Drawing Geometric Figures with Given Conditions

Explore ideas and representations

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

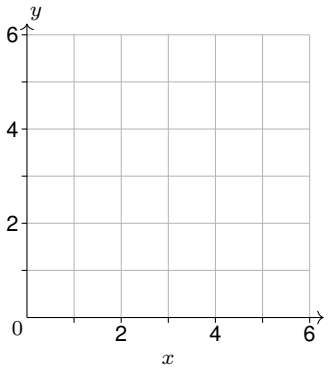
Can a 3 by 2 rectangle meet perimeter 10 and area 6?

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

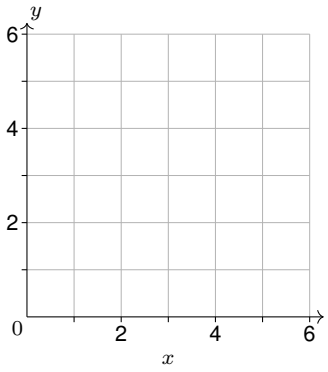
Show your thinking.

1. Draw a rectangle with vertices $(0,0), (4,0), (4,2), (0,2)$. Verify side lengths and perimeter.



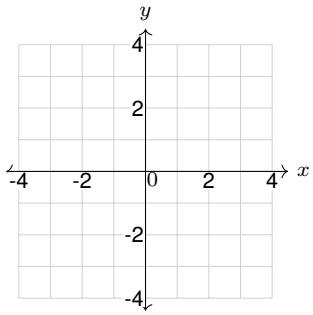
2. A right triangle has perpendicular legs 3 and 4 grid units. Find its area and explain which lengths you used.

3. Draw a parallelogram with vertices $(0,0), (3,0), (4,2), (1,2)$. Show its base and height; find area.



4. A square has side 3 grid units. Find area and perimeter.

5. Draw an isosceles triangle with base endpoints $(-2,0), (2,0)$ and apex $(0,3)$. Find base, height, and area.



6. A trapezoid has vertices $(0,0), (4,0), (3,2), (1,2)$. Find the lengths of both horizontal bases, the height, and area.

Answer Key

1. One rectangle: $(0,0), (4,0), (4,2), (0,2)$; area 8, perimeter 12.
2. Area 6 square units.
3. Base 3 units; height 2 units; area 6 square units.
4. Side 3 units; area 9 square units; perimeter 12 units.
5. $(-2,0), (2,0), (0,3)$; base 4, height 3, area 6.
6. Bases 4 and 2 units; height 2 units; area 6 square units.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Horizontal edges span $4 - 0 = 4$ units; vertical edges span $2 - 0 = 2$ units.
2. The perimeter is $2(4 + 2) = 12$ units and the area is $4(2) = 8$ square units.
3. Horizontal and vertical sides meet at right angles; the listed vertices satisfy all conditions.

Problem 2

1. Use the 3-unit leg as the base.
2. The 4-unit leg is perpendicular to that base, so it gives the height.
3. Area $= (1/2)(3)(4) = 6$ square units.

Problem 3

1. Plot and join the four given vertices in order. The bottom base runs from $(0,0)$ to $(3,0)$, a length of 3 units.
2. Mark the vertical gap between the bases at $y = 0$ and $y = 2$ as the 2-unit height.
3. Area is base times perpendicular height: $3(2) = 6$ square units.

Problem 4

1. Four equal sides give perimeter $4(3) = 12$ 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. Base length $= 2 - (-2) = 4$ units.
2. The base midpoint is $(0,0)$, so the symmetric apex has $x = 0$. Its height above the base is $3 - 0 = 3$ units.
3. Area $= (1/2)(4)(3) = 6$ square units.

Problem 6

1. The horizontal bases have lengths 4 and $3 - 1 = 2$.
2. Height $= 2$ units, so area $= (1/2)(4 + 2)(2) = 6$.
3. Reverse check: $2(6)/(4 + 2) = 2$ units of height.

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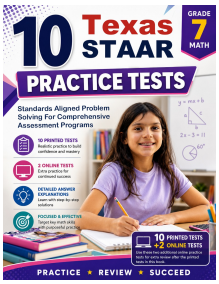

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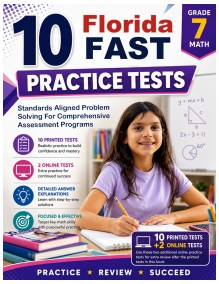

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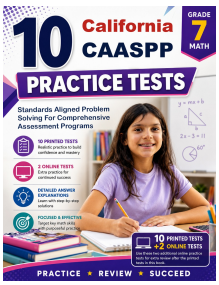

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