

Quadratic Factorisation & [EQN] Root Solver

Tactile Concrete-Pictorial-Abstract (CPA) Station Guide • CCSS.MATH.HSA.REI.B.4

Student Name: _____

Date: _____

Model: SC-32

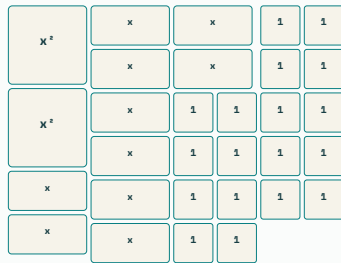
Check Score: ___ / 4

STUDENT SELF-CHECK RULE (NO CHEATING):

Build with blocks and solve on paper first! Use your SC-32 calculator ONLY to verify answers on the 4-line LCD screen.

STATION LAB TUTORIAL: BENCH SCHEMATIC & CPA PROGRESSION

1. 2D Bench Blueprint



Kit: Algebra Tiles

2. Desk Setup (Concrete -> Pictorial)

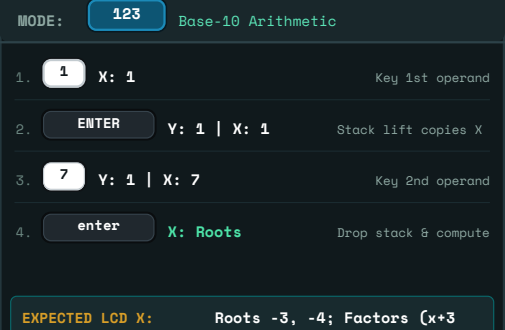
Physical Bench Setup:

Arrange one x^2 tile, 5 x -tiles, and 6 unit squares into a complete rectangle: $(x+2)(x+3)$.

Sketch Model on Paper:

Draw area model rectangle labeled with dimensions $(x + 2)$ and $(x + 3)$.

3. Step-by-Step LCD Stack Trace (SC-32)



1 Factor $x^2 + 5x + 6$ via [EQN].

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-32

2 Factor $x^2 - x - 6$ via [EQN].

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-32

3 Difference of squares: $x^2 - 16$ via [EQN].

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-32

4 Double root: $x^2 + 6x + 9$ via [EQN].

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-32

Station Diagnostic & Solution Key: Chapter 5

Quadratic Factorisation & [EQN] Root Solver • Manipulative Setup, Diagnostic Rubric & Verification Flow

MANIPULATIVE HARDWARE STATION INVENTORY & 3D PRINT PREPARATION

Station Kit: Algebra Studio & Factoring Stage

CAD / STL Source File:

Recommended Filaments:

CAD Blueprint: algebra_tiles

Education/scad/algebra_factoring_parts.scad

Blue x² Flats, Green x Rods, Yellow Unit Squares (PLA)

Target Device: SC-32 Scientific

Standard: Gridfinity 42mm Pitch / 0.6mm Inset Markings

#	Math Problem Prompt	Expected Math Answer	Self-Check Keystrokes & RPN Stack
1	Factor $x^2 + 5x + 6$ via [EQN]. Standard: CCSS.MATH.HSA.REI.B.4	Roots -2, -3; $(x+2)(x+3)$	[1] [ENTER] [5] [ENTER] [6] [EQN]
2	Factor $x^2 - x - 6$ via [EQN]. Standard: CCSS.MATH.HSA.REI.B.4	Roots 3, -2; $(x-3)(x+2)$	[1] [ENTER] [1] [+/-] [ENTER] [6] [+/-]
3	Difference of squares: $x^2 - 16$ via [EQN]. Standard: CCSS.MATH.HSA.REI.B.4	Roots 4, -4; $(x-4)(x+4)$	[1] [ENTER] [0] [ENTER] [16] [+/-] [EQ]
4	Double root: $x^2 + 6x + 9$ via [EQN]. Standard: CCSS.MATH.HSA.REI.B.4	Double root -3; $(x+3)^2$	[1] [ENTER] [6] [ENTER] [9] [EQN]

TEACHER DIAGNOSTIC GUIDE: COMMON MISCONCEPTIONS & REMEDIATION

Key Misconception to Target During Station Observation:
Factors $(x - r1)(x - r2)$ have opposite signs from roots $r1, r2$.

How the Manipulatives & Calculator Foster Self-Correction:
Students solve with pencil and physical blocks first. When they self-check on the SC-32, 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.