Below is an eight-week, two-student study plan for **In Metrics We Trust**, aligned to the patterns you have used for the other NCSO events. It treats the event as a *precision-focused, station-based measurement lab*, with emphasis on **speed, accuracy, estimation, spatial reasoning, and correct metric-unit choice**.

Nothing outside of writing instruments is allowed in competition, so practice emphasizes **building internal benchmarks**, **eye-calibration**, and **consistent measurement routines**.

In Metrics We Trust — 8-Week Study Plan

Weekly session structure (each 60 minutes)

- **Warm-Up (8–10 min):** 1–2 estimation tasks + a unit-selection mini-quiz.
- **Hands-On (20–25 min):** Practice with rulers, mass scales, graduated cylinders, angle tools.
- **Station Simulation (20–25 min):** Timed items (3–6 stations per session).
- **Wrap (3–5 min):** Two statements: “What I measured correctly today” / “What I overshot/undershot.”

Week-by-Week Plan

Week 1 — Orientation & Metric Foundations

Goals

- Understand event rules, precision expectations, and typical tools.
- Build “metric sense”: relationships among **mm–cm–m–km**, **mg–g–kg**, **mL–L**, and degrees.

Session Tasks

- Create benchmark estimates:
    - 1 mm ≈ thickness of a dime
    - 1 cm ≈ width of a fingernail
    - 10 cm ≈ handspan for many children
    - 1 L ≈ typical water bottle
    - 1 g ≈ a small paperclip
- Quick drills: “Which unit is appropriate?” scenarios.

Station Simulation

1. Estimate lengths (no tools) → measure → compare % error.
2. Classify angles (acute, right, obtuse, straight).

Week 2 — Length Measurement & Precision

Tools: ruler, meter stick, calipers (if provided).

Session Tasks

- Proper eye alignment: avoid parallax.
- Practice reading to **nearest mm**.
- Distinguish **precision** vs **accuracy**.
- Introduce perimeter and area of rectangles/triangles.

Station Simulation

1. Measure irregular objects to the required precision.
2. Area of given shapes (squares, rectangles, right triangles).

Week 3 — Mass Measurement

Tools: triple-beam balance, electronic scale.

Session Tasks

- Zeroing technique.
- Reading beams from largest → smallest.
- Handling objects gently for true mass.

Station Simulation

1. Mass of various objects → record to nearest gram or tenth gram as prompted.
2. Mass estimation contest (guess → weigh → % error).

Mini-Drill

- Sort objects (paperclip, eraser, apple, shoe) into mg/g/kg categories.

Week 4 — Liquid Volume & Displacement

Tools: beakers, graduated cylinders, overflow can (if available).

Session Tasks

- Reading meniscus twice (eye level + center of arc).
- Volume increments (1 mL, 2 mL, 5 mL).
- Water-displacement method for irregular objects.

Station Simulation

1. Given water height before/after object → compute displaced volume.
2. Convert between L and mL.
3. Identify correct tool for given volume (10 mL vs 500 mL).

Week 5 — Temperature & Angles

Tools: thermometers (alcohol or digital), protractors.

Session Tasks

- Temperature reading from partial immersion.
- °C scale reasoning (0°C freezing, 100°C boiling).
- Angle measurement with protractor: center alignment, baseline line-up.

Station Simulation

1. Read temperatures from diagrams with uneven scale marks.
2. Measure angles (to nearest degree).
3. Identify angle type by diagram.

Week 6 — Shapes, Lines, & Geometric Classification

Topics

- Parallel, perpendicular, intersecting lines.
- Polygon classification: sides, angles, properties (rectangle vs parallelogram vs rhombus vs square).
- 3D shapes: rectangular prism, cylinder (for context only), cube.

Station Simulation

1. Classify polygons by properties.
2. Identify lines/angles from diagrams.
3. Compute area/perimeter quickly from given sides.

Week 7 — Multi-Step Measurement Problems

Integrated Scenarios

- "Measure first, then compute something."
    - Length → area
    - Height → volume of rectangular prism
    - Mass + volume → density (if asked; sometimes included indirectly)

Session Tasks

- Walk through multi-step problems requiring conversion between units.
- Ensure students can read a tool → extract number → apply formula.

Station Simulation

1. Volume of classroom objects using rulers (rectangular prism).
2. Mass + volume: reason whether object sinks or floats.
3. Temperature + length: compare change over time.

Week 8 — Full Mock Competition

Session A — 60-Minute Rotation

- Include:
    - 4 length stations
    - 3 mass stations
    - 3 volume stations
    - 2 temperature stations
    - 2 angle/shape stations
    - 2 integrated multi-step calculations
- Use real objects, not paper-only tasks.

Session B — Error Analysis

- Identify whether errors stem from:
    - wrong unit
    - wrong precision
    - misreading scale
    - arithmetic or conversion
    - estimation bias
- Run a **speed round**: 12 measurements in 5 minutes (no calculation).

Core Skills & Mini-Drills

1. Estimation

- Practice:
    - "How many mm in this object?"
    - "How heavy is this object in grams?"
- Students develop mental anchors.

2. Reading Scales

- Start each tool with:
    - “What is the smallest division?”
    - “What unit is this tool reading?”

3. Tool Selection

- Students answer quickly:
    - mg or g or kg?
    - mm or cm or m?
    - mL or L?
    - Protractor or right-angle triangle?

4. Conversions

- Practice only metric (base-10):
    - mm ↔ cm ↔ m ↔ km
    - mg ↔ g ↔ kg
    - mL ↔ L
- Use quick sanity checks:

    - “If unit gets bigger, number should get smaller.”

5. Angle & Shape Classification

- Quick cards: students view a shape → classify → justify.

6. Volume Reasoning

- For displacement:
    - Volume = **final reading − initial reading**
- For prisms:
    - $V = l \times w \times h$ (in cm^3)

Station Prompts for Practice

Length

- “Measure this pencil to the nearest mm.”
- “Estimate first, then measure.”

Mass

- “Use triple-beam balance: what is the mass?”
- “Choose mg/g/kg for the object shown.”

Volume

- “How many mL in the cylinder after adding the object?”
- “Compute the volume of this box.”

Temperature

- “Read the thermometer (partial scale).”
- “Estimate the change after heating.”

Angles

- “Measure angle A.”
- “Identify right/acute/obtuse.”

Geometry

- “Which polygon classification fits this shape?”
- “Identify perpendicular lines in the diagram.”

Two-Student Team Role Plan

- **Student A — Measurement Specialist:** ruler reading, mass, temperature.
- **Student B — Geometry Specialist:** angles, shapes, conversions, multi-step calculations.
- Swap roles weekly to avoid gaps.

If you want, I can now generate:

- A **full printable mock test** (20–25 stations).
- A set of **unit-selection flashcards** (term on one side, correct metric unit on the other).
- A **calibration sheet** (standard classroom objects with benchmark values).