Math League Contest Problem Set 12117

Target Round Problem 4

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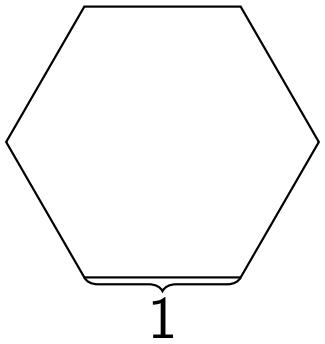
Math League, LLC

An equiangular but not equilateral hexagon has three times the area of a regular hexagon with side length 1. If both hexagons have whole number side lengths, then what is the perimeter of the larger hexagon?

Find the perimeter of an equiangular (non-equilateral) hexagon that has thrice the area of a regular hexagon with side length 1.



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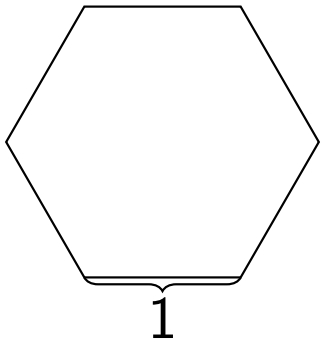
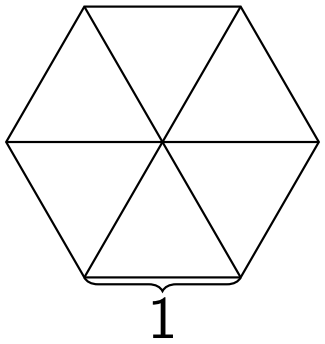


Area

Find the perimeter of an equiangular (non-equilateral) hexagon that has thrice the area of a regular hexagon with side length 1.



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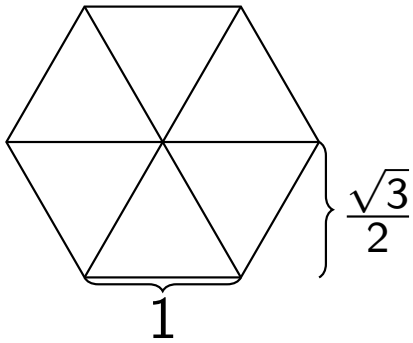
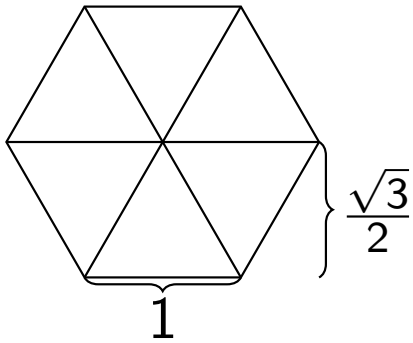


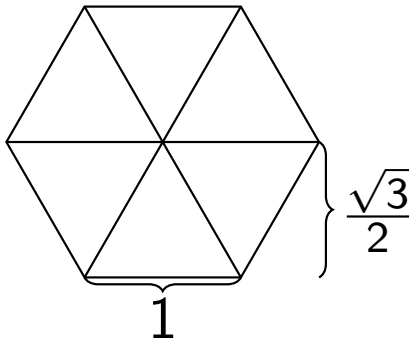
$$\text{Area} = 6 \cdot \frac{1}{2} \cdot 1 \cdot \frac{\sqrt{3}}{2}$$

Find the perimeter of an equiangular (non-equilateral) hexagon that has thrice the area of a regular hexagon with side length 1.



$$\text{Area} = 6 \cdot \frac{1}{2} \cdot 1 \cdot \frac{\sqrt{3}}{2} = \frac{3}{2} \cdot \sqrt{3}$$

Find the perimeter of an equiangular (non-equilateral) hexagon that has thrice the area of a regular hexagon with side length 1.



$$\text{Area} = \frac{3}{2} \cdot \sqrt{3}$$

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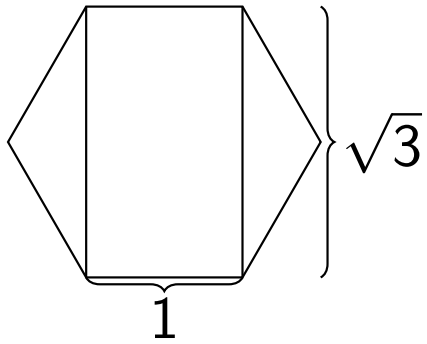
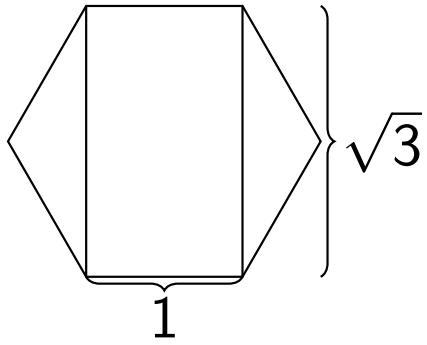


Area $= \frac{3}{2} \cdot \sqrt{3}$, so we need an additional $3 \cdot \sqrt{3}$.

Find the perimeter of an equiangular (non-equilateral) hexagon that has thrice the area of a regular hexagon with side length 1.



Area $= \frac{3}{2} \cdot \sqrt{3}$, so we need an additional $3 \cdot \sqrt{3}$.

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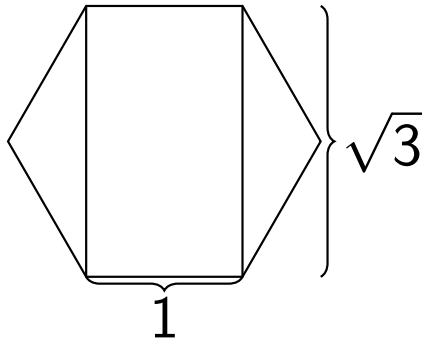

Area $= \frac{3}{2} \cdot \sqrt{3}$, so we need an additional $3 \cdot \sqrt{3}$.

$$\text{Area} = \frac{3}{2} \cdot \sqrt{3} + 3 \cdot \sqrt{3} = \frac{9}{2} \cdot \sqrt{3}$$

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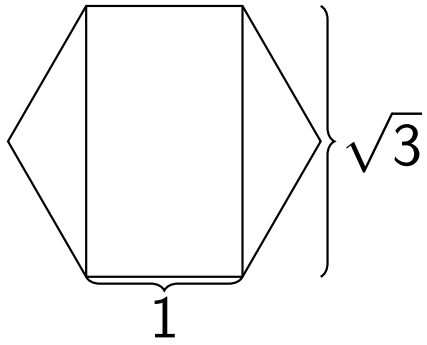

Area $= \frac{3}{2} \cdot \sqrt{3}$, so we need an additional $3 \cdot \sqrt{3}$.

Area $= \frac{3}{2} \cdot \sqrt{3} + 3 \cdot \sqrt{3} = \frac{9}{2} \cdot \sqrt{3}$, Perimeter $= 2 \cdot 4 + 4 \cdot 1 = \boxed{12}$

Key Concepts

- Area of an Equilateral Triangle

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- Area of an Equilateral Triangle
- Area of a Rectangle

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- Area of an Equilateral Triangle
- Area of a Rectangle
- Area of a Regular Hexagon