BRILLIANT

Competitive Math Assessment - Measures Practice Quiz #1

Here are some suggestions for how to practice replicating testing conditions:

- Make sure you have a quiet place to practice on your own for an extended period of time. This will help model the actual experience of a competition. When you have finished the quiz, check your solutions using the online Brilliant quiz.
- Set a timer, or at least keep an eye on the clock to learn your own pace. If you want to set a specific time goal, math competitions provide an average of about 2 minutes per problem, so you should give yourself 30-40 minutes to complete these problems. Keep in mind that the general difficulty of problems increases as you move forward.
- Some competitions allow students to use calculators while others do not. We encourage you to use a calculator only for the most in-depth calculations on this practice quiz.

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1. _____

Four rectangles each have a base width of 2. Their lengths are 10, 20, 30, and 40. What is the sum of the areas of the four rectangles?

2. _____

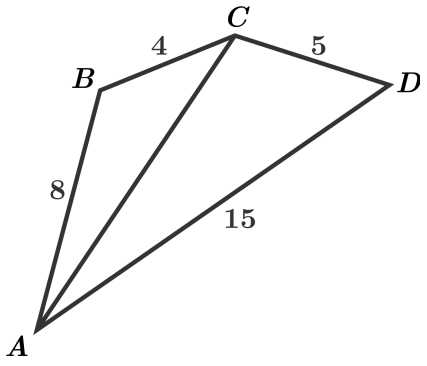
The length of a rectangle is two times its width. When its length is decreased by 4 units and its width is increased by 6 units, a new rectangle with the same area is created. What is the perimeter of the new rectangle?

A. 18 **B.** 20

C. 22 **D.** 26

3. _____

AC is a positive integer. What is the value of AC ?



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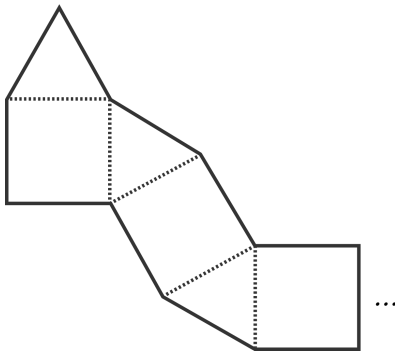
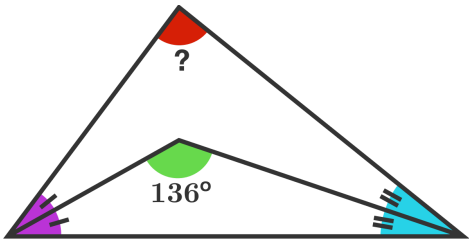
4. _____ Imagine constructing a polygon by beginning with an equilateral triangle with side lengths of 1. Then, add a square onto one side of that equilateral triangle. Then, add an equilateral triangle onto one side of the square. If you continue this pattern until you have 10 equilateral triangles and 10 squares, what will be the perimeter of the polygon?



5. _____ If angles of the same color are congruent, what is the measure of the red angle?



A. 92°

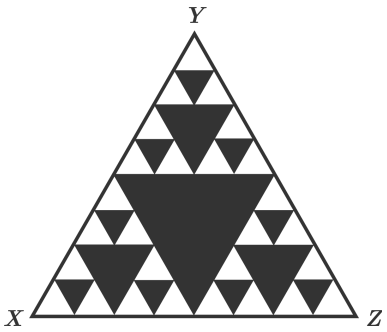
B. 102°

C. 107°

D. 112°

6. _____

In equilateral triangle XYZ each downward-pointing black triangle has its vertices at the midpoints of the sides of an upward-pointing white triangle. What fraction of the area of triangle XYZ is white?



A. $\frac{1}{3}$

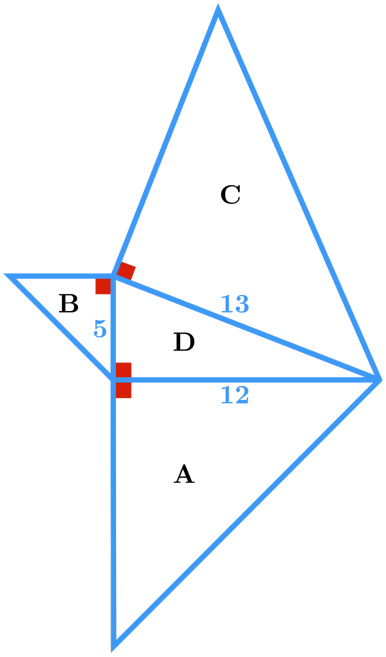
B. $\frac{27}{64}$

C. $\frac{7}{16}$

D. $\frac{9}{16}$

7. _____

Triangles A, B, and C are isosceles right triangles constructed on the sides of the 5-12-13 right triangle. The area of each triangle is represented by the capital letter inside the triangle. Which statement is true?



