BMC Intermediate I -- Geometry   9/2015
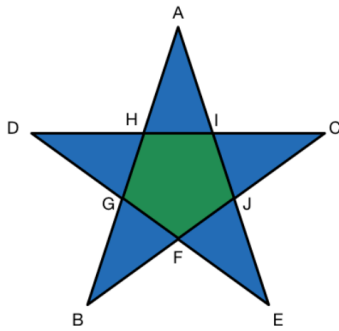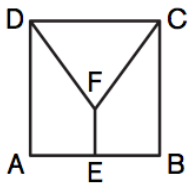
1. If the 5-pointed star ABCDE has an outside perimeter of 50 cm and the pentagon FGHIJ perimeter of 30cm what is AB + BC + CD + DE + EA?

2. If the perimeter of the yellow triangle is 20, the perimeter of the blue triangle 30 and the perimeter of the 6-pointed star is 40 what is the perimeter of the green hexagon?


3.

Square ABCD has sides of length 12 cm. The three interior segments divide the square, as shown, into two congruent trapezoids and an isosceles triangle, all with equal areas. What is the length of segment CF?

4.

Equilateral triangle ABC has sides of length 10 cm. If D, E, F and G divide base BC into five congruent segments, as shown, what is the total area of the three shaded regions? Express your answer in simplest radical form.
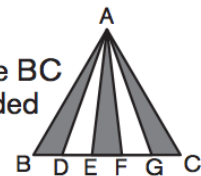

5.

An equilateral triangle is placed on the outside of each side of a square of length 6 cm, and a circle is then drawn through four vertices of the triangles as shown. What percent of the area of the circle is the unshaded region? Express your answer to the nearest whole number.
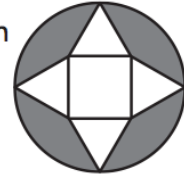
6.

Starting with an isosceles right triangle with legs of length 1 unit, a second isosceles right triangle is built using the hypotenuse of the first triangle as a leg. A third isosceles right triangle is then built using the second triangle's hypotenuse as a leg, and so on, as demonstrated in the figure. If this pattern continues, what will be the number of units in the length of the hypotenuse of the 20th isosceles right triangle?
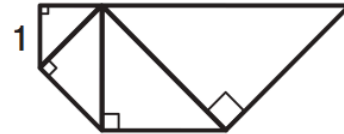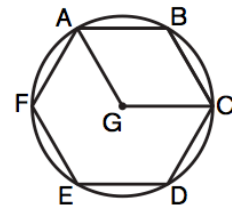
7.

In the figure shown, four circles of radius 4 mm are centered at the corners of a square of side length 8 mm. What is the total area of the shaded regions? Express your answer in terms of π.

8.

A regular hexagon ABCDEF is inscribed in a unit circle with center G, as shown. What is the area of quadrilateral ABCG? Express your answer as a common fraction in simplest radical form.
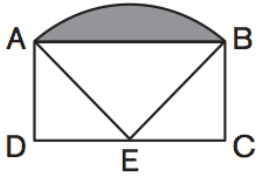
9.

A square is inscribed in a circle of radius 2 units, and then the largest possible circle is inscribed between the square and the original circle, as shown. What is the radius of the inscribed circle? Express your answer as a decimal to the nearest tenth.
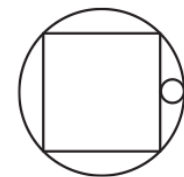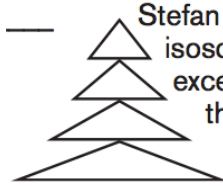
10.

In rectangle ABCD, shown here, AB = 4 cm and BC = 2 cm. If E is the midpoint of side DC and also is the center of a circle that contains points A and B, what is the area of the shaded segment of the circle determined by chord AB? Express your answer as a decimal to the nearest tenth.

11.

Stefan created this tree design in his computer drawing class. It consists of four isosceles triangles of the same height arranged vertically as shown. With the exception of the top triangle, the apex of each triangle is the midpoint of the base of the triangle above it, and the base of each triangle is 50% larger than the base of the triangle above it. What is the ratio of the area of the smallest triangle to the area of the largest? Express your answer as a common fraction.

12.

As shown, convex hexagon ABCDEF has right angles at A, C and E, and 150-degree angles at B, D and F. If each side is 2 inches long, its area can be expressed in simplest radical form as $p + q\sqrt{3}$. What is the value of pq?
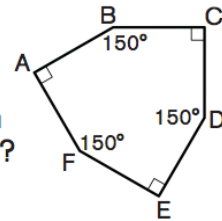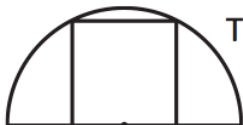
13.

One square is inscribed in another so that the sides of the inner square make 30-degree and 60-degree angles with the sides of the outer square. Each side of the inner square is 4 units, and the area of the outer square, in simplest radical form, is $a + b\sqrt{3}$. What is $a + b$?
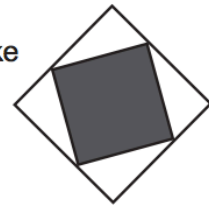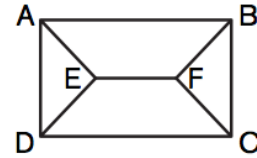
14.

The figure shows a square inscribed in a semicircle. What is the ratio of the radius of the semicircle to the side length of the square? Express your answer as a common fraction in simplest radical form.

15.

In the figure shown, AE = ED = EF = BF = CF = 1 unit, and
m∠AED = m∠BFC = 90 degrees. What is the area of rectangle
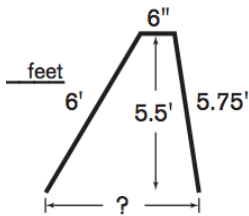ABCD? Express your answer in simplest radical form.

16.

In the equilateral triangle, each downward facing white triangle has its vertices at the midpoints of the sides of the larger upward facing triangle that just contains it. What fraction of the entire figure is white? Express your answer as a common fraction.

17.

A ladder is 5.5 feet high when opened. The platform at the top is 6 inches wide and parallel to the floor, and the two supports are 6 feet and 5.75 feet, as shown. How many feet long apart are the two supports on the floor? Express your answer as a decimal to the nearest hundredth.

18.

A square has its four vertices on the sides of a regular hexagon with side length 1 cm. What is the side length of the square? Express your answer in simplest radical form.
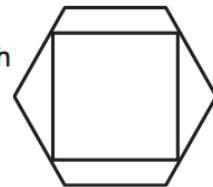
19.

Two equilateral triangles are drawn in a square. Two opposite sides of the square coincide with one side of each of the triangles, as shown. What is the ratio of the area of the center rhombus to the area of the entire square? Express your answer as a decimal to the nearest thousandth.