Unit 5: Areas of Polygons & Elapsed Time — Building Skate Ramps, Measuring Sails & Navigating by Grid

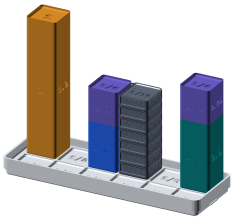
Areas of Parallelograms, Triangles, Trapezoids, Composite Figures, Coordinate Polygons & Base-60 Time

When Liam set out to build a wooden skateboard launch ramp and a pair of cornhole boards in his garage, he hit a wall right away at the hardware store. Plywood and grip tape are sold by the square foot, yet almost none of the pieces in his sketch were plain rectangles. The side panels of his ramp were right triangles, the gym vaulting box he wanted to copy had trapezoid sides, and the cornhole board had a square hole cut right out of the middle.

Down at the marina, Sora felt just as unsure when she had to order replacement sailcloth for a triangular mainsail and measure diagonal boat-trailer spaces in the lot. Whenever slanted sides and strange angles appeared, both Liam and Sora worried they would mix up which numbers to multiply and waste expensive materials.

Even plotting a rectangular field on a map grid or adding flight times across the 60-minute clock mark tripped them up when they tried to count squares one by one or add minutes like ordinary base-10 decimals.

Everything changed when they took a pair of scissors to scrap cardboard and saw that every parallelogram, triangle, and trapezoid is secretly built from ordinary rectangles. Once they learned to slice and slide shapes by hand—and check their areas and elapsed times using the geometry and clock keys on the SC-6—they never had to guess a formula again.



Real-World Mathematical Context & Two-Method Mastery • Hands-On Models: Fraction Strips & Place Value Blocks

UNIT 5 LESSONS — LEARN TWO TEXTBOOK WAYS FIRST, THEN CHECK YOUR WORK ON THE SC-6 CALCULATOR

SEC 5.1 (pp.46-47) Areas of Parallelograms and Rectangles

Textbook Ways: Way 1: Area Formula A = bh | Way 2: Cut-and-Slide Rectangle Decomposition

Learn by Hand: If you cut a right triangle from one end of a parallelogram and translate (slide) it to the other end, the parallelogram forms a rectangle with the exact same base b and perpendicular height h! Therefore, the area of any parallelogram is A = bh, where h is the perpendicular vertical height (never the slanted side length).

Check Your Work on the SC-6 Calculator:

[1] [2] [ENTER] [8] [f] [■]

Press 12 [ENTER] 8 [f][RECT] to confirm Area = 96 cm^2 on X (and Perimeter = 40 cm on Y).

SEC 5.2 (pp.48-49) Areas of Triangles

Textbook Ways: Way 1: Formula A = (b × h) ÷ 2 | Way 2: Take Half of Base or Height First (1/2b × h)

Learn by Hand: Any triangle can be duplicated and rotated to form a parallelogram with the same base b and height h. Because the two congruent triangles make up one bh parallelogram, the area of a single triangle is exactly half the area of the parallelogram: A = 1/2bh = (b × h) ÷ 2.

Check Your Work on the SC-6 Calculator:

[1] [0] [ENTER] [6] [g] [▲]

Press 10 [ENTER] 6 [g][TRI] (which automatically computes 1/2 × b × h) to confirm 30 cm^2!

SEC 5.3 (pp.50-51) Areas of Trapezoids and Composite Figures

Textbook Ways: Way 1: Decompose & Add Sub-Areas | Way 2: Trapezoid Formula A = 1/2h(b_1 + b_2) | Way 3: Enclosing Box Minus Cutouts

Learn by Hand: A trapezoid has two parallel bases, b_1 and b_2, and a perpendicular height h. Its area is half the product of the height and the sum of the bases: A = 1/2h(b_1 + b_2). To find the area of a composite figure, decompose it into non-overlapping rectangles, triangles, and trapezoids (or subtract cutout areas from an enclosing rectangle).

Check Your Work on the SC-6 Calculator:

[g] [CLΣ] [1] [2] [ENTER] [8] [f] [■] [Σ+] [1] [2] [ENTER] [5] [g] [▲] [Σ+] [f] [Σx]

Split the shape into a rectangle and triangle on paper first. On your SC-6, clear stats with [g][CLΣ], add the rectangle (12 [ENTER] 8 [f][RECT] [Σ+]) and triangle (12 [ENTER] 5 [g][TRI] [Σ+]), and press [f][Σx] to confirm 126 ft^2!

SEC 5.4 (pp.52-53) Polygons in the Coordinate Plane & Elapsed Time

Textbook Ways: Way 1: Subtract Coordinates / Regroup 60 min = 1 hr | Way 2: Count Grid Squares / Time-Line Jumps

Learn by Hand: To find the length of a horizontal segment in Quadrant I, subtract the x-coordinates; for a vertical segment, subtract the y-coordinates. When calculating elapsed time, remember that hours and minutes use Base-60 (60 minutes = 1 hour), so regroup 60 minutes whenever minutes exceed 59 or when borrowing 1 hour.

Check Your Work on the SC-6 Calculator:

[9] [ENTER] [2] [-] [8] [ENTER] [3] [-] [f] [■]

Press 9 [ENTER] 2 [-] (7) and 8 [ENTER] 3 [-] (5), then [f][RECT] to see Area = 35 on X and Perimeter = 24 on Y!

TEXTBOOK MODEL: PAPER / GRAPH / FORMULA

Section 5.1 — Practice A: Areas of Parallelograms and Rectangles

Key Vocabulary: polygon • parallelogram • base (b) • perpendicular height (h) • slant length • perimeter Name: _____ Date: _____ Score: ____ / 100

TEXTBOOK CONCEPT & VISUAL DIAGRAM

Parallelogram Cut-and-Slide Proof: Area = Base b × Perpendicular Height h



HOW THE TEXTBOOK & VISUAL MODEL WORK TOGETHER:

Textbook Concept: Area of a rectangle = lw; Area of a parallelogram = bh, where height h is PERPENDICULAR (90°) to the base b.

Textbook Visual Proof: Cut the right triangle from one end of a parallelogram and slide it to the other end to form a b × h rectangle.

WATCH OUT: Always multiply Base b × Perpendicular Height h (at 90°) — ignore the slanted side length when finding area!

WORKED EXAMPLE — 2 TEXTBOOK WAYS FOR DOUBLE POINTS (+20)

Problem: Find the area of a parallelogram with base b = 12 cm, perpendicular height h = 8 cm, and slanted side 10 cm.

WAY 1: Use the Parallelogram Area Formula A = bh

Multiply base b = 12 cm by perpendicular height h = 8 cm: A = 12 × 8 = 96 cm² (ignore the 10 cm slant side for area!).

WAY 2: Cut-and-Slide into a Rectangle

Cut the right triangle off one end and slide it to the other end to form a 12 cm by 8 cm rectangle → Area = 96 cm².

Answer: 96 cm² 1 Way = +10 | 2 Ways = +20!

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 5.1 PRACTICE A (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

1 2 ENTER 8 f ■

Multiply base × perpendicular height (12 × 8) on paper first. Then check on your SC-6: Press 12 [ENTER] 8 [f][RECT] to confirm Area = 96 cm² on X (and Perimeter = 40 cm on Y).

SECTION 5.1 PRACTICE A — KEY IDEAS & MULTI-METHOD PRACTICE

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 **Find the area of a parallelogram with base b = 15 m, perpendicular height h = 9 m, and slanted side 11 m.**

Starter Step 1: Multiply base b = 15 m by the PERPENDICULAR height h = 9 m (ignore the 11 m slanted side!).

