test where you cannot know the result before it happens. The things you use to get the results are called **random generators**. On this task they are things you can hold in your hand: coins, dice, a spinner and cards. Each possible result is called an **outcome**. To **conduct** an experiment means to do it. A **guess** is what you think will happen, written down before you start.*

**Choose ONE experiment from the list.**

| Experiment | What you do |
|---|---|
| 1 | Toss one coin, 20 times |
| 2 | Toss two coins at the same time, 20 times |
| 3 | Roll one die, 20 times |
| 4 | Spin the four-colour spinner, 20 times |
| 5 | Shuffle the 4 cards, draw one card, put it back and shuffle again — 20 times |

In Experiment 2, each toss gives one of three results: 2 heads, one of each, or 2 tails. The spinner in Experiment 4 has four equal parts: red, blue, green and yellow. The cards in Experiment 5 are one spade, one heart, one diamond and one club.

**A1.** Write down the random generators you will use. Then list all the possible outcomes of your experiment.

**A2.** Make a guess: which outcome do you think will happen most often? Write it down.

**A3.** Conduct your experiment 20 times. Record every result with tally marks as you go.

## Part B — Record and order

*To **order** the outcomes means to put them in a line by their counts — here, from the outcome that happened least to the outcome that happened most.*

**B1.** Count your tally marks and write the count for each outcome. Check that your counts add to 20.

**B2.** Order your outcomes from least to most. Outcomes that happened the same number of times sit together in the order.

**B3.** Which outcome happened most often? Which outcome happened least often?

## Part C — The variation in the results

***Variation** is the way the results change when you repeat the same experiment.*

**C1.** Work with another pair that did the same experiment 20 times. Write down their counts. (If no other pair did your experiment, use the set of results your teacher gives you.)

**C2.** Look at both sets of results. Are they exactly the same? Name one way they are different, with the numbers — for example, "We got 12 heads. They got 9 heads."

**C3.** Finish this sentence, by talking or by writing. Use the word *variation*.

"We did the same experiment 20 times, and the other pair did it 20 times, but …"

## Part D — Look back

**D1.** Look at your guess from Part A. Did the outcome you guessed come up most often? Then answer this: if you conduct your experiment 20 more times, can you be certain the counts will be the same as this time? Say why.

## Marking guide

**Task K4 — Repeated chance experiment with a named random generator. Total: 10 marks.**

This guide is written in the language of the achievement-standard extract carried on the CD for this task (authority file, `maths_4.json`):

- `VC2M4P02`: "They conduct repeated chance experiments and describe the variation in results."

Award each mark once, for an action you can see or hear. Each row is 1 or 0 — no half marks. Record while the pair works. Any instruction may be read aloud, and a pair may recount or say a sentence again once before you record the mark. Marks are awarded for the experiment the pair chose; the examples below use Experiment 1, the coin.

### Part A — plan and conduct (`VC2M4P02`) — 3 marks

| Mark | Observable student action |
|---|---|
| A1 (1) | The pair names the random generators they are using, and lists every possible outcome of their experiment: coin — heads, tails; two coins — 2 heads, one of each, 2 tails; die — 1, 2, 3, 4, 5, 6; spinner — red, blue, green, yellow; cards — spade, heart, diamond, club. |
| A2 (1) | The pair writes down a guess that names one of the outcomes listed in A1 as the outcome they think will happen most often. |
| A3 (1) | Both students conduct the experiment 20 times and record all 20 results as they go — one tally mark, or one written result, for each trial. |

Notes for Part A:

- For A1, the random generators must be named in words — pointing at the coin alone is not enough. For Experiment 2, accept "2 heads, 1 head and 1 tail, 2 tails" or the same idea in other words.
- For A2, the guess must name an outcome from the pair's own list — a guess about an outcome that cannot happen on their experiment does not score.
- For A3, all 20 results must be recorded. If the pair stops short, let them finish the trials before you record the mark. Tally marks and a written list of results both count.

### Part B — record and order (`VC2M4P02`) — 3 marks

| Mark | Observable student action |
|---|---|
| B1 (1) | The pair writes a count for every outcome, and the counts add to 20. |
| B2 (1) | The pair orders the outcomes from least to most, and the order matches the counts. |
| B3 (1) | The pair names the outcome that happened most often and the outcome that happened least often, matching their counts. |

Notes for Part B:

- Let the pair recount once before you record B1. If the final counts add to 20, award the mark.
- An outcome that came up 0 times goes first in the order from least to most; the order still matches the counts.
- Outcomes with the same count may sit in any order among themselves.

