Composite Figures: Area and Perimeter

Investigate mistakes and missing measures

Name _____ **Date** _____ **Score** _____ / 10

QUICK REVIEW

Partition a composite region into nonoverlapping rectangles, triangles, or circles, or subtract a completely specified cutout. Use $A = lw$, $A = \frac{1}{2}bh$, and $A = \pi r^2$. Perimeter follows exposed boundary only: shared edges are not exterior. A semicircle has curved length πr and area $\frac{1}{2}\pi r^2$; its diameter counts only when exposed. Keep length units separate from square units.

Worked example

An 8 by 6 rectangle has a 3 by 2 rectangular corner removed. The cutout sides follow the rectangle sides. Find area and perimeter.

1. The area is the outer rectangle minus the corner: $8(6) - 3(2) = 48 - 6 = 42$.

2. The exposed lengths are $8, 6-2, 3, 2, 8-3, 6$, totaling $8+4+3+2+5+6 = 28$.

3. The corner removal replaces exterior lengths $3+2$ with equal inner lengths $3+2$, so perimeter stays $2(8+6) = 28$.

Answer: 42 square units; 28 units.

Practice Problems

Show your thinking.

1. An L-region comes from an 11 by 8 rectangle with a 4 by h corner cut out. Remaining area is 72. Recover h.

2. A student adds perimeters of a 6 by 4 rectangle and a 3 by 2 rectangle joined along a 2-unit edge. Correct the exposed perimeter.

3. A rectangle and exterior triangle share base 6. Rectangle height is 5 and total area is 42. Recover the triangle height.

4. A student uses radius 10 for a semicircle attached along a 10-unit rectangle side. Find the corrected exact semicircle area.

5. A middle rectangular notch has depth d in a rectangle. The perimeter increases from 30 to 38. Recover d.

6. A 10 by 8 rectangle has a circular hole of radius 3. A student subtracts the circumference to find area. Correct the expression.

7. A square frame has outer side 10, inner square side s, and material area 64. Recover s.

8. Two rectangles have areas 30 and 24 and overlap in a 2 by 3 rectangle. A student adds $30 + 24$. Correct the union area.

9. A stadium region consists of a rectangle of width 6, length L, and semicircular ends of radius 3. Exact perimeter is $24 + 6\pi$. Find L.

10. A student removes a 3 by 2 corner from a 9 by 7 rectangle and predicts perimeter decreases by 10. Correct the perimeter.

Answer Key

1. $h = 4$ units
2. 26 units
3. 4 units
4. $\frac{25}{2}\pi$ square units
5. $d = 4$ units
6. $80 - 9\pi$ square units
7. $s = 6$ units
8. 48 square units
9. $L = 12$ units
10. 32 units

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. The full rectangle area is $11(8) = 88$, so the removed corner area is $88 - 72 = 16$.

2. The cutout satisfies $4h = 16$, giving $h = 4$ units.

3. Check $88 - 4(4) = 72$ square units. The cutout fits because $4 < 11$ and $4 < 8$, leaving an actual L-region.

Problem 2

1. The separate perimeters are $2(6 + 4) = 20$ and $2(3 + 2) = 10$, totaling 30.

2. The shared 2-unit edge is counted twice but is internal, so subtract $2(2) = 4$.

3. The exposed perimeter is $30 - 4 = 26$ units. Subtracting the common edge only once would still leave one hidden copy in the total.

Problem 3

1. The rectangle area is $6(5) = 30$, leaving $42 - 30 = 12$ square units for the triangle.

2. Then $\frac{1}{2}(6)h = 12$, so $3h = 12$ and $h = 4$.

3. Check $30 + \frac{1}{2}(6)(4) = 42$. The triangle height is perpendicular to the shared base, not the length of a sloping side.

