

# Numbers to 20: Place Value & Staging

Tactile Concrete-Pictorial-Abstract (CPA) Station Guide • CCSS.MATH.1.NBT.B.2

Student Name: \_\_\_\_\_

Date: \_\_\_\_\_

Model: SC-6

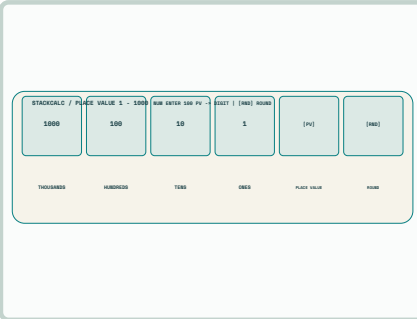
Check Score: \_\_\_ / 4

## STUDENT SELF-CHECK RULE (NO CHEATING):

Build with blocks and solve on paper first! Use your SC-6 calculator ONLY to verify answers on the 4-line LCD screen.

### STATION LAB TUTORIAL: BENCH SCHEMATIC & CPA PROGRESSION

#### 1. 2D Bench Blueprint



Kit: Place Value Tray Whole

#### 2. Desk Setup (Concrete -> Pictorial)

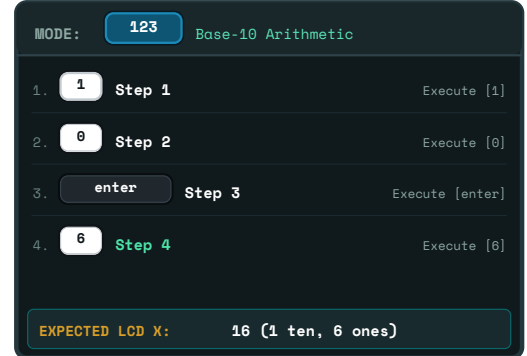
##### Physical Bench Setup:

One 10-rod alongside 4 unit cubes shows 14 as 1 ten and 4 ones.

##### Sketch Model on Paper:

Draw a 10-rod bar and 4 individual unit squares.

#### 3. Step-by-Step LCD Stack Trace (SC-6)



#### 1 Combine 1 ten (10) and 3 ones (3).

Manipulative Model &amp; Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-6

#### 2 Combine 1 ten (10) and 7 ones (7).

Manipulative Model &amp; Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-6

#### 3 Decompose 18: subtract 8 ones. What remains?

Manipulative Model &amp; Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-6

#### 4 Decompose 15: subtract 1 ten (10). What remains?

Manipulative Model &amp; Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-6

# Station Diagnostic & Solution Key: Chapter 7

Numbers to 20: Place Value & Staging • Manipulative Setup, Diagnostic Rubric & Verification Flow

MANIPULATIVE HARDWARE STATION INVENTORY & 3D PRINT PREPARATION

Station Kit: Place Value Studio (Base-10 Rods & Units)

CAD / STL Source File:

Recommended Filaments:

CAD Blueprint: place\_value\_tray\_whole

Education/scad/lib/place\_value\_tray\_whole.scad

Teal Tray & White Numerals (PLA)

Target Device: SC-6 Elementary

Standard: Gridfinity 42mm Pitch / 0.6mm Inset Markings

| # | Math Problem Prompt                                                                              | Expected Math Answer | Self-Check Keystrokes & RPN Stack |
|---|--------------------------------------------------------------------------------------------------|----------------------|-----------------------------------|
| 1 | Combine 1 ten (10) and 3 ones (3).<br><small>Standard: CCSS.MATH.1.NBT.B.2</small>               | 13                   | [1][0] [ENTER] [3] [ + ]          |
| 2 | Combine 1 ten (10) and 7 ones (7).<br><small>Standard: CCSS.MATH.1.NBT.B.2</small>               | 17                   | [1][0] [ENTER] [7] [ + ]          |
| 3 | Decompose 18: subtract 8 ones. What remains?<br><small>Standard: CCSS.MATH.1.NBT.B.2</small>     | 10 (1 ten)           | [1][8] [ENTER] [8] [ - ]          |
| 4 | Decompose 15: subtract 1 ten (10). What remains?<br><small>Standard: CCSS.MATH.1.NBT.B.2</small> | 5 (5 ones)           | [1][5] [ENTER] [1][0] [ - ]       |

TEACHER DIAGNOSTIC GUIDE: COMMON MISCONCEPTIONS & REMEDIATION

Key Misconception to Target During Station Observation:

Watch for reversing digits (writing 41 instead of 14).

How the Manipulatives & Calculator Foster Self-Correction:

Students solve with pencil and physical blocks first. When they self-check on the SC-6, any discrepancy between their written answer and the calculator's 4-line LCD immediately prompts them to re-inspect their physical bench model or regrouping, turning errors into productive struggle without teacher intervention.

Station Facilitation & Pacing Tip:

Keep 3D printed trays docked on standard Gridfinity baseplates to prevent loose parts on student desks. Encourage students to articulate their CPA steps: name the block representation (Concrete), point to their drawn tape/bond model (Pictorial), and verify register values (Abstract).

CLASSROOM SCORING & STATION MASTERY RUBRIC

Exemplary (18–20 pts):

Complete, accurate manipulative sketches; exact math answers; independently verified self-check on LCD stack.

Proficient (14–17 pts):

Correct math answers; minor sketch omissions; verified on calculator with minimal teacher prompting.

Developing (10–13 pts):

Understands problem concept but made computational slips; successfully self-corrected using calculator LCD.

Intervention (<10 pts):

Relied on calculator before solving on paper, or struggled with underlying physical manipulative models.