### Part C — the variation in the results (VC2M4P02) — 3 marks

| Mark | Observable student action |
|---|---|
| C1 (1) | The pair writes down another pair's counts for the same experiment with 20 trials, or the counts from the set the teacher gives them. |
| C2 (1) | The pair says the two sets of results are not exactly the same, and names at least one difference between the counts. |
| C3 (1) | The pair finishes the sentence so that it says the same experiment with the same number of trials can give different results, and uses the word *variation* (or says what variation means: the results changed from one run to the other). |

Notes for Part C:

- For C2, a difference must be a count, not just "they are different" — for example, "We got 12 heads. They got 9 heads." If the two sets of counts happen to be the same, award C2 if the pair says the sets match this time and says another run could give different counts.
- For C3, the meaning is enough: award the mark when the sentence says the results can be different even though the experiment and the number of trials were the same, and ties that to variation. No numbers for chance are needed or required at this level.

### Part D — look back (VC2M4P02) — 1 mark

| Mark | Observable student action |
|---|---|
| D1 (1) | The pair says whether the outcome they guessed in Part A came up most often in their results, and says they cannot be certain of the same counts for another 20 trials because the results vary. |

Notes for Part D:

- Award the mark whether the guess came true or not. The mark is for comparing the guess with the results, and for the reason about another run.
- Accept "no, because the results can change", "no, that is variation" and the same idea in other words. Chance at this level is described in words.

### Score

| Part | Marks |
|---|---|
| Part A — plan and conduct (VC2M4P02) | 3 |
| Part B — record and order (VC2M4P02) | 3 |
| Part C — the variation in the results (VC2M4P02) | 3 |
| Part D — look back (VC2M4P02) | 1 |
| **Task K4 total** | **10** |

A pair that names its random generators, does the experiment 20 times, records and orders the outcomes, and finds and describes the variation between their run and another pair's run is a pair that can "conduct repeated chance experiments" and "describe the variation in results" (VC2M4P02).

## Task K5 — Build and run an algorithm (flow chart, then calculator or spreadsheet)

> *follow and create algorithms involving a sequence of steps and decisions that use addition or multiplication to generate sets of numbers; identify and describe any emerging patterns* — VC2M4N10

*Follow an algorithm. Then create your own, draw it as a flow chart, run it, and describe the pattern it makes.*

| | |
|---|---|
| **Task** | K5 — Build and run an algorithm (flow chart, then calculator or spreadsheet) |
| **Assesses** | `VC2M4N10` (subtopic 1E) |
| **Marks** | **10** — Part A 3, Part B 4, Part C 2, Part D 1 (Marking guide below) |
| **Timing** | This is a classroom task, not an exam. It is untimed. Guidance duration for planning: about 30 minutes — about 5 minutes for Part A, about 10 minutes for Part B, about 10 minutes for Part C and about 5 minutes for Part D. It may be split across more than one session. |
| **Equipment** | Supplied by the teacher — see the list below. |
| **Calculators and digital tools** | Permitted, not required. Every part of this task can be done with pencil and paper. In Part C, a calculator or a spreadsheet is offered as another way to run your algorithm (§7, D7). |
| **Read aloud** | Any instruction on this task may be read aloud by the teacher. |

### Words you know — from 1E

These words were taught in 1E. They are used in this task.

- An **algorithm** is a list of steps to follow in order. Each step tells you to do one thing.
- A **sequence of steps** means the steps happen one after another, in a fixed order.
- A **decision** is a step that asks a yes-or-no question, like *Is the number even?*
- A **flow chart** is a drawing that shows an algorithm's steps as boxes joined by arrows. Each box holds one step, and the arrows show the order to follow. A **Start** box shows where to begin. A **Stop** box shows where to end. A number-step box does number work, like *Add 4*. A decision box holds a yes-or-no question.
- To **generate** numbers means to make them one at a time by following the steps. A **set** of numbers is a group of numbers. As you run an algorithm, you write down the number you start with, and every new number you make.
- A **pattern emerges** when you can see something that keeps happening in the numbers, like "each number is 4 more than the one before".
- A **calculator** is a tool that works out number calculations for you.
- A **spreadsheet** is a program that works with numbers laid out in a grid of boxes called **cells**. A **formula** is a rule you type into a cell, like `=A1*3`, which means "multiply the number in cell A1 by 3". **Fill down** copies a formula down a column, so the rule runs again and again.

### Equipment

Per student:

- A pencil and paper.
- A ruler, to draw the boxes of the flow chart.

Per pair of students, optional — the digital route in Part C:

- A calculator.

For the class, optional — the digital route in Part C:

- A device with a spreadsheet program — Microsoft Excel or Google Sheets — set up by the teacher.

Source: Microsoft, *Microsoft Excel*, retrieved 2026-08-19. Source: Google, *Google Sheets*, retrieved 2026-08-19.

