Drawing Geometric Figures with Given Conditions

Spot mistakes, reason, and work backward

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

Use grid units rather than measuring the printed page. Check every condition: side lengths, right angles, parallel sides, and area. A rectangle with vertices $(0,0), (3,0), (3,2), (0,2)$ has side lengths $3, 2$, perimeter 10, and area 6 square units.

Worked example

Can a 3 by 2 rectangle meet perimeter 10 and area 6?

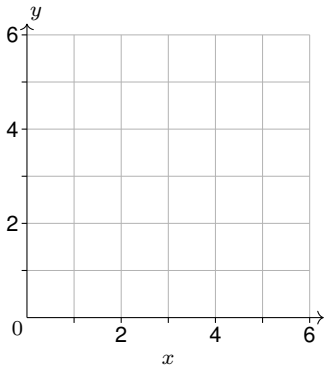
1. Perimeter $= 2(3+2) = 10$.
2. Area $= 3(2) = 6$.
3. Horizontal and vertical grid edges make four right angles, so all conditions hold.
Answer: Yes.

Practice Problems

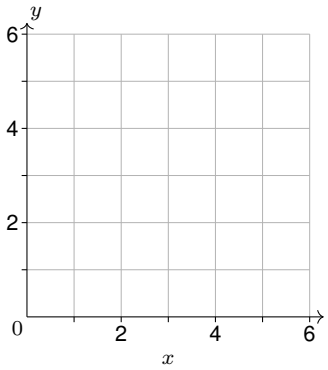
Show your thinking.

1. A rectangle has width 2 and perimeter 12 grid units. Find its length and check the perimeter.

2. A right triangle has one leg 3 and area 6 square grid units. Find the other leg and draw it using axes.



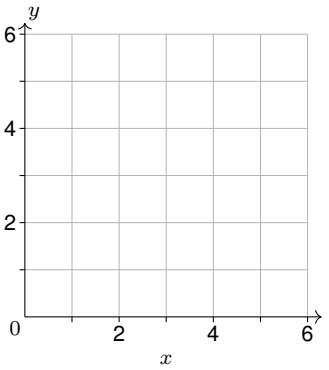
3. A student calls $(0,0), (3,0), (4,2), (0,2)$ a parallelogram. Repair the fourth vertex so opposite sides have matching moves, then draw it.



4. A square has perimeter 12 grid units. Find its side length and area.

5. An isosceles triangle has base endpoints $(-2,0), (2,0)$ and height 3. Explain why apex $(1,3)$ fails symmetry; give the correct apex above the base.

6. A trapezoid has bases 4 and 2 grid units and area 6 square units. Recover the height and draw one example.



Answer Key

1. Length 4 units.
2. Other leg 4 units; plot $(0,0), (3,0), (0,4)$.
3. Replace $(0,2)$ with $(1,2)$; join $(0,0), (3,0), (4,2), (1,2)$ in order.
4. Side 3 units; area 9 square units; perimeter 12 units.
5. Correct apex: $(0,3)$. The old apex is not above the midpoint.
6. Bases 4 and 2 units; height 2 units; area 6 square units. Plot $(0,0), (4,0), (3,2), (1,2)$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Two lengths plus two widths total 12, so $L + 2 = 12/2 = 6$.
2. Subtract the known width: $L = 6 - 2 = 4$ units.
3. Check $2(4 + 2) = 12$ units.

Problem 2

1. The leg lengths multiply to twice the area: $3h = 2(6) = 12$, so $h = 12/3 = 4$ units.
2. Place the 3-unit leg on the horizontal axis and the 4-unit leg on the vertical axis, both from the origin.
3. Join $(3,0)$ to $(0,4)$; area check: $(1/2)(3)(4) = 6$ square units.

Problem 3

1. From the given $(3,0)$ to $(4,2)$, move $4 - 3 = 1$ unit right and $2 - 0 = 2$ units up.
2. The opposite side must make the same move from $(0,0)$. The old vertex $(0,2)$ moves only up. Move 1 right and 2 up instead to get $(1,2)$.
3. Join the repaired vertices. Left to right, the top moves $4 - 1 = 3$ units, matching the bottom move of $3 - 0 = 3$ units.

Problem 4

1. Side $= 12/4 = 3$ units.
2. Area $= 3^2 = 9$ square units.
3. The four axis-aligned edges have length 3 and right angles, so this is a square.

Problem 5

1. The base midpoint has horizontal coordinate $(-2 + 2)/2 = 0$ and lies on $y = 0$.
2. For equal slanted sides the apex must lie directly above the midpoint, but $(1,3)$ is 1 unit to its right.
3. Keep the height of 3 units and set $x = 0$, giving $(0,3)$.

Problem 6

1. Use $A = (1/2)(b_1 + b_2)h$. Thus $h = 2(6)/(4 + 2) = 2$ units.
2. Place the 4-unit base on $y = 0$ and the 2-unit base from $(1,2)$ to $(3,2)$.
3. Join the endpoints; area check: $(1/2)(4 + 2)(2) = 6$ square units.

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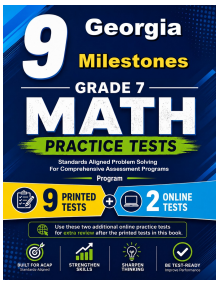

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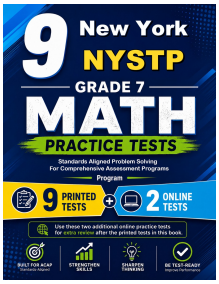

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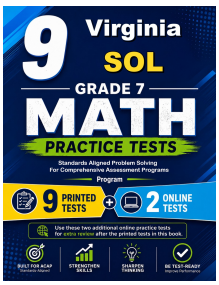

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