Way 1 (Paper Work):

Base b = ___ Height h = ___

Area A = b × h = _____

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

2 **Parallelogram Flower Bed: A botanical garden bed is shaped like a parallelogram with a base of 8 meters and a perpendicular height of 4.5 meters. What is the area of the flower bed?**

Starter Step 1: Multiply base b = 8 m by the perpendicular height h = 4.5 m: A = b × h.

Way 1 (Paper Work):

Base b = ___ Height h = ___

Area A = b × h = _____

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

3 **Find the area of a parallelogram with base b = 8.5 m and perpendicular height h = 6.4 m.**

Way 1 (Paper Work):

Base b = ___ Height h = ___

Area A = b × h = _____

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

4 **Find the area of a square courtyard tile with side length 13 cm.**

Way 1 (Paper Work):

Base b = ___ Height h = ___

Area A = b × h = _____

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

5 **A parallelogram has a base of 6 1/2 inches and a perpendicular height of 4 inches. What is its area?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

6 **A parallelogram has an area of 108 cm² and a base of 12 cm. What is its perpendicular height?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

7 **A parallelogram has an area of 135 ft² and a perpendicular height of 7.5 ft. What is its base?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

8 **Error Analysis: A parallelogram has base b = 10 cm, perpendicular height h = 6 cm, and slanted side s = 7.5 cm. Sam calculated the area as 75 cm². Explain his error and find the correct area.**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

9 **Angled Parking Spaces: Each angled parking space is a parallelogram with a base of 9 feet and a perpendicular length of 18.5 feet. How many square feet of asphalt are needed to pave 4 adjacent spaces?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

10 **Patio Planter Cutout: A rectangular stone patio measuring 15 feet by 12 feet has a parallelogram-shaped herb planter (base 4 feet, perpendicular height 3 feet) built in the center. How many square feet of stone paving surround the planter?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

TEXTBOOK MODEL: PAPER / GRAPH / FORMULA

Section 5.1 — Practice B: Modeling Real Life (Areas of Parallelograms and Rectangles)

Textbook Ways: Area Formula A = bh | Cut-and-Slide Rectangle Decomposition **Name:** _____ **Date:** _____ **Score:** ____ / 100

WORKED EXAMPLE — FINDING A MISSING DIMENSION (2 TEXTBOOK WAYS = +20 PTS DOUBLE)

Problem: A parallelogram-shaped team banner has an area of 168 square inches and a base of 14 inches. What is the vertical height of the banner?

WAY 1: Substitute into A = bh & Solve Using Division

Write 168 = 14h. Divide both sides by 14: h = 168 ÷ 14 = 12 inches.

WAY 2: Partial Quotients / Area Decomposition

Split 168 in^2 into 140 in^2 + 28 in^2: (140 ÷ 14) + (28 ÷ 14) = 10 in + 2 in = 12 inches.

Check: b × h = 14 in × 12 in = 168 in^2.

WATCH OUT: Always multiply Base b × Perpendicular Height h (at 90°) — ignore the slanted side length when finding area!

Answer: 12 inches

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 5.1 PRACTICE B (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

1 6 8 ENTER 1 4 ÷ f LASTx f ■

Solve 168 ÷ 14 by hand first to find the missing height. Then check on your SC-6:
Press 168 [ENTER] 14 [÷] to confirm 12 inches, and [f][LASTx] [f][RECT] to verify 12 × 14 = 168 in^2.

When Liam measured a slanted parallelogram parking space in the marina lot, his tape measure showed a 10-foot base, an 18-foot straight-up perpendicular height, and a 20-foot slanted side stripe. Having three numbers confused him, and he multiplied 10 × 20 first because those were the outer edges. Unsure if 200 square feet was right, he sketched the parallelogram on grid paper, snipped off the slanted right triangle on one end, and slid it to the other end. It locked into a 10-by-18 rectangle (180 square feet)! That one cut showed him why area always uses perpendicular height, while the 20-foot slanted edge is only used when walking the perimeter.

SECTION 5.1 PRACTICE B — MODELING REAL LIFE & APPLICATIONS

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 **Diagonal Parking Space: A parallelogram parking space has a base of 10 feet, a perpendicular height of 18 feet, and a slanted side of 20 feet. What is the area of the parking space?**

Starter Step 1: Multiply base b = 10 ft by the perpendicular height h = 18 ft (ignore the 20 ft slanted side!).

Way 1 (Paper Work):

Base b = ___ Height h = ___

Area A = b × h = _____

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

2 **Parking Space Stripes: What is the perimeter around all four outer edges of the parking space in Problem 1?**

Starter Step 1: Perimeter measures the outer boundary—add the two 10 ft bases and the two 20 ft slanted sides.

Way 1 (Paper Work):

Outer Sides: s_1=___ s_2=___

Perimeter P = 2(s_1 + s_2) = _____

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

3 **Staircase Railing Glass: A parallelogram glass panel has a base of 4.5 feet and a vertical height of 3.2 feet. What is its area?**

Way 1 (Paper Work):

Base b = ___ Height h = ___

Area A = b × h = _____

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

4 **Garden Patio Stone: A parallelogram patio stone has an area of 135 square inches and a perpendicular height of 9 inches. What is its base length?**

Way 1 (Paper Work):

Base b = ___ Height h = ___

Area A = b × h = _____

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

5 **Quilt Pattern Rhombus: A quilt uses 8 identical parallelogram patches, each with base 6 cm and perpendicular height 4.5 cm. What is the total area of all 8 patches?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

6 **Basketball Key Paint: The rectangular free-throw lane is 19 feet long by 12 feet wide. How many square feet of paint are needed to cover it?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

7 **Lawn Area: A rectangular yard is 65 feet by 40 feet. A storage shed covers a 10 ft by 8 ft corner. How many square feet of grass remain?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

8 **Find the area of a parallelogram with base 5 1/2 inches and perpendicular height 4 inches.**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

9 **Rectangle A and Parallelogram B both have a base of 16 cm and a perpendicular height of 9 cm. How do their areas compare, and why?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

10 **Banner Cost: A parallelogram banner has a base of 8 feet and a height of 3.5 feet. If vinyl printing costs $4.00 per square foot, how much does the banner cost?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

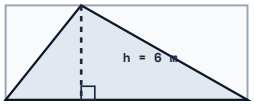
HANDS-ON MODEL: FRACTION STRIPS

Section 5.2 — Practice A: Areas of Triangles

Key Vocabulary: triangle • congruent triangles • perpendicular base & height • Area Formula A = 1/2bh Name: _____ Date: _____ Score: ____ / 100

TEXTBOOK CONCEPT & HANDS-ON MODEL (FRACTION STRIPS)

Triangle Area Proof: Every Triangle Is 1/2 of a b × h Rectangle (A = 1/2bh)



Rectangle = 10 × 6 = 60 m²

Triangle = 1/2(10)(6) = 30 m²

Missing Height Formula:

h = 2A ÷ b (Double Area first!)

HOW THE TEXTBOOK & VISUAL MODEL WORK TOGETHER:

Textbook Concept: Two congruent triangles always form a parallelogram of area bh, so every triangle has area A = 1/2bh = (b × h) ÷ 2.

Textbook Mental-Math Tip: You can either multiply b × h first and divide by 2, OR take half of the even dimension first and then multiply.

WATCH OUT: Don't forget to divide by 2 for triangles (A = 1/2bh)! And when solving for a missing height, double the area first (h = 2A ÷ b).

WORKED EXAMPLE — 2 TEXTBOOK WAYS FOR DOUBLE POINTS (+20)

Problem: Find the area of a triangle with base b = 10 cm and perpendicular height h = 6 cm.