Digital tools are permitted in this task but not required. Every mark can be earned with pencil and paper.

### Safety — at point of use

- Keep the table clear of everything not needed for the task. Bags stay on the floor.
- Pencils and rulers are for drawing. They are not for pointing, hitting or throwing. If you move with a pencil, hold it with the point facing down, or put it down first.
- The teacher sets up the devices and the calculators. Carry a device with two hands. Do not touch plugs, power points or cords. Tell the teacher about a broken cord, screen or key.
- Food and drink stay away from the devices and calculators.
- Everyone stops, and hands stay still, when the teacher says stop.
- Pack up the way the teacher says: pencils down, calculators back in their box, devices off or back where they came from.

### Part A — Follow an algorithm (3 marks)

Here is an algorithm, written as flow chart boxes in order.

| Box | Step |
|---|---|
| Start | Start with 3. Write it down. |
| Do something | Multiply by 2. Write down the answer. |
| Do something | Multiply your new number by 2. Write down the answer. |
| Do something | Multiply your new number by 2. Write down the answer. |
| Decision | For each number you wrote down, ask: *Is the number even?* Yes: circle it. No: leave it. |
| Stop | Stop. |

Follow the boxes in order, from Start to Stop.

**A1.** Write the set of numbers the algorithm generates.

My set: _____, _____, _____, _____

**A2.** Circle the numbers in your set that get a yes answer.

**A3.** Describe the pattern you can see in the set.

---

### Part B — Create your own algorithm (4 marks)

Now create your own algorithm that generates a set of numbers.

**Plan first.** Choose:

- a starting number you can work with,
- at least three number steps. Each step adds or multiplies — only adding and multiplying are used in this task. You may repeat one rule, like *add 5* every time, or mix your steps,
- a yes-or-no question for your decision — for example, *Is the number even?* or *Is the number more than 20?* — and what happens on a yes answer and on a no answer — for example, *circle it* and *leave it*.

**B1.** Draw your algorithm as a flow chart in the box below.

Your flow chart must have:

- a Start box with your starting number,
- at least three number-step boxes, and each one adds or multiplies,
- one decision box with your yes-or-no question, and a yes path and a no path,
- a Stop box,
- arrows joining the boxes, showing the order to follow.

The arrows go forward, from Start to Stop. They never go back to a box you have already used — algorithms that go back and repeat a step come in Year 5.

As you run your chart, write down your starting number and every new number you make, just like the boxes in Part A.

Draw your flow chart here

## Part C — Run your algorithm (2 marks)

**C1.** Run your flow chart from Part B. Follow each step in order, and write down each number you generate. Your set must have at least four numbers, counting your starting number.

My set: _____, _____, _____, _____, and keep going if your chart has more steps.

**C2.** Use your decision on each number in your set. Do what your chart says for each answer — for example, circle the numbers that get a yes answer.

You can run your chart by hand. That is enough for every mark in this task. If your class has a calculator or a spreadsheet, you can use it to check your run:

- **Calculator:** work out each step on the calculator, and write down each answer as you go.
- **Spreadsheet:** put your starting number in a cell — for example, cell A1. Type a formula into the next cell that does your rule to the cell above it — for example, if your rule is *multiply by 2*, type `=A1*2` into cell A2. Use fill down, and the spreadsheet repeats your rule down the column.

If your by-hand set and your check set are different, find the mistake and fix it before you go on.

## Part D — Describe the pattern (1 mark)

**D1.** Write two things you notice about your set of numbers. At least one must be a pattern that keeps happening — for example, *each number is 5 more than the one before*, or *each number is 3 times the one before*.

## Marking guide

**Task K5 — Build and run an algorithm (flow chart, then calculator or spreadsheet). Total: 10 marks.**

This guide is for the teacher. It is not student-facing. Judgements are written in the language of the achievement-standard extract carried on `VC2M4N10` in the authority file (`maths_4.json`): *"They follow and create algorithms that generate sets of numbers and identify emerging patterns."*

**Administration**

- This is a classroom task, not an exam. It is untimed (guidance: about 30 minutes, may be split across sessions). Any instruction may be read aloud by the teacher.
- Award 1 mark for each observable action below. Each row is 1 or 0 — no half marks. Record while the student works, and keep the student's flow chart and recorded set with this sheet as evidence.
- Student algorithms will differ. Score each action against the student's own flow chart and set, not against any particular numbers.
- To check Part C, run the student's Part B chart yourself and compare it with their recorded set.
- A student may re-run or correct once before you record a mark.
- The digital route in Part C is an alternative, never a requirement (§7, D7). A student who runs the chart by hand can earn every mark: do not withhold a mark because no device was used, and do not award one because a device was used.
- The teacher may help a student find a key, a button or a menu on a device. The teacher may not correct the student's flow chart or set: where the teacher corrects an error, award the mark only for what the student did unaided.

