

Problem 17

In the given circle, the diameter EB is parallel to DC , and AB is parallel to ED . The angles AEB and ABE are in the ratio 4 : 5. What is the degree measure of angle BCD ?

- (A) 120 (B) 125 © 130 (D) 135 (E) 140

Problem 18

Rectangle $ABCD$ has $AB = 6$ and $BC = 3$. Point M is chosen on side AB so that $\angle AMD = \angle CMD$. What is the degree measure of $\angle AMD$;

- (A) 15 (B) 30 © 45 (D) 60 (E) 75

Problem 20

Rhombus $ABCD$ has side length 2 and $\angle B = 120^\circ$. Region R consists of all points inside the rhombus that are closer to vertex B than any of the other three vertices. What is the area of R ?

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

Problem 25

Let $\widehat{A_1}$ be a triangle with sides 2011, 2012, and 2013. For $n \geq 1$, if $T_n = \triangle ABC$ and D , E , and F are the points of tangency of the incircle of $\triangle ABC$ in the sides AB , BC and AC , respectively, then T_{n+1} is a triangle with side lengths AD , BE , and CF , if it exists. What is the perimeter of the last triangle in the sequence (T_n) ?

- (A) $\frac{1509}{8}$
(B) $\frac{1509}{32}$
© $\frac{1509}{64}$
(D) $\frac{1509}{128}$
(E) $\frac{1509}{256}$

12a

Problem 18

The closed curve in the figure is made up of 9 congruent circular arcs each of length $\frac{2\pi}{3}$, where each of the centers of the corresponding circles is among the vertices of a regular hexagon of side 2 . What is the area enclosed by the curve?