WAY 1: Multiply Base × Height, Then Divide by 2

Find the enclosing rectangle area (10 × 6 = 60 cm²), then divide by 2: 60 ÷ 2 = 30 cm².

WAY 2: Take Half of an Even Dimension First

Take 1/2 of base 10 first (1/2 × 10 = 5), then multiply by height 6: 5 × 6 = 30 cm² (or 10 × 1/2(6) = 10 × 3 = 30 cm²).

Answer: 30 cm² 1 Way = +10 | 2 Ways = +20!

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 5.2 PRACTICE A (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

1 0 ENTER 6 g ▲

Calculate 1/2 × 10 × 6 on paper first. Then check on your SC-6 using the Triangle Area key: Press 10 [ENTER] 6 [g][TRI] (which automatically computes 1/2 × b × h) to confirm 30 cm²!

SECTION 5.2 PRACTICE A — KEY IDEAS & MULTI-METHOD PRACTICE

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 **Triangular Park Pavilion Pennant: A nylon celebration pennant for the park pavilion has a base of 25 cm and a height of 60 cm. What is the area of the pennant?**

Starter Step 1: Use Triangle Area A = 1/2bh: multiply 1/2 × 25 cm × 60 cm (remember to divide by 2!).

Way 1 (Paper Work):

Base b = ___ Height h = ___

Area A = 1/2 × b × h = _____

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

2 **A right triangle has legs of 9 feet and 4 feet, and a slanted hypotenuse of 9.85 feet. What is its area?**

Starter Step 1: Use the two perpendicular legs (9 ft and 4 ft) as base and height in A = 1/2bh (ignore the 9.85 ft slanted side!).

Way 1 (Paper Work):

Base b = ___ Height h = ___

Area A = 1/2 × b × h = _____

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

3 **Find the area of a triangle with base b = 16 cm and height h = 11 cm.**

Way 1 (Paper Work):

Base b = ___ Height h = ___

Area A = 1/2 × b × h = _____

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

4 **Find the area of a triangle with base b = 12.5 m and height h = 8.4 m.**

Way 1 (Paper Work):

Base b = ___ Height h = ___

Area A = 1/2 × b × h = _____

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

5 **Find the area of a triangle with base b = 4 1/2 inches and height h = 6 inches.**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

6 **A triangle has an area of 54 cm² and a base of 12 cm. What is its perpendicular height?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

7 **A triangle has an area of 84 m² and a perpendicular height of 14 m. What is its base?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

8 **Error Analysis: Leo found the area of a triangle with base 8 cm and height 5 cm as 40 cm². What did he forget to do, and what is the correct area?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

9 **Sailboat Rigging: A sailboat has a triangular mainsail (base 12 ft, height 25 ft) and a triangular jib sail (base 8 ft, height 15 ft). What is the combined area of both sails?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

10 **Diamond Kite Area: Sora's kite is made of two identical triangles that share a 40 cm center crossbar (base). Each triangle has a height of 35 cm (70 cm from top tip to bottom tip). What is the total area of the kite?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

HANDS-ON MODEL: FRACTION STRIPS

Section 5.2 — Practice B: Modeling Real Life (Areas of Triangles)

Textbook Ways: Formula A = (b × h) ÷ 2 | Take Half of Base or Height First (1/2b × h) **Name:** _____ **Date:** _____ **Score:** ____ / 100

WORKED EXAMPLE — FINDING MISSING HEIGHT OF A TRIANGLE (2 TEXTBOOK WAYS = +20 PTS DOUBLE)

Problem: A triangular sports pennant has an area of 60 square inches and a base of 15 inches. What is the height of the pennant?

WAY 1: Substitute into A = 1/2bh & Solve

Write 60 = 1/2(15)h → 60 = 7.5h. Divide both sides by 7.5: h = 60 ÷ 7.5 = 8 inches.

WAY 2: Double the Triangle into a Parallelogram First

Two identical pennants form a parallelogram of area 2 × 60 = 120 in^2. Divide by base 15: h = 120 ÷ 15 = 8 inches.

Check: A = 1/2 × 15 × 8 = 15 × 4 = 60 in^2.

WATCH OUT: Don't forget to divide by 2 for triangles (A = 1/2bh)! And when solving for a missing height, double the area first (h = 2A ÷ b).

Answer: 8 inches

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 5.2 PRACTICE B (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

6 0 ENTER 2 × 1 5 ÷

Double the area and divide by the base on paper first. Then check on your SC-6:
Press 60 [ENTER] 2 [×] 15 [÷] to confirm h = 8 in. (and test 15 [ENTER] 8 [g][TRI] = 60!).

Sora always forgot to divide by 2 when finding the area of a triangle, especially when she was in a hurry measuring a 12-foot by 25-foot sailboat mainsail. While helping Liam cut two triangular side panels for his skate ramp out of a single rectangular sheet of plywood, she watched him draw one diagonal line from corner to corner across the rectangle. Seeing the two identical right triangles nested inside the rectangle made it impossible to forget: two matching triangles always make one rectangle or parallelogram of area b × h, so a single triangle is always half (1/2bh).

SECTION 5.2 PRACTICE B — MODELING REAL LIFE & APPLICATIONS

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 **Sailboat Mainsail: A triangular sail has a base of 12 feet and a height of 25 feet. What is the area of the sail?**

Starter Step 1: Use Triangle Area A = 1/2bh with base b = 12 ft and height h = 25 ft.

Way 1 (Paper Work):

Base b = ___ Height h = ___

Area A = 1/2 × b × h = _____

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

2 **Skateboard Launch Ramp: Each triangular side panel of a launch ramp has a base of 8 feet and a height of 3.5 feet. What is the area of one side panel, and what is the combined area of both side panels?**

Starter Step 1: Find the area of 1 triangular side panel using A = 1/2bh, then multiply by 2 for both panels.

Way 1 (Paper Work):

Base b = ___ Height h = ___

Area A = 1/2 × b × h = _____

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

3 **Hang Glider Wing: A triangular hang glider wing has a wingspan (base) of 30 feet and a center chord (height) of 9.4 feet. What is its wing area?**

Way 1 (Paper Work):

Base b = ___ Height h = ___

Area A = 1/2 × b × h = _____

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

4 **Yield Sign Base: A triangular road sign has an area of 450 square inches and a height of 25 inches. What is the base of the sign?**

Way 1 (Paper Work):

Base b = ___ Height h = ___

Area A = 1/2 × b × h = _____

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

5 **Tent Door Height: A triangular tent door has an area of 18 square feet and a base of 6 feet. What is the height of the tent door?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

6 **Diagonal Sandwich Cut: A square slice of bread measures 4.5 inches on each side and is cut diagonally into 2 congruent triangles. What is the area of one triangle?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

7 **Corner Flower Bed: A right-triangular flower bed in the corner of a yard has perpendicular sides of 9 feet and 12 feet, and a 15-foot slanted front edge. What is its area?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

8 **Falcon Stoop Wing Geometry: During a high-speed dive, a peregrine falcon sweeps its wings into two right triangles, each with base 18 cm and length 35 cm. What is their combined wing area?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

9 **Find the area of a triangle with base 6 1/2 inches and height 4 inches.**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

10 **Skylight Panes: A skylight is built from 4 congruent triangular glass panes, each with base 5 feet and height 6.4 feet. What is the total glass area?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

TEXTBOOK MODEL: PAPER / GRAPH / FORMULA

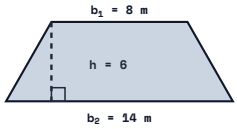
Section 5.3 — Practice A: Areas of Trapezoids and Composite Figures

Key Vocabulary: trapezoid • parallel bases (b_1, b_2) • height (h) • composite figure • decompose

Name: _____ Date: _____ Score: ____ / 100

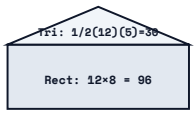
TEXTBOOK CONCEPT & VISUAL DIAGRAM

Trapezoid: $A = 1/2h(b_1 + b_2)$



$A = 1/2(6)(8+14) = 3(22) = 66\ m^2$

Composite: Decompose or Subtract



Total = 96 + 30 = 126 ft^2

HOW THE TEXTBOOK & VISUAL MODEL WORK TOGETHER:

Textbook Trapezoid Formula: $A = 1/2h(b_1 + b_2)$ — add the two parallel bases, multiply by the perpendicular height h, and divide by 2 (average of bases × h).

