

一、平面几何

Problem 17

Rectangle $ABCD$ has $AB = 4$ and $BC = 3$. Segment EF is constructed through B so that EF is perpendicular to DB , and A and C lie on DE and DF , respectively. What is EF ?

- (A) 9
- (B) 10
- (C) $\frac{125}{12}$
- (D) $\frac{103}{9}$
- (E) 12

Problem 21

Many Gothic cathedrals have windows with portions containing a ring of congruent circles that are circumscribed by a larger circle. In the figure shown, the number of smaller circles is four. What is the ratio of the sum of the areas of the four smaller circles to the area of the larger circle?

- (A) $3 - 2\sqrt{2}$
- (B) $2 - \sqrt{2}$
- (C) $4(3 - 2\sqrt{2})$
- (D) $\frac{1}{2}(3 - \sqrt{2})$
- (E) $2\sqrt{2} - 2$

Problem 23

Convex quadrilateral $ABCD$ has $AB = 9$ and $CD = 12$. Diagonals AC and BD intersect at E , $AC = 14$, and $\triangle AED$ and $\triangle BEC$ have equal areas. What is AE ?

- (A) $\frac{9}{2}$
- (B) $\frac{50}{11}$
- (C) $\frac{21}{4}$
- (D) $\frac{17}{3}$
- (E) 6

096

Problem 16

Points A and C lie on a circle centered at O , each of \overrightarrow{BA} and \overrightarrow{BC} are tangent to the circle, and $\triangle ABC$ is equilateral. The circle intersects \overrightarrow{BO} at D . What is \overrightarrow{BO} ?

- (A) $\frac{\sqrt{2}}{3}$
- (B) $\frac{1}{2}$
- (C) $\frac{\sqrt{3}}{3}$
- (D) $\frac{\sqrt{2}}{2}$
- (E) $\frac{\sqrt{3}}{2}$

Problem 18

Rectangle $ABCD$ has $AB = 8$ and $BC = 6$. Point M is the midpoint of diagonal \overrightarrow{AC} , and E is on AB with $ME \perp \overrightarrow{AC}$. What is the area of $\triangle AME$?

- (A) $\frac{65}{8}$

(B) $\frac{25}{3}$

(C) 9

(D) $\frac{75}{8}$

(E) $\frac{85}{8}$