Problem 4

1. The shared 10-unit side is a diameter, so the actual radius is $10/2 = 5$.

2. The correct half-circle area is $\frac{1}{2}\pi(5)^2 = \frac{25}{2}\pi$, not $\frac{1}{2}\pi(10)^2 = 50\pi$.

3. The error factor is $50/12.5 = 4$: doubling radius multiplies area by $2^2 = 4$. The correct half-circle area is 12.5π.

Problem 5

1. The increase is $38 - 30 = 8$ units. Removing the mouth and adding the equal back edge cancel.

2. The two new inward sides contribute $2d = 8$, hence $d = 4$ units.

3. The depth check is $30 + 2(4) = 38$. This applies to a middle notch, not an axis-aligned corner removal.

Problem 6

1. The rectangular area is $10(8) = 80$ square units; the circular area is $\pi(3)^2 = 9\pi$.

2. The correct subtraction is $80 - 9\pi$ square units. Circumference would be $2\pi(3) = 6\pi$ linear units.

3. The proposed $80 - 6\pi$ uses the wrong quantity and differs by 3π. Subtracting circular area, not circumference, leaves $80 - 9\pi$ square units.

Problem 7

1. The area equation is $10^2 - s^2 = 64$, giving $100 - s^2 = 64$.

2. Thus $s^2 = 36$ and the positive inner side is $s = 6$ units.

3. The check $100 - 36 = 64$ confirms the frame. The opening fits since $6 < 10$; subtracting side lengths would not recover its area.

Problem 8

1. The overlap area is $2(3) = 6$ square units and was counted in both original areas.

2. The union is $30 + 24 - 6 = 48$ square units, removing one duplicate count.

3. The 6-unit overlap must remain once. Subtracting it twice would give $54 - 12 = 42$, incorrectly excluding that shared region.

Problem 9

1. The two arcs make a full circle with circumference $2\pi(3) = 6\pi$.

2. The remaining straight boundary gives $2L = 24$, so $L = 12$ units.

3. Check $2(12) + 6\pi = 24 + 6\pi$. The two 6-unit diameters are shared boundaries, not part of the exposed perimeter.

Problem 10

1. The original perimeter is $2(9 + 7) = 32$. Removing the corner removes $3 + 2 = 5$ units of exterior edge.

2. The cut introduces inner edges $3 + 2 = 5$, so perimeter is $32 - 5 + 5 = 32$.

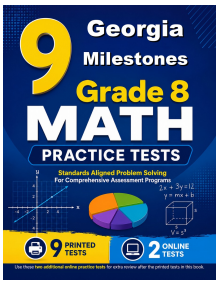
3. The area decreases by $3(2) = 6$, but perimeter stays 32 units. Area change cannot be used as boundary change.

TESTINAR

Keep Building Grade 8 Math Skills

Choose the practice book matched to your state assessment and turn worksheet practice into a complete test-prep plan.

All Grade 8 books



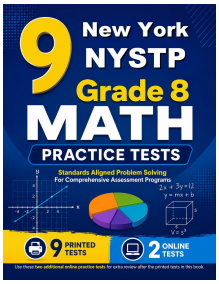
GEORGIA MILESTONES

9 Full-Length Math Practice Tests

Build Grade 8 accuracy, confidence, and test stamina with 9 printable practice tests.

Printable eBook • Instant PDF access

View eBook



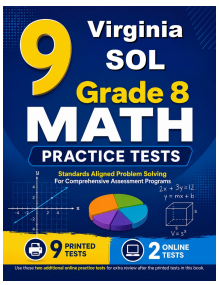
NEW YORK NYSTP

9 Full-Length Math Practice Tests

Build Grade 8 accuracy, confidence, and test stamina with 9 printable practice tests.

Printable eBook • Instant PDF access

View eBook



VIRGINIA SOL

9 Full-Length Math Practice Tests

Build Grade 8 accuracy, confidence, and test stamina with 9 printable practice tests.

Printable eBook • Instant PDF access

View eBook

Need a different state?
Testinar has Grade 8 math practice books for state assessments across the country.

TESTINAR.COM/GRADES/8