Textbook Composite Figures: Either DECOMPOSE (split into non-overlapping rectangles/triangles and add) or SUBTRACT (enclosing box minus cutouts).

WATCH OUT: In a trapezoid, add the two parallel bases ($b_1 + b_2$) FIRST before multiplying by 1/2h!

WORKED EXAMPLE — 3 TEXTBOOK WAYS (ANY 2 WAYS = +20 PTS)

Problem: Find the total area of a 12 ft by 8 ft rectangular shed wall topped by a roof gable triangle (base 12 ft, height 5 ft).

WAY 1: Decompose into a Rectangle + Triangle

Split the house wall horizontally: bottom 12 × 8 rectangle = 96 ft^2; top roof triangle = 1/2 × 12 × 5 = 30 ft^2. Sum: 96 + 30 = 126 ft^2.

WAY 2: Enclosing Rectangle Minus Corner Triangles

Full 12 × 13 enclosing box = 156 ft^2. Subtract the two unshaded top right triangles (2 × 1/2 × 6 × 5 = 30 ft^2): 156 - 30 = 126 ft^2.

WAY 3: Split Vertically into Two Congruent Trapezoids

Left and right halves are vertical trapezoids with parallel sides 8 ft and 13 ft and width 6 ft: 2 × 1/2(6)(8 + 13) = 6 × 21 = 126 ft^2.

Answer: 126 ft^2

1 Way = +10 | 2 Ways = +20!

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 5.3 PRACTICE A (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

[g] [CLΣ] 1 2 [ENTER] 8 [f] [■] [Σ+] 1 2 [ENTER] 5 [g] [▲] [Σ+] [f] [Σx]

Split the shape into a rectangle and triangle on paper first. On your SC-6, clear stats with [g][CLΣ], add the rectangle (12 [ENTER] 8 [f][RECT] [Σ+]) and triangle (12 [ENTER] 5 [g][TRI] [Σ+]), and press [f][Σx] to confirm 126 ft^2!

SECTION 5.3 PRACTICE A — KEY IDEAS & MULTI-METHOD PRACTICE

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 **Find the area of a trapezoid with parallel bases $b_1 = 10$ cm and $b_2 = 14$ cm, and height $h = 6$ cm.**

Starter Step 1: Add the two parallel bases (10 + 14) inside parentheses first, then multiply by 1/2 and by the height 6.

Way 1 (Paper Work):

$b_1 + b_2$ = ___ + ___ = ___

A = 1/2 × h × (b_1+b_2) = _____

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

2 **Find the area of a trapezoid with parallel bases $b_1 = 18$ ft and $b_2 = 12$ ft, and height $h = 9$ ft.**

Starter Step 1: Add the two parallel bases (18 + 12) inside parentheses first, then multiply by 1/2 and by the height 9.

Way 1 (Paper Work):

$b_1 + b_2$ = ___ + ___ = ___

A = 1/2 × h × (b_1+b_2) = _____

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

3 **An L-shaped floor plan consists of a 10 ft by 6 ft section and an 8 ft by 4 ft section. What is the total floor area?**

Way 1 (Paper Work):

Part 1 Area = _____

Part 2 Area = _____ → Sum = ___

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

4 **A directional sign is made of a 15 in. by 6 in. rectangle attached to a triangular arrowhead with base 10 in. and height 6 in. What is the total area of the sign?**

Way 1 (Paper Work):

Part 1 Area = _____

Part 2 Area = _____ → Sum = ___

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

5 **Find the area of a trapezoid with parallel bases $b_1 = 8.5$ m and $b_2 = 5.5$ m, and height $h = 4.2$ m.**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

6 **Picture Frame Mat: A 10 in. by 8 in. rectangular mat board has a 6 in. by 4 in. rectangular photo window cut out of the center. What is the remaining area of the mat border?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

7 **A trapezoid has an area of 90 cm^2 and parallel bases of 11 cm and 7 cm. What is its perpendicular height h?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

8 **Mini-Golf Fairway: A mini-golf hole is made of a 12 ft by 5 ft rectangular fairway connected to a trapezoid green (bases 5 ft and 9 ft, height 4 ft). How much turf is needed to cover the hole?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

9 **Two Ways to Measure a Trapezoid: Find the area of a right trapezoid with bases 10 cm and 16 cm and height 8 cm both by using the trapezoid formula and by splitting it into a 10×8 rectangle and a 6×8 right triangle.**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

10 **Backyard Landscaping: A 20 ft by 15 ft rectangular yard contains a triangular flowerbed (base 8 ft, height 6 ft) and a 5 ft by 5 ft square storage shed. How many square feet of grass lawn remain?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

TEXTBOOK MODEL: PAPER / GRAPH / FORMULA

Section 5.3 — Practice B: Modeling Real Life (Areas of Trapezoids and Composite Figures)

Textbook Ways: Decompose & Add Sub-Areas | Trapezoid Formula $A = 1/2h(b_1 + b_2)$ | Enclosing Box Minus Cutouts Name: _____ Date: _____ Score: ____ / 100

WORKED EXAMPLE — TRAPEZOID CLASSROOM DESK (3 TEXTBOOK WAYS • ANY 2 = +20 PTS)

Problem: A trapezoid classroom desk has parallel bases of 48 inches and 36 inches, and a depth (height) of 24 inches. What is the area of the desktop?

WAY 1: Trapezoid Area Formula $A = 1/2h(b_1 + b_2)$
Add the parallel bases (48 + 36 = 84 in) and multiply by 1/2 of height (1/2 × 24 = 12 in): 12 × 84 = 1,008 in².

WAY 2: Decompose into a Rectangle + Side Triangles
Center rectangle = 36 × 24 = 864 in². Extra base width (48 - 36 = 12 in) forms triangles of area 1/2 × 12 × 24 = 144 in². Total: 864 + 144 = 1,008 in².

WAY 3: Average the Two Bases × Height
Average of bases = (48 + 36) ÷ 2 = 42 in. Multiply by height 24 in: 42 × 24 = 1,008 in².

WATCH OUT: In a trapezoid, add the two parallel bases ($b_1 + b_2$) FIRST before multiplying by 1/2h!

Answer: 1,008 square inches

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 5.3 PRACTICE B (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

4 8 ENTER 3 6 + 2 4 g ▲

Add the parallel bases (48 + 36) and multiply by 1/2 × 24 on paper first. On your SC-6, press 48 [ENTER] 36 [+] 24 [g][TRI] (which takes 1/2 × ($b_1 + b_2$) × h!) to confirm 1,008 in².