### Follow — Part A (`VC2M4N10`) — 3 marks

| Mark | Observable student action |
|---|---|
| A1 (1) | The student follows the boxes in order and records the set 3, 6, 12, 24. |
| A2 (1) | The student applies the decision to each number in the set and circles exactly 6, 12 and 24. |
| A3 (1) | The student describes the pattern: each number is 2 times the one before (the numbers double each time). |

Notes for Part A:

- Award A1 on the finished set, in order. If one number is wrong, let the student re-run once before you record the mark.
- For A2, 3 stays uncircled: 3 is odd, so it gets a no answer.
- For A3, accept any true description of the growth — *each number is doubled*, *each number is 2 times the one before*. "The numbers get bigger" alone does not say what keeps happening: ask the student to say more before you award the mark.

### Create — Part B (`VC2M4N10`) — 4 marks

| Mark | Observable student action |
|---|---|
| B1 (1) | The flow chart has a Start box that sets a starting number, and a Stop box. |
| B2 (1) | The flow chart has at least three number-step boxes, and each one adds or multiplies — no subtracting and no dividing. |
| B3 (1) | The flow chart has one decision box that asks a yes-or-no question, with a yes path and a no path shown — for example, *circle it* on yes and *leave it* on no. |

| Mark | Observable student action |
|---|---|
| B4 (1) | The boxes are joined by arrows showing one order that can be followed from Start to Stop, with no arrow going back to an earlier box. |

Notes for Part B:

- Accept any starting number and any add-or-multiply rule, including a chart that mixes adding steps and multiplying steps. The CD allows addition or multiplication.
- A repeated rule drawn forward, box by box (three *add 5* boxes), is in scope. An arrow that sends the chart back to repeat a box is not: algorithms with branching and repetition (iteration) are Level 5 (VC2M5N10). Ask the student to redraw that arrow going forward, and award B4 only for a forward-going chart.
- If a number-step box subtracts or divides, do not award B2: ask the student to change that step to adding or multiplying, and award B2 only when every number step adds or multiplies.
- For B3, the question must be answerable yes or no for each number in the set — *Is the number even?* and *Is the number more than 20?* qualify; *What is the number?* does not.

### Generate — Part C (VC2M4N10) — 2 marks

| Mark | Observable student action |
|---|---|
| C1 (1) | The student runs their own Part B flow chart and records a set of at least four numbers, counting the starting number, with every number matching the chart's own steps. |
| C2 (1) | The student applies their own decision correctly to each number in the set — for example, circles exactly the numbers that get a yes answer. |

Notes for Part C:

- Check C1 by running the student's chart yourself. The set must come from the student's own chart, not from the Part A chart.
- If a number is wrong, let the student re-run once. If the set then matches the chart, award C1.
- Award C1 and C2 the same way for all three routes: by hand, on a calculator, or on a spreadsheet. If the student used a by-hand run and a digital run and the two disagree, the student finds and fixes the mistake: award the marks once the recorded set matches the chart.
- For C2, if no number in the set gets a yes answer, award the mark when the student applies the decision to each number and does the no path for every one — for example, leaves every number uncircled.

### Identify emerging patterns — Part D (VC2M4N10) — 1 mark

| Mark | Observable student action |
|---|---|
| D1 (1) | The student writes two things they notice about their own set. Both are true of the set, and at least one names a pattern that keeps happening — for example, *each number is 5 more than the one before*, *each number is 3 times the one before*, *all the numbers are even*, *all the numbers are odd*. |

Notes for Part D:

- Accept any statement that is true of the student's own set and says what keeps happening. "The numbers get bigger" alone is not enough: ask the student to say how they grow.
- For a multiplying set, *the numbers grow faster and faster* counts, as long as the student's rule really multiplies.

### Score

| Part | Marks |
|---|---|
| Follow — Part A (VC2M4N10) | 3 |
| Create — Part B (VC2M4N10) | 4 |
| Generate — Part C (VC2M4N10) | 2 |
| Identify emerging patterns — Part D (VC2M4N10) | 1 |
| **Task K5 total** | **10** |

**Coverage:** all 10 marks evidence VC2M4N10 (subtopic 1E). VC2M4N10 also appears in written form in T1 (TOC §7, "Coverage of assessment"), so a student absent for this task is still assessed on the CD.

A student who follows an algorithm, draws their own algorithm as a flow chart, runs it to generate a set of numbers and says what keeps happening in that set is a student who follows and creates "algorithms that generate sets of numbers" and identifies "emerging patterns" (VC2M4N10).