ANGLE CHASING AND POLYGONS FOR AMC 10: PRACTICE SET

ANDY JO

Contents

1. Problems 2
2. Answer Key 5

1. Problems

Beginner.

1. (2011 AMC 10B, Problem #7) The sum of two angles of a triangle is $\frac{6}{5}$ of a right angle, and one of these two angles is 30° larger than the other. What is the degree measure of the largest angle in the triangle?

(A) 69 **(B)** 72 **(C)** 90 **(D)** 102 **(E)** 108

2. (2007 AMC 10A, Problem #8) Triangles ABC and ADC are isosceles with $AB = BC$ and $AD = DC$. Point D is inside $\triangle ABC$, $\angle ABC = 40^\circ$, and $\angle ADC = 140^\circ$. What is the degree measure of $\angle BAD$?

(A) 20 **(B)** 30 **(C)** 40 **(D)** 50 **(E)** 60

3. (2015 AMC 12B, Problem #7) A regular 15-gon has L lines of symmetry, and the smallest positive angle for which it has rotational symmetry is R degrees. What is $L + R$?

(A) 24 **(B)** 27 **(C)** 32 **(D)** 39 **(E)** 54

4. (1962 AHSME, Problem #20) The angles of a pentagon are in arithmetic progression. One of the angles, in degrees, must be:

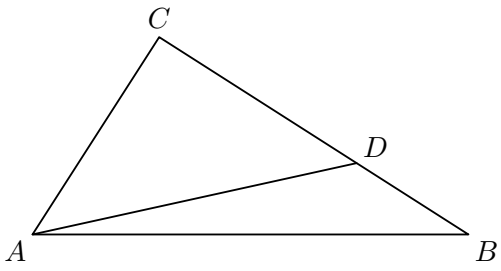
(A) 108 **(B)** 90 **(C)** 72 **(D)** 54 **(E)** 36

5. (1968 AHSME, Problem #6) Let side AD of convex quadrilateral $ABCD$ be extended through D, and let side BC be extended through C, to meet in point E. Let S represent the degree-sum of angles CDE and DCE, and let S' represent the degree-sum of angles BAD and ABC. If $r = \frac{S}{S'}$, then:

(A) $r = 1$ sometimes, $r > 1$ sometimes **(B)** $r = 1$ sometimes, $r < 1$ sometimes
(C) $0 < r < 1$ **(D)** $r > 1$ **(E)** $r = 1$

Intermediate.

6. (1957 AHSME, Problem #44) In triangle ABC, $AC = CD$ and $\angle CAB - \angle ABC = 30^\circ$. Then $\angle BAD$ is:



(A) 30° **(B)** 20° **(C)** $22\frac{1}{2}^\circ$ **(D)** 10° **(E)** 15°

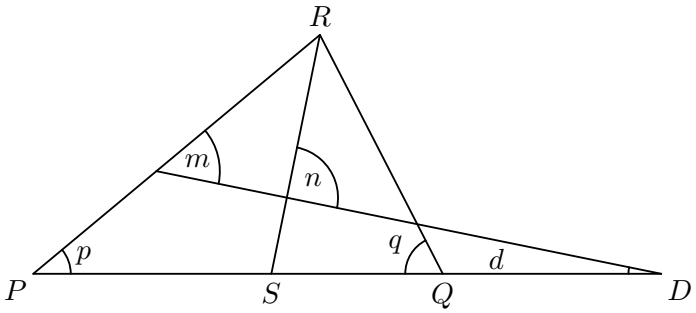
7. (1961 AHSME, Problem #27) Given two equiangular polygons P_1 and P_2 with different numbers of sides; each angle of P_1 is x degrees and each angle of P_2 is kx degrees, where k is an integer greater than 1. The number of possibilities for the pair (x, k) is:

(A) infinite **(B)** finite, but greater than two **(C)** two **(D)** one **(E)** zero

8. (1991 AHSME, Problem #12) The measures (in degrees) of the interior angles of a convex hexagon form an arithmetic sequence of positive integers. Let m° be the measure of the largest interior angle of the hexagon. The largest possible value of m° is

(A) 165° **(B)** 167° **(C)** 170° **(D)** 175° **(E)** 179°

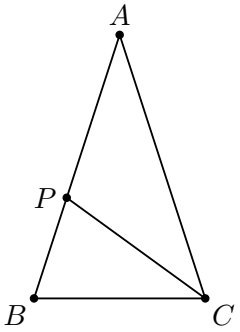
9. (1954 AHSME, Problem #37) Given triangle PQR with $\overline{RS}$ bisecting $\angle R$, $\overline{PQ}$ extended to D, and $\angle n$ a right angle, then:



(A) $\angle m = \frac{1}{2}(\angle p - \angle q)$ **(B)** $\angle m = \frac{1}{2}(\angle p + \angle q)$ **(C)** $\angle d = \frac{1}{2}(\angle q + \angle p)$

(D) $\angle d = \frac{1}{2}\angle m$ **(E)** none of these is correct

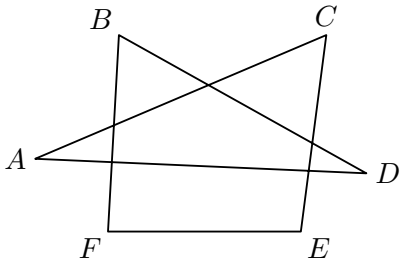
10. (1994 AHSME, Problem #13) In triangle ABC, $AB = AC$. If there is a point P strictly between A and B such that $AP = PC = CB$, then $\angle A =$



(A) 30° **(B)** 36° **(C)** 48° **(D)** 60° **(E)** 72°

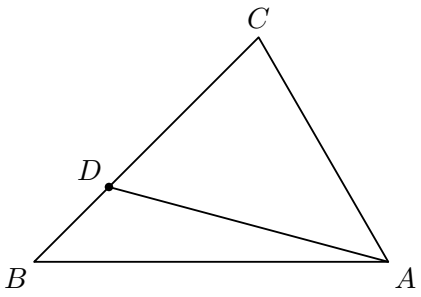
Advanced.

11. (1972 AHSME, Problem #21) If the sum of the measures in degrees of angles A, B, C, D, E, and F in the figure is $90n$, then n is equal to:



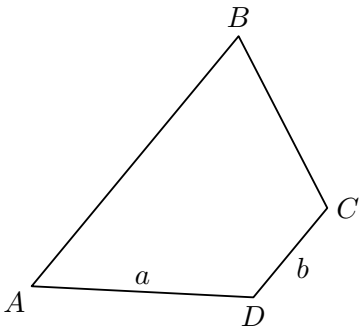
(A) 2 **(B)** 3 **(C)** 4 **(D)** 5 **(E)** 6

12. (2001 AMC 12, Problem #24) In triangle ABC, $\angle ABC = 45^\circ$. Point D is on $\overline{BC}$ so that $2 \cdot BD = CD$ and $\angle DAB = 15^\circ$. Find $\angle ACB$.



(A) 54° **(B)** 60° **(C)** 72° **(D)** 75° **(E)** 90°

13. (1970 AHSME, Problem #30) In the accompanying figure, segments AB and CD are parallel, the measure of angle D is twice that of angle B, and the measures of segments AD and CD are a and b, respectively. Then the measure of AB is equal to:



(A) $\frac{1}{2}a + 2b$ **(B)** $\frac{3}{2}b + \frac{3}{4}a$ **(C)** $2a - b$ **(D)** $4b - \frac{1}{2}a$ **(E)** $a + b$

14. (2022 