The trapezoid area formula—$A = 1/2h(b_1 + b_2)$—looked so crowded with subscripts and parentheses that Liam was convinced he would never remember it on a test. Looking at the trapezoid side of a gym vaulting box (16 inches wide at the top and 28 inches wide at the bottom), he wondered what would happen if he just found the halfway average of the top and bottom widths: halfway between 16 and 28 is 22 inches. Multiplying that 22-inch average width by the 20-inch height gave 440 square inches—and he realized that 'average the two parallel bases, then multiply by the height' is the exact same formula in plain English!

SECTION 5.3 PRACTICE B — MODELING REAL LIFE & APPLICATIONS

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 **Gym Vaulting Box: The trapezoid side of a gym vaulting box has a top base of 16 inches, a bottom base of 28 inches, and a height of 20 inches. What is its area?**

Starter Step 1: Add the top and bottom parallel bases (16 + 28) first, then multiply by 1/2 and by the perpendicular height 20.

Way 1 (Paper Work):

$b_1 + b_2$ = ___ + ___ = ___

A = 1/2 × h × (b_1+b_2) = _____

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

2 **Popcorn Tub Panels: Each of the 4 sides of a popcorn tub is a trapezoid with bases of 4 inches and 6 inches and a height of 8 inches. What is the total area of all 4 sides?**

Starter Step 1: Find the area of 1 trapezoid side using $A = 1/2h(b_1 + b_2)$, then multiply that area by 4 sides.

Way 1 (Paper Work):

$b_1 + b_2$ = ___ + ___ = ___

A = 1/2 × h × (b_1+b_2) = _____

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

3 **Mini-Golf Putting Green: An L-shaped putting green is formed by a 14 ft by 6 ft section and a 10 ft by 5 ft section. What is the total turf area?**

Way 1 (Paper Work):

Part 1 Area = _____

Part 2 Area = _____ → Sum = ___

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

4 **Model Rocket Fins: A model rocket has 3 identical trapezoid fins. Each fin has parallel edges of 5 cm and 9 cm and a height of 6 cm. What is the total area of all 3 fins?**

Way 1 (Paper Work):

$b_1 + b_2$ = ___ + ___ = ___

A = 1/2 × h × (b_1+b_2) = _____

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

5 **Directional Arrow Sign: An arrow sign is made of a 15 in by 6 in rectangle attached to a triangle with base 12 in and height 8 in. What is the total area of the sign?**

Way 1 (Show Paper Steps): Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

6 **Cornhole Board Cutout: A rectangular cornhole board measures 48 inches by 24 inches, with a 6 in by 6 in square opening cut out. What is the area of the remaining wood surface?**

Way 1 (Show Paper Steps): Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

7 **Trapezoid Patio Height: A trapezoid patio has parallel bases of 10 feet and 16 feet and an area of 104 square feet. What is the perpendicular distance (height) between the bases?**

Way 1 (Show Paper Steps): Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

8 **Barn Gable Wall: A barn wall is a 20 ft by 14 ft rectangle topped by a triangular roof gable with base 20 ft and height 6 ft. What is the total area of the wall?**

Way 1 (Show Paper Steps): Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

9 **Swimming Pool Deck Border: A 20 m by 10 m rectangular pool is surrounded by a concrete deck whose outer boundary measures 26 m by 16 m. What is the area of the concrete deck?**

Way 1 (Show Paper Steps): Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

10 **Hexagon Tile: A regular hexagon tile is made of 2 identical trapezoids, each with bases of 4 cm and 8 cm and height 3.5 cm. What is the area of the hexagon?**

Way 1 (Show Paper Steps): Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

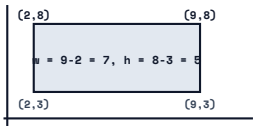
TEXTBOOK MODEL: PAPER / GRAPH / FORMULA

Section 5.4 — Practice A: Polygons in the Coordinate Plane & Elapsed Time

Key Vocabulary: coordinate grid • vertices • horizontal side • vertical side • elapsed time • base-60 regrouping Name: _____ Date: _____ Score: ____ / 100

TEXTBOOK CONCEPT & VISUAL DIAGRAM

Polygon on Coordinate Grid



P = 2(7+5) = 24 | Area = 35

Elapsed Time (Base-60: 1 hr = 60 min)



8:40 → 9:00 (+20m)
9:00 → 12:30 (+3h 30m)
Total = 3 hr 50 min

15 min = 0.25 hr | 30 min = 0.5 hr

HOW THE TEXTBOOK & VISUAL MODEL WORK TOGETHER:

Textbook Coordinate Polygons: Subtract x-coordinates for horizontal side lengths and y-coordinates for vertical side lengths, then find Perimeter and Area.
Textbook Elapsed Time: Regroup 60 minutes = 1 hour when adding/subtracting times, or jump to the nearest hour on a time number line.
WATCH OUT: Wait! 1 hour = 60 minutes (NOT 100): when borrowing 1 hour in elapsed time, add 60 minutes to the minutes column.

WORKED EXAMPLE — 2 TEXTBOOK WAYS FOR DOUBLE POINTS (+20)

Problem: A rectangle has vertices (2, 3), (9, 3), (9, 8), and (2, 8). Find its width, height, perimeter, and area.

WAY 1: Subtract Coordinates to Find Side Lengths

For A(2,3), B(9,3), C(9,8), D(2,8): Width = 9 - 2 = 7; Height = 8 - 3 = 5. Perimeter = 2(7+5) = 24; Area = 7 × 5 = 35.

WAY 2: Count Grid Intervals & Decompose

Count 7 grid units right from x=2 to x=9 and 5 grid units up from y=3 to y=8 → 5 rows of 7 squares = 35 square units.

Answer: Width = 7, Height = 5, Perimeter = 24, Area = 35

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 5.4 PRACTICE A (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

9 ENTER 2 - 8 ENTER 3 - f ■

Subtract coordinates to find the width and height on paper first. Check on your SC-6:
Press 9 [ENTER] 2 [-] (7) and 8 [ENTER] 3 [-] (5), then [f][RECT] to see Area = 35 on X and Perimeter = 24 on Y!

SECTION 5.4 PRACTICE A — KEY IDEAS & MULTI-METHOD PRACTICE

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 Find the length of the horizontal segment connecting (3, 4) and (11, 4) in the coordinate plane.

Starter Step 1: Since both points share the same y-coordinate (4), subtract their x-coordinates (11 - 3) to find the horizontal length.

Way 1 (Paper Work):



WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

2 A rectangle has vertices at (1, 2), (10, 2), (10, 8), and (1, 8). What is its area?

Starter Step 1: Subtract the x-coordinates (10 - 1) for the base and subtract the y-coordinates (8 - 2) for the height, then multiply.

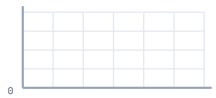
Way 1 (Paper Work):



WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

3 Aquarium Filter Cycle: The main bio-filter pump starts its morning cycle at 7:10 AM and runs for 3 hours and 48 minutes. At what time does the cycle finish?

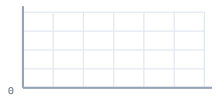
Way 1 (Paper Work):



CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

4 Convert 2 hours 30 minutes into decimal hours, and convert 4 hours 45 minutes into decimal hours.

Way 1 (Paper Work):



CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

5 Science Museum Fountain Shift: The courtyard water fountain turns on at 8:15 AM and shuts down for maintenance at 3:05 PM. For how many hours and minutes did the fountain run?

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

6 Convert 1.75 hours into hours and minutes.

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

7 A train departs at 8:50 AM and arrives at 11:25 AM. How long was the train ride in hours and minutes?

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

8 A right triangle in the coordinate plane has vertices at (2, 1), (10, 1), and (2, 7). What is the area of the triangle?

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

9 Saturday Pet-Sitting: You pet-sit a neighbor's dogs from 9:15 AM until 2:45 PM on Saturday at a rate of $18.50 per hour. How many hours did you work, and how much did you earn?

