

## Additional Geometry\* Problems Using the Structure-Symmetry-Similarity Strategy

\*You'll use algebra.

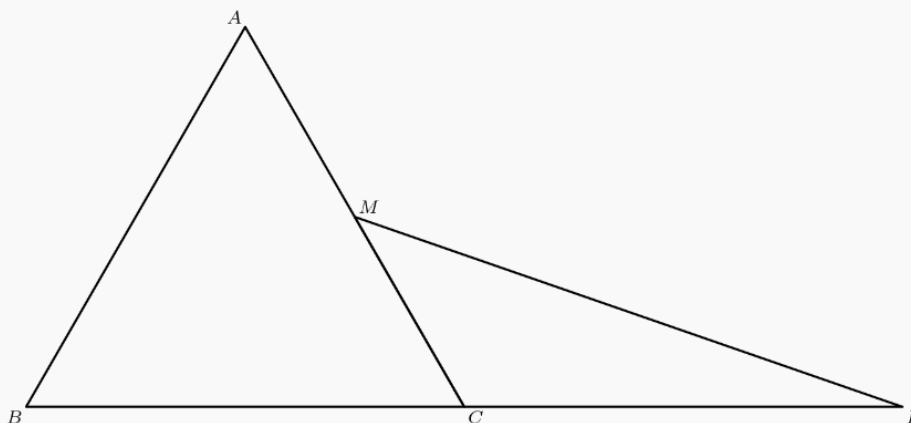
**Source for AMC 10 and AMC 12 Problems:** Art of Problem Solving – AoPS Wiki

[https://artofproblemsolving.com/wiki/index.php?title=Main\\_Page](https://artofproblemsolving.com/wiki/index.php?title=Main_Page) (many more online!)

### 1. AMC 10 2005B #14

#### Problem 14

Equilateral  $\triangle ABC$  has side length 2,  $M$  is the midpoint of  $\overline{AC}$ , and  $C$  is the midpoint of  $\overline{BD}$ . What is the area of  $\triangle CDM$ ?



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

### 2. AMC 10 2005B #23

#### Problem 23

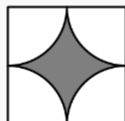
In trapezoid  $ABCD$  we have  $\overline{AB}$  parallel to  $\overline{DC}$ ,  $E$  as the midpoint of  $\overline{BC}$ , and  $F$  as the midpoint of  $\overline{DA}$ . The area of  $ABEF$  is twice the area of  $FECD$ . What is  $AB/DC$ ?

- (A) 2   (B) 3   (C) 5   (D) 6   (E) 8

### 3. AMC 10 2005B #8

#### Problem 8

An 8-foot by 10-foot floor is tiled with square tiles of size 1 foot by 1 foot. Each tile has a pattern consisting of four white quarter circles of radius  $1/2$  foot centered at each corner of the tile. The remaining portion of the tile is shaded. How many square feet of the floor are shaded?

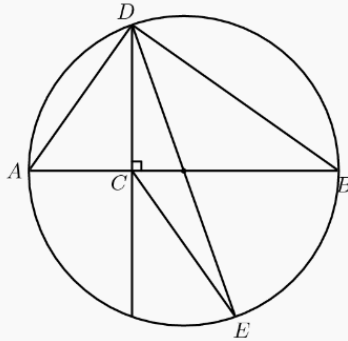


- (A)  $80 - 20\pi$    (B)  $60 - 10\pi$    (C)  $80 - 10\pi$    (D)  $60 + 10\pi$    (E)  $80 + 10\pi$

#### 4. AMC 10 2005A #23

##### Problem 23

Let  $AB$  be a diameter of a circle and let  $C$  be a point on  $AB$  with  $2 \cdot AC = BC$ . Let  $D$  and  $E$  be points on the circle such that  $DC \perp AB$  and  $DE$  is a second diameter. What is the ratio of the area of  $\triangle DCE$  to the area of  $\triangle ABD$ ?



- (A)  $\frac{1}{6}$     (B)  $\frac{1}{4}$     (C)  $\frac{1}{3}$     (D)  $\frac{1}{2}$     (E)  $\frac{2}{3}$

#### 5. AMC 10 2005A #25

##### Problem 25

In  $\triangle ABC$  we have  $AB = 25$ ,  $BC = 39$ , and  $AC = 42$ . Points  $D$  and  $E$  are on  $AB$  and  $AC$  respectively, with  $AD = 19$  and  $AE = 14$ . What is the ratio of the area of triangle  $ADE$  to the area of the quadrilateral  $BCED$ ?

- (A)  $\frac{266}{1521}$     (B)  $\frac{19}{75}$     (C)  $\frac{1}{3}$     (D)  $\frac{19}{56}$     (E) 1

#### 6. AMC 12 2015B #13

##### Problem 13

Quadrilateral  $ABCD$  is inscribed in a circle with  $\angle BAC = 70^\circ$ ,  $\angle ADB = 40^\circ$ ,  $AD = 4$ , and  $BC = 6$ . What is  $AC$ ?

- (A)  $3 + \sqrt{5}$     (B) 6    (C)  $\frac{9}{2}\sqrt{2}$     (D)  $8 - \sqrt{2}$     (E) 7

#### 7. AMC 12 2015B #16

##### Problem 16

A regular hexagon with sides of length 6 has an isosceles triangle attached to each side. Each of these triangles has two sides of length 8. The isosceles triangles are folded to make a pyramid with the hexagon as the base of the pyramid. What is the volume of the pyramid?

- (A) 18    (B) 162    (C)  $36\sqrt{21}$     (D)  $18\sqrt{138}$     (E)  $54\sqrt{21}$

#### 8. AMC 12 2015B #19

##### Problem 19

In  $\triangle ABC$ ,  $\angle C = 90^\circ$  and  $AB = 12$ . Squares  $ABXY$  and  $ACWZ$  are constructed outside of the triangle. The points  $X$ ,  $Y$ ,  $Z$ , and  $W$  lie on a circle. What is the perimeter of the triangle?

- (A)  $12 + 9\sqrt{3}$     (B)  $18 + 6\sqrt{3}$     (C)  $12 + 12\sqrt{2}$     (D) 30    (E) 32