

Polynomial Equations & Factoring: Area Model & [EQN] Solver

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

Student Name: _____

Date: _____

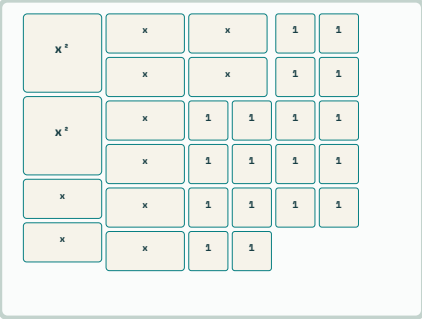
Model: SC-32

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



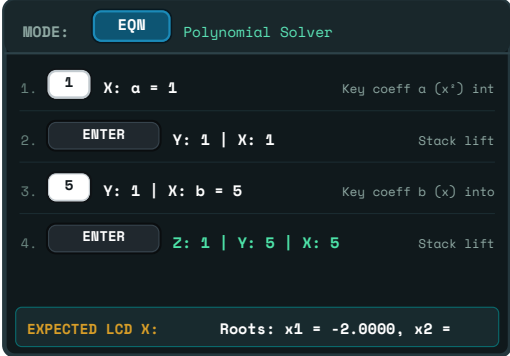
Kit: Algebra Tiles

2. Desk Setup (Concrete -> Pictorial)

Physical Bench Setup:
Arrange 1 x² tile (40x40mm), 5 x-tiles (40x10mm), and 6 unit squares (10x10mm) into solid rectangle.

Sketch Model on Paper:
Draw 2x2 area matrix with dimensions (x + 2) and (x + 3).

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



1 Find roots of $x^2 + 7x + 12 = 0$ using [EQN].

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-32

2 Find roots of $x^2 - 5x + 6 = 0$ using [EQN].

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-32

3 Find roots of $x^2 - 4 = 0$ using [EQN].

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-32

4 Find roots of $x^2 + 4x + 4 = 0$ (perfect square).

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-32

Station Diagnostic & Solution Key: Chapter 7

Polynomial Equations & Factoring: Area Model & [EQN] Solver • Manipulative Setup, Diagnostic Rubric & Verification Flow

MANIPULATIVE HARDWARE STATION INVENTORY & 3D PRINT PREPARATION

Station Kit: Tactile Algebra Stage & Polynomial Tiles

CAD / STL Source File:

Recommended Filaments:

CAD Blueprint: algebra_tiles

Education/scad/algebra_factoring_parts.scad

Oceanic Teal x' Tiles, Amber x-Rods & White Units (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	Find roots of $x^2 + 7x + 12 = 0$ using [EQN]. Standard: CCSS.MATH.HSA.APR.A.1	$x1 = -3, x2 = -4$	[1] [ENTER] [7] [ENTER] [1][2] [EQN]
2	Find roots of $x^2 - 5x + 6 = 0$ using [EQN]. Standard: CCSS.MATH.HSA.APR.A.1	$x1 = 2, x2 = 3$	[1] [ENTER] [5] [+/-] [ENTER] [6] [EQN]
3	Find roots of $x^2 - 4 = 0$ using [EQN]. Standard: CCSS.MATH.HSA.APR.A.1	$x1 = 2, x2 = -2$	[1] [ENTER] [0] [ENTER] [4] [+/-] [EQN]
4	Find roots of $x^2 + 4x + 4 = 0$ (perfect squar Standard: CCSS.MATH.HSA.APR.A.1	$x1 = -2$ (Repeated)	[1] [ENTER] [4] [ENTER] [4] [EQN]

TEACHER DIAGNOSTIC GUIDE: COMMON MISCONCEPTIONS & REMEDIATION

Key Misconception to Target During Station Observation:

Roots on LCD have opposite signs from binomial factors: root $r = -2$ corresponds to factor $(x + 2)$.

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.