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

10 Coordinate Park Blueprint: A rectangular park has vertices (2, 2), (14, 2), (14, 11), and (2, 11), where each grid unit represents 10 yards. What are the perimeter (in yards) and area (in square yards) of the park?

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

TEXTBOOK MODEL: PAPER / GRAPH / FORMULA

Section 5.4 — Practice B: Modeling Real Life (Polygons in the Coordinate Plane & Elapsed Time)

Textbook Ways: Subtract Coordinates / Regroup 60 min = 1 hr | Count Grid Squares / Time-Line Jumps Name: _____ Date: _____ Score: ____ / 100

WORKED EXAMPLE — ELAPSED TIME & DECIMAL HOURS (2 TEXTBOOK WAYS = +20 PTS DOUBLE)

Problem: A 3D print starts at 9:40 AM and takes 2 hours 50 minutes. At what time does the print finish?

WAY 1: Add Hours & Minutes, Then Regroup 60 min = 1 hr

9 hr 40 min + 2 hr 50 min = 11 hr 90 min. Regroup 90 min = 1 hr 30 min → 12 hr 30 min = 12:30 PM.

WAY 2: Jump to Benchmark Hours on a Time Line

From 9:40 AM, add 20 min to reach 10:00 AM (2 hr 30 min left to go). Add 2 hr 30 min → 12:30 PM.

Check: From 9:40 AM to 12:40 PM is 3 hours; 10 minutes earlier is 12:30 PM (2 hr 50 min).

WATCH OUT: Wait! 1 hour = 60 minutes (NOT 100): when borrowing 1 hour in elapsed time, add 60 minutes to the minutes column.

Answer: 12:30 PM

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 5.4 PRACTICE B (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

[CLK] 9 • 4 0 [ENTER] 2 • 5 0 + 3 • 1 5 [f] [▸HR]

Add the hours and minutes on paper first (rolling 60 minutes into 1 hour). Check on your SC-6 using [CLK] Planetary Clock Mode or convert H.MM values with [f][→HR] and [g][→HMS] to confirm 12:30 PM!

When Sora plotted a rectangular park with corners at (1, 2) and (11, 8) on a map grid, she started counting little grid squares one by one and kept losing her place. And when she tried to add a 3-hour 40-minute flight to an 8:35 AM takeoff using regular base-10 column addition, she got a weird time like '11:75 AM.' Taking a breath, she realized she could subtract coordinates (11 - 1 = 10 wide and 8 - 2 = 6 tall) instead of counting squares—and on a clock, every 60 minutes bundles into 1 full hour, turning 75 minutes into 1 hour and 15 minutes (12:15 PM).

SECTION 5.4 PRACTICE B — MODELING REAL LIFE & APPLICATIONS

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 **Coordinate Soccer Field: A field on a coordinate map has corners at (1, 2), (11, 2), (11, 8), and (1, 8). Find its perimeter and area.**

Starter Step 1: Subtract the x-coordinates (11 - 1) for the width and the y-coordinates (8 - 2) for the height.

Way 1 (Paper Work):

0

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

2 **Coordinate Right Triangle: A triangle has vertices at (2, 1), (10, 1), and (2, 7). Find its area.**

Starter Step 1: Subtract x-coordinates (10 - 2) for the horizontal leg and y-coordinates (7 - 1) for the vertical leg, then use A = 1/2bh.

Way 1 (Paper Work):

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

3 **Flight Duration: A flight departs at 8:35 AM and lands 3 hours 40 minutes later. At what time does the flight land?**

Way 1 (Paper Work):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

4 **Science Lab Timer: A chemistry experiment starts at 10:45 AM and ends at 2:20 PM. How many hours and minutes did the experiment run?**

Way 1 (Paper Work):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

5 **Marathon Split Sum: A runner completes the first half of a marathon in 1 hour 52 minutes and the second half in 1 hour 58 minutes. What is her total time?**

Way 1 (Paper Work):

0

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

6 **Lifeguard Shift Pay: You work a lifeguard shift from 1:15 PM to 4:45 PM at $14 per hour. How much do you earn for the shift?**

Way 1 (Show Paper Steps): Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

7 **Battery Endurance Test: A laptop battery test lasts 2.75 hours. How many hours and minutes is that?**

Way 1 (Paper Work):

0

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

8 **3D Print Queue: Print A takes 1 hr 25 min, Print B takes 2 hr 15 min, and Print C takes 50 min. What is the total print time in hours and minutes?**

Way 1 (Show Paper Steps): Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

9 **Missing Vertex: Three corners of a rectangle are at (3, 4), (9, 4), and (9, 10). What are the coordinates of the fourth corner, and what is the area of the rectangle?**

Way 1 (Show Paper Steps): Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

10 **Train Travel Distance: A train travels for 2 hours 15 minutes at an average speed of 80 miles per hour. How many miles does it travel?**

Way 1 (Show Paper Steps): Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

SUMMATIVE QUIZ: 10 ITEMS × 10 PTS = 100

Unit 5 Mastery Quiz: Areas of Polygons & Elapsed Time

Directions: Show all paper steps in each box (+6 pts work, +4 pts answer). Name: _____ Date: _____ Score: ____ / 100

ASSESSMENT BREAKDOWN: #1–#6 CORE FLUENCY (60 PTS) • #7–#9 REAL-LIFE APPLICATIONS (30 PTS) • #10 ERROR ANALYSIS (10 PTS)

Standards Assessed: CCSS 6.G.A.1 • TEKS 6.8B–D • FL MA.6.GR.2.1–2 • UIL Calculator Applications & MathCounts 2D Geometry

1 CORE FLUENCY (SEC 5.1) • 10 PTS

Find the area of a parallelogram with base b = 15 cm and perpendicular height h = 8 cm.

[ ] Work (+6) [ ] Ans (+4) **Ans:** _____

2 CORE FLUENCY (SEC 5.2) • 10 PTS

Find the area of a triangle with base b = 18 m and height h = 11 m.

[ ] Work (+6) [ ] Ans (+4) **Ans:** _____

3 CORE FLUENCY (SEC 5.3) • 10 PTS

Find the area of a trapezoid with parallel bases $b_1 = 9$ in., $b_2 = 15$ in., and height h = 7 in.

[ ] Work (+6) [ ] Ans (+4) **Ans:** _____

4 CORE FLUENCY (SEC 5.2) • 10 PTS

A triangle has an area of 60 ft^2 and a base of 15 ft. What is its perpendicular height h?

[ ] Work (+6) [ ] Ans (+4) **Ans:** _____

5 CORE FLUENCY (SEC 5.4) • 10 PTS

Find the total area of an L-shaped deck composed of a 10 ft by 8 ft rectangle and a 6 ft by 4 ft rectangle.

[ ] Work (+6) [ ] Ans (+4) **Ans:** _____

6 CORE FLUENCY (SEC 5.4) • 10 PTS

A train departs at 1:45 PM and arrives at 4:20 PM. What is the elapsed travel time in hours and minutes?

[ ] Work (+6) [ ] Ans (+4) **Ans:** _____

7 REAL LIFE (SEC 5.2) • 10 PTS

A triangular sailboat sail has base 12 ft and height 25 ft. If sailcloth costs $4 per square foot, how much does the cloth cost?

[ ] Work (+6) [ ] Ans (+4) **Ans:** _____

8 REAL LIFE (SEC 5.3) • 10 PTS

A trapezoidal courtyard has parallel sides of 20 m and 28 m and a width (height) of 10 m. How many square meters of pavers are needed?

