

Circles & Area: Circumference, Pi & Modulo Dial

Tactile Concrete-Pictorial-Abstract (CPA) Station Guide • CCSS.MATH.7.G.B.4

Student Name: _____

Date: _____

Model: SC-32

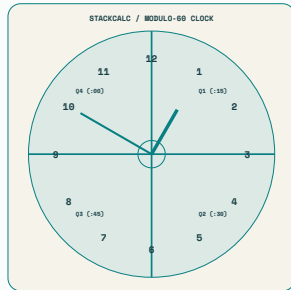
Check Score: ____ / 4

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: Clock Dial

2. Desk Setup (Concrete -> Pictorial)

Physical Bench Setup:

Wrap string around circular dial; stretch across 3+ diameters to discover ratio $\pi \approx 3.1416$.

Sketch Model on Paper:

Draw circle showing radius r , diameter $d = 2r$, and area sectors unrolled into parallelogram.

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

MODE: 123 Base-10 Arithmetic

1. 5 X: 5 Radius $r = 5$ into X

2. π^2 X: 25 Square radius: $5^2 =$

3. π Y: 25 | X: 3.1416 Constant π into X

4. $\times$ X: 78.5398 Area: $25 \times \pi = 78.53$

EXPECTED LCD X: Area = 78.5398 cm^2

1 Find circumference of circle with diameter $d = 14$ cm: $14 \times \pi$.

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-32

2 Find area of circle with radius $r = 6$ cm: $6^2 \times \pi$.

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-32

3 Find area of circle with radius $r = 8$ cm: $8^2 \times \pi$.

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-32

4 Find radius of circle with circumference $C = 31.42$ cm.

Manipulative Model & Desk Sketch (Show your work):

Final Math Answer:

☐ Verified on SC-32

Station Diagnostic & Solution Key: Chapter 8

Circles & Area: Circumference, Pi & Modulo Dial • Manipulative Setup, Diagnostic Rubric & Verification Flow

MANIPULATIVE HARDWARE STATION INVENTORY & 3D PRINT PREPARATION

Station Kit: 4-Quadrant Modulo Clock & Rotary Dial

CAD / STL Source File:

Recommended Filaments:

CAD Blueprint: clock_dial

Education/scad/lib/clock_quadrants.scad

White Faceplate with Oceanic Teal Hands (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 circumference of circle with diameter d Standard: CCSS.MATH.7.G.B.4	43.9823 cm	[1][4] [ENTER] [π] [×]
2	Find area of circle with radius r = 6 cm: 6² Standard: CCSS.MATH.7.G.B.4	113.0973 cm²	[6] [x²] [π] [×]
3	Find area of circle with radius r = 8 cm: 8² Standard: CCSS.MATH.7.G.B.4	201.0619 cm²	[8] [x²] [π] [×]
4	Find radius of circle with circumference C = Standard: CCSS.MATH.7.G.B.4	r ≈ 5.0 cm	[3][1][.][4][2] [ENTER] [2] [÷] [π] [÷]

TEACHER DIAGNOSTIC GUIDE: COMMON MISCONCEPTIONS & REMEDIATION

Key Misconception to Target During Station Observation:

Watch for confusing diameter with radius when calculating area πr^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.