A. $A + B = C$

B. $B + C = A$

C. $C + D = A + B$

D. $5B + 12C = 13A$

8. _____

A square and an equilateral triangle have the same perimeter. The area of the triangle is $64\sqrt{3}$. What is the diagonal length of the square?

A. $12\sqrt{2}$

B. $16\sqrt{2}$

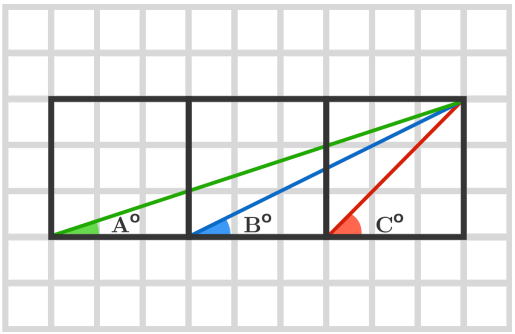
C. $12\sqrt{3}$

D. $16\sqrt{3}$

9. _____

What is the sum of angles A, B, and C, in degrees?

(Hint: try adding lines to your diagram that will create some similar triangles.)

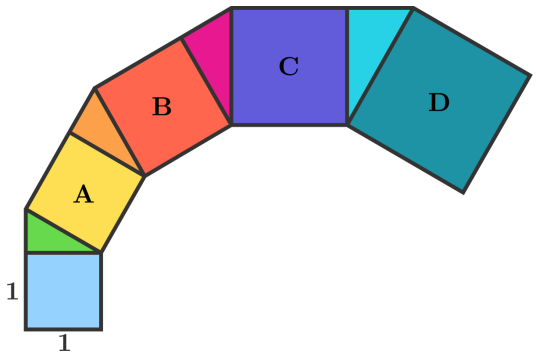


10. _____

If the degree measures of the angles of a quadrilateral are in the ratio 1 : 2 : 3 : 4, how many degrees larger is the measure of the largest angle than the measure of the smallest angle?

11. _____

The spiral below is created by connecting 30-60-90 triangles with squares. Each triangle has a long leg bordering one square and the hypotenuse bordering another square. Beginning with the smallest square on the lower left side of the figure whose area is 1, and moving up and right across the figure, what is the first square whose area is at least double that of the smallest blue square?



A. Square A

B. Square B

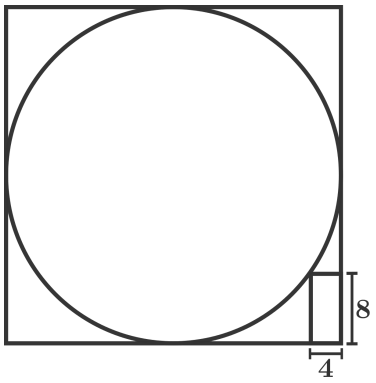
C. Square C

D. Square D

12. _____

The interior angles in a 15-gon form an arithmetic sequence of integers. The smallest angle measures $128°$. What is the measure, in degrees, of the largest angle?

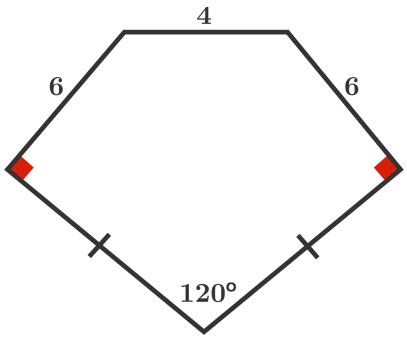
13. _____ In the figure below, a circle is inscribed in a square. The small rectangle, whose width is 4 and height is 8, has one vertex on the circle. What is the radius of the circle?



A. 16 **B.** 18

C. 20 **D.** 22

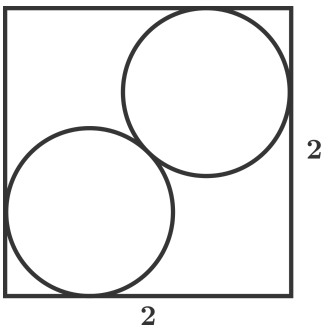
14. _____ What is the perimeter of the pentagon?



A. $16 + 10\sqrt{3}$ **B.** $16 + 15\sqrt{3}$

C. $16 + 10\ \frac{\sqrt{3}}{3}$ **D.** $16 + 20\ \frac{\sqrt{3}}{3}$

15. _____ Two congruent circles are placed in a square so that they are tangent to the square and tangent to each other. The side length of the square is 2. What is the radius of each circle?



A. $\sqrt{2}-1$

B. $2-\sqrt{2}$

C. $\sqrt{2}$

D. $\frac{\sqrt{2}}{2}$