[ ] Work (+6) [ ] Ans (+4) **Ans:** _____

9 REAL LIFE (SEC 5.4) • 10 PTS

A rectangular wall is 14 ft wide and 9 ft tall with a 3 ft by 4 ft window. Find the painted wall area excluding the window.

[ ] Work (+6) [ ] Ans (+4) **Ans:** _____

10 ERROR ANALYSIS (SEC 5.1) • 10 PTS

A parallelogram has base 12 cm, slant side 10 cm, and perpendicular height 8 cm. Chloe multiplied $12 \times 10 = 120$ cm^2. Explain her error and find the true area.

[ ] Work (+6) [ ] Ans (+4) **Ans:** _____

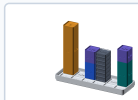
Unit 5: Areas of Polygons & Elapsed Time — Practice A & B Complete Key

Big Ideas Math Grade 6 — Chapter 4 (Areas of Polygons) • Concept → Blocks (When Applicable: Fraction Strips & Place Value Blocks) → Calculator

1. Concept (Stack Approach): Every polygon area formula decomposes into base-times-height products held on the stack, while elapsed time regroups in base-60 rather than base-10.

2. Blocks (When Applicable — Fraction & Place Value): Use Fraction Strips for fractional edge lengths and Place Value columns to contrast base-10 regrouping with 60-minute hours.

3. Calculator (SC-6): Compute rectangle [f][RECT] and triangle [g][TRI] areas, accumulate composite sub-areas with [Σ+] and [f][Σx], and convert H.MMSS time via [f][→HR] and [g][→HMS].



SEC 5.1 (pp.46-47): AREAS OF PARALLELOGRAMS AND RECTANGLES

Methods: W1: Area Formula A = bh | W2: Cut-and-Slide Rectangle Decomposition

PRACTICE A (p.46): KEY IDEAS (#1-#10) — ExA: 96 cm²		PRACTICE B (p.47): REAL LIFE (#1-#10) — ExB: 12 inches	
A1: 135 m² (A = 15 × 9) Check: 15 [ENT] 9 [f][RECT]	**A2: 36 m²** (A = 8 × 4.5) Check: 8 [ENT] 4.5 [f][RECT]	**B1: 180 ft²** (A = 10 × 18) Check: 10 [ENT] 18 [f][RECT]	**B2: 60 ft** ((10 + 20) × 2) Check: 10 [ENT] 20 [+] 2 [×]
A3: 54.4 m² (A = 8.5 × 6.4) Check: 8.5 [ENT] 6.4 [f][RECT]	**A4: 169 cm²** (13^2) Check: 13 [x²]	**B3: 14.4 ft²** (A = 4.5 × 3.2) Check: 4.5 [ENT] 3.2 [f][RECT]	**B4: 15 inches** (135 ÷ 9) Check: 135 [ENT] 9 [÷]
A5: 26 in.² (A = 6 1/2 × 4) Check: 6 [.] 1 [.] 2 [ENT] 4 [f][RECT]	**A6: 9 cm** (108 ÷ 12) Check: 108 [ENT] 12 [÷]	**B5: 216 cm²** ((6×4.5) × 8) Check: 6 [ENT] 4.5 [f][RECT] 8 [×]	**B6: 228 ft²** (A = 19 × 12) Check: 19 [ENT] 12 [f][RECT]
A7: 18 ft (135 ÷ 7.5) Check: 135 [ENT] 7.5 [÷]	**A8: 60 cm² (He multiplied by the slanted side 7.5)** (A = 10 × 6) Check: 10 [ENT] 6 [f][RECT]	**B7: 2,520 ft²** ((65×40) - (10×8)) Check: 65 [ENT] 40 [f][RECT] 10 [ENT] 8 [f][RECT] [-]	**B8: 22 in²** (5 1/2 × 4) Check: 5 [.] 1 [.] 2 [ENT] 4 [×]
A9: 666 ft² ((9×18.5) × 4) Check: 9 [ENT] 18.5 [f][RECT] 4 [×]	**A10: 168 ft²** ((15×12) - (4×3)) Check: 15 [ENT] 12 [f][RECT] 4 [ENT] 3 [f][RECT] [-]	**B9: Both equal 144 cm² (same base and perpendicular height)** Check: 16 [ENT] 9 [f][RECT]	**B10: 28 ft² × $4 = $112.00** ((8×3.5) × 4) Check: 8 [ENT] 3.5 [f][RECT] 4 [×]

SEC 5.2 (pp.48-49): AREAS OF TRIANGLES

Methods: W1: Formula A = (b × h) ÷ 2 | W2: Take Half of Base or Height First (1/2b × h)

PRACTICE A (p.48): KEY IDEAS (#1-#10) — ExA: 30 cm²		PRACTICE B (p.49): REAL LIFE (#1-#10) — ExB: 8 inches	
A1: 750 cm² (A = 1/2(25 × 60)) Check: 25 [ENT] 60 [g][TRI]	**A2: 18 ft²** (A = 1/2(9 × 4)) Check: 9 [ENT] 4 [g][TRI]	**B1: 150 ft²** (A = 1/2(12 × 25)) Check: 12 [ENT] 25 [g][TRI]	**B2: 14 ft² (1 side); 28 ft² (both)** (A = 1/2(8 × 3.5)) Check: 8 [ENT] 3.5 [g][TRI]
A3: 88 cm² (A = 1/2(16 × 11)) Check: 16 [ENT] 11 [g][TRI]	**A4: 52.5 m²** (A = 1/2(12.5 × 8.4)) Check: 12.5 [ENT] 8.4 [g][TRI]	**B3: 141 ft²** (A = 1/2(30 × 9.4)) Check: 30 [ENT] 9.4 [g][TRI]	**B4: 36 inches** ((450 × 2) ÷ 25) Check: 450 [ENT] 2 [×] 25 [÷]
A5: 13 1/2 in.² (13.5) (A = 1/2(4 1/2 × 6)) Check: 4 [.] 1 [.] 2 [ENT] 6 [g][TRI]	**A6: 9 cm** ((54 × 2) ÷ 12) Check: 54 [ENT] 2 [×] 12 [÷]	**B5: 6 feet** ((18 × 2) ÷ 6) Check: 18 [ENT] 2 [×] 6 [÷]	**B6: 10.125 in² (10 1/8 in²)** (A = 1/2(4.5 × 4.5)) Check: 4.5 [ENT] 4.5 [g][TRI]
A7: 12 m ((84 × 2) ÷ 14) Check: 84 [ENT] 2 [×] 14 [÷]	**A8: 20 cm² (He forgot to divide by 2)** (A = 1/2(8 × 5)) Check: 8 [ENT] 5 [g][TRI]	**B7: 54 ft²** (A = 1/2(9 × 12)) Check: 9 [ENT] 12 [g][TRI]	**B8: 630 cm² (315 cm² per wing)** (1/2(18×35) × 2) Check: 18 [ENT] 35 [g][TRI] 2 [×]
A9: 210 ft² (1/2(12×25) + 1/2(8×15)) Check: 12 [ENT] 25 [g][TRI] 8 [ENT] 15 [g][TRI] [+]	**A10: 1,400 cm²** (A = 1/2(40 × 70)) Check: 40 [ENT] 70 [g][TRI]	**B9: 13 in²** ((6 1/2 × 4) ÷ 2) Check: 6 [.] 1 [.] 2 [ENT] 4 [×] 2 [÷]	**B10: 64 ft²** (1/2(5×6.4) × 4) Check: 5 [ENT] 6.4 [g][TRI] 4 [×]

