

2D Vector Decomposition & Resultants

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

Student Name: _____

Date: _____

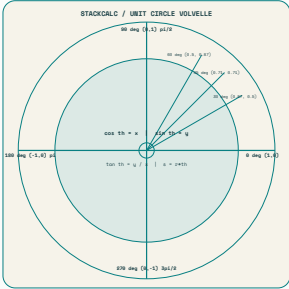
Model: SC-32

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: Unit Circle Volvelle

2. Desk Setup (Concrete -> Pictorial)

Physical Bench Setup:
Set volvelle vector arrow to magnitude 20 at 60°. Read horizontal (10) and vertical (17.32) projections.

Sketch Model on Paper:
Draw vector diagram on coordinate grid resolving into orthogonal components.

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

MODE: 123 Base-10 Arithmetic

1. 5 Step 1

Execute [5]

2. 0 Step 2

Execute [0]

3. enter Step 3

Execute [enter]

4. 3 Step 4

Execute [3]

EXPECTED LCD X: Fx = 43.3013 N, Fy = 25.00

1 Find Fx for F = 100 N at 45°.

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-32

2 Find Fy for F = 100 N at 45°.

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-32

3 Find magnitude of vector <3, 4>: [3] [x²] [4] [x²] [+] [√].

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-32

4 Find angle for vector <1, 1>: [1] [ENTER] [1] [÷] [ATAN].

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-32

Station Diagnostic & Solution Key: Chapter 9

2D Vector Decomposition & Resultants • Manipulative Setup, Diagnostic Rubric & Verification Flow

MANIPULATIVE HARDWARE STATION INVENTORY & 3D PRINT PREPARATION

Station Kit: Unit Circle Trigonometry Volveille

CAD / STL Source File:

Recommended Filaments:

CAD Blueprint: unit_circle_volveille

Hardware/models/stl/accessories/volveille.stl

Dual Precision Rotary Dial in Dark Blue & White (PLA/PETG)

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 F_x for $F = 100\text{ N}$ at 45° . Standard: CCSS.MATH.HSN.VM.A.1	70.7107 N	[100] [ENTER] [45] [COS] [*]
2	Find F_y for $F = 100\text{ N}$ at 45° . Standard: CCSS.MATH.HSN.VM.A.1	70.7107 N	[100] [ENTER] [45] [SIN] [*]
3	Find magnitude of vector $\langle 3, 4 \rangle$: [3] [x^] [4] Standard: CCSS.MATH.HSN.VM.A.1	5.0000	[3] [x^] [4] [x^] [+] [√]
4	Find angle for vector $\langle 1, 1 \rangle$: [1] [ENTER] [1] Standard: CCSS.MATH.HSN.VM.A.1	45.0000°	[1] [ENTER] [1] [÷] [ATAN]

TEACHER DIAGNOSTIC GUIDE: COMMON MISCONCEPTIONS & REMEDIATION

Key Misconception to Target During Station Observation:

Remember horizontal is cosine (adj/hyp) and vertical is sine (opp/hyp).

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.