

Time: Modulo-60 Arithmetic & Elapsed Minutes

Tactile Concrete-Pictorial-Abstract (CPA) Station Guide • CCSS.MATH.3.MD.A.1

Student Name: _____

Date: _____

Model: SC-6

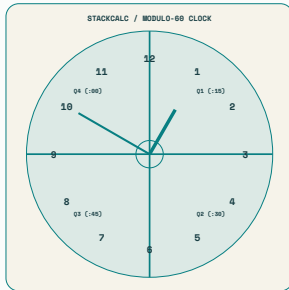
Check Score: ____ / 4

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: Clock Dial

2. Desk Setup (Concrete -> Pictorial)

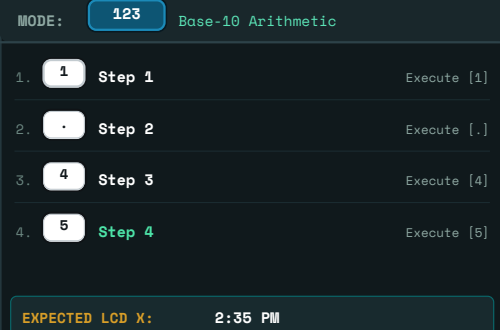
Physical Bench Setup:

Turn the minute hand 45 minutes; observe the geared hour hand advance $\frac{3}{4}$ of an hour.

Sketch Model on Paper:

Draw clock face showing start time (2:15) and end time (3:00).

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



1 Start at 3:20, add 45 minutes elapsed time.

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-6

2 Start at 10:15, add 55 minutes elapsed time.

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-6

3 Class ends at 2:10; began at 1:30. How many minutes elapsed?

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-6

4 Add 90 minutes to 8:00 AM.

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-6

Station Diagnostic & Solution Key: Chapter 10

Time: Modulo-60 Arithmetic & Elapsed Minutes • Manipulative Setup, Diagnostic Rubric & Verification Flow

MANIPULATIVE HARDWARE STATION INVENTORY & 3D PRINT PREPARATION

Station Kit: Classroom Planetary Geared Clock (12-Frame ~~Stage~~) STL Source File:

Recommended Filaments:

CAD Blueprint: clock_dial

Education/scad/clock_system_blocks.scad

4-Quadrant Color-Coded Modulo-60 Dial (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	Start at 3:20, add 45 minutes elapsed time. Standard: CCSS.MATH.3.MD.A.1	4:05	[3.20] [CLK] [ENTER] [45] [+]
2	Start at 10:15, add 55 minutes elapsed time. Standard: CCSS.MATH.3.MD.A.1	11:10	[10.15] [CLK] [ENTER] [55] [+]
3	Class ends at 2:10; began at 1:30. How many Standard: CCSS.MATH.3.MD.A.1	40 minutes	[2.10] [CLK] [ENTER] [1.30] [-]
4	Add 90 minutes to 8:00 AM. Standard: CCSS.MATH.3.MD.A.1	9:30 AM	[8.00] [CLK] [ENTER] [90] [+]

TEACHER DIAGNOSTIC GUIDE: COMMON MISCONCEPTIONS & REMEDIATION

Key Misconception to Target During Station Observation:

Remind students that minutes roll over at 60, not 100.

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.