SEC 5.3 (pp.50-51): AREAS OF TRAPEZOIDS AND COMPOSITE FIGURES

Methods: W1: Decompose & Add Sub-Areas | W2: Trapezoid Formula A = 1/2h(b_1 + b_2) | W3: Enclosing Box Minus Cutouts

PRACTICE A (p.50): KEY IDEAS (#1-#10) — ExA: 126 ft²		PRACTICE B (p.51): REAL LIFE (#1-#10) — ExB: 1,008 square inches	
A1: 72 cm² (A = 1/2((10 + 14) × 6)) Check: 10 [ENT] 14 [+] 6 [g][TRI]	**A2: 135 ft²** (A = 1/2((18 + 12) × 9)) Check: 18 [ENT] 12 [+] 9 [g][TRI]	**B1: 440 in²** (A = 1/2((16 + 28) × 20)) Check: 16 [ENT] 28 [+] 20 [g][TRI]	**B2: 40 in² per side; 160 in² total** (A = 1/2((4 + 6) × 8)) Check: 4 [ENT] 6 [+] 8 [g][TRI]
A3: 92 ft² (Stats(10, 6, 8, 4)) Check: 10 [ENT] 6 [f][RECT] [Σ+] 8 [ENT] 4 [f][RECT] [Σ+] [f][Σx]	**A4: 120 in.²** (Stats(15, 6, 10, 6)) Check: 15 [ENT] 6 [f][RECT] [Σ+] 10 [ENT] 6 [g][TRI] [Σ+] [f][Σx]	**B3: 84 + 50 = 134 ft²** ((14×6) + (10×5)) Check: 14 [ENT] 6 [f][RECT] 10 [ENT] 5 [f][RECT] [+]	**B4: 42 cm² (1 fin); 126 cm² (3 fins)** (A = 1/2((5 + 9) × 6)) Check: 5 [ENT] 9 [+] 6 [g][TRI]
A5: 29.4 m² (A = 1/2((8.5 + 5.5) × 4.2)) Check: 8.5 [ENT] 5.5 [+] 4.2 [g][TRI]	**A6: 56 in.²** (Stats(10, 8, 6, 4)) Check: 10 [ENT] 8 [f][RECT] [Σ+] 6 [ENT] 4 [f][RECT] [f][Σ−] [f][Σx]	**B5: 90 + 48 = 138 in²** ((15×6) + 1/2(12×8)) Check: 15 [ENT] 6 [f][RECT] 12 [ENT] 8 [g][TRI] [+]	**B6: 1,152 - 36 = 1,116 in²** ((48×24) - 6^2) Check: 48 [ENT] 24 [f][RECT] 6 [x²] [-]
A7: 10 cm ((90 × 2) ÷ (11 + 7)) Check: 90 [ENT] 2 [×] 11 [ENT] 7 [+] [÷]	**A8: 88 ft²** (Stats(60, 5, 9, 4)) Check: 60 [Σ+] 5 [ENT] 9 [+] 4 [g][TRI] [Σ+] [f][Σx]	**B7: h = 8 ft** (104 ÷ 13) Check: 104 [ENT] 13 [÷]	**B8: 280 + 60 = 340 ft²** ((20×14) + 1/2(20×6)) Check: 20 [ENT] 14 [f][RECT] 20 [ENT] 6 [g][TRI] [+]
A9: 104 cm² (80 + 24 = 104) (A = 1/2((10 + 16) × 8)) Check: 10 [ENT] 16 [+] 8 [g][TRI]	**A10: 251 ft²** (Stats(300, 24, 25)) Check: 300 [Σ+] 24 [f][Σ−] 25 [f][Σ−] [f][Σx]	**B9: 416 - 200 = 216 m²** ((26×16) - (20×10)) Check: 26 [ENT] 16 [f][RECT] 20 [ENT] 10 [f][RECT] [-]	**B10: 42 cm²** (1/2((4 + 8)×3.5) × 2) Check: 4 [ENT] 8 [+] 3.5 [g][TRI] 2 [×]

SEC 5.4 (pp.52-53): POLYGONS IN THE COORDINATE PLANE & ELAPSED TIME

Methods: W1: Subtract Coordinates / Regroup 60 min = 1 hr | W2: Count Grid Squares / Time-Line Jumps

PRACTICE A (p.52): KEY IDEAS (#1-#10) — ExA: Width = 7, Height = 5, Perimeter = 24, Area = 35		PRACTICE B (p.53): REAL LIFE (#1-#10) — ExB: 12:30 PM	
A1: 8 units (11 - 3) Check: 11 [ENT] 3 [-]	**A2: 54 square units** (A = (10 - 1) × (8 - 2)) Check: 10 [ENT] 1 [-] 8 [ENT] 2 [-] [f][RECT]	**B1: W=10, H=6, P=32, Area=60** (A = (11 - 1) × (8 - 2)) Check: 11 [ENT] 1 [-] 8 [ENT] 2 [-] [f][RECT]	**B2: Base=8, Height=6, Area=24** (A = 1/2((10 - 2) × (7 - 1))) Check: 10 [ENT] 2 [-] 7 [ENT] 1 [-] [g][TRI]
A3: 10:58 AM (7.10 + 3.48) Check: [CLK] 7.10 [ENT] 3.48 [+]	**A4: 2.5 hours; 4.75 hours** (2.30 (to HR); 4.45 (to HR)) Check: 2.30 [f][→HR]; 4.45 [f][→HR]	**B3: 12:15 PM** (8.35 + 3.40) Check: [CLK] 8.35 [ENT] 3.40 [+]	**B4: 3 hours 35 minutes** (14.20 - 10.45) Check: [CLK] 14.20 [ENT] 10.45 [-]
A5: 6 hours 50 minutes (15.05 - 8.15) Check: [CLK] 15.05 [ENT] 8.15 [-]	**A6: 1 hour 45 minutes** (1.75 (to HMS)) Check: 1.75 [g][→HMS]	**B5: 3 hours 50 minutes** (1.52 + 1.58) Check: [CLK] 1.52 [ENT] 1.58 [+]	**B6: 3.5 hr × $14 = $49.00** (3.5 × 14) Check: 3.5 [ENT] 14 [×]
A7: 2 hours 35 minutes (11.25 - 8.50) Check: [CLK] 11.25 [ENT] 8.50 [-]	**A8: 24 square units** (A = 1/2(8 × 6)) Check: 8 [ENT] 6 [g][TRI]	**B7: 2 hours 45 minutes** (2.75 (to HMS)) Check: 2.75 [g][→HMS]	**B8: 4 hours 30 minutes** ((1.25 + 2.15) + 0.50) Check: [CLK] 1.25 [ENT] 2.15 [+] 0.50 [+]
A9: 5.5 hours (5 hr 30 min); $101.75 (5.5 × 18.50) Check: 5.5 [ENT] 18.50 [×]	**A10: Perimeter = 420 yd; Area = 10,800 yd²** (A = 12 × 9) Check: 12 [ENT] 9 [f][RECT]	**B9: (3, 10); Area = 36** (A = (9 - 3) × (10 - 4)) Check: 9 [ENT] 3 [-] 10 [ENT] 4 [-] [f][RECT]	**B10: 180 miles** (2.25 × 80) Check: 2.25 [ENT] 80 [×]

UNIT 05 MASTERY QUIZ KEY (p.116 • TEKS 6.8B-D): Q1: 120 cm² Q2: 99 m² Q3: 84 in² Q4: 8 ft Q5: 104 ft²

Quiz Q6-Q10 Answers: Q6: 2 hr 35 min Q7: $600 (150 ft²) Q8: 240 m² Q9: 114 ft² Q10: Use perp h=8: 96 cm²