

Problem 19

In rectangle $ABCD$, $AB = 6$ and $BC = \frac{1}{3}$. Point E between B and C , and point F between E and C are such that $BE = EF = FC$. Segments AE and AF intersect BD at P and Q respectively. The ratio $\overline{BP} : PQ : QD$ can be written as $\mathbf{T} : \mathbf{s} : \mathbf{t}$ where the greatest common factor of \mathbf{T} , \mathbf{s} and \mathbf{t} is 1. What is $\mathbf{r} + \mathbf{s} + \mathbf{t}$.

- (A) 7
- (B) 9
- (C) 12
- (D) 15
- (E) 20

Problem 21

Circles with centers P , Q and R , having radii 1, 2 and 3, respectively, lie on the same side of line l and are tangent to l at P' , Q' and R' , respectively, with Q' between P' and R' . The circles with center Q is externally tangent to each of the other two circles. What is the area of triangle PQR'

- (A) 0
- (B) $\sqrt{\frac{2}{3}}$
- (C) 1
- (D) $\sqrt{6} - \sqrt{2}$
- (E) $\sqrt{\frac{3}{2}}$

Problem 24

A quadrilateral is inscribed in a circle of radius $200\sqrt{2}$. Three of the sides of this quadrilateral have length 200. What is the length of the fourth side?

- (A) 200
- (B) $200\sqrt{2}$
- (C) $200\sqrt{3}$
- (D) $300\sqrt{2}$
- (E) 500

166

Problem 19

Rectangle $ABCD$ has $AB = 5$ and $BC = 4$. Point E lies on \overline{AB} so that $EB = 1$, point G lies on BC so that $CG = 1$, and point F lies on GD so that $DF = 2$. Segments AG and AC intersect EF at Q and P , respectively. What is the value of \overline{EF} ?

- (A) $\frac{\sqrt{13}}{16}$
- (B) $\frac{\sqrt{2}}{13}$
- (C) $\frac{9}{82}$
- (D) $\frac{10}{91}$
- (E) $\frac{1}{9}$

Problem 23

In regular hexagon $ABCDEF$, points W , X , Y , and Z are chosen on sides BC , \overline{CD} , EF , and \overline{FA} respectively, so lines AB , ZW , YX , and ED are parallel and equally spaced. What is the ratio of the area of hexagon $WCXYFZ$ to the area of hexagon $ABCDEF$?

- (A) $\frac{1}{3}$
- (B) $\frac{10}{27}$
- (C) $\frac{11}{27}$
- (D) $\frac{4}{9}$
- (E) $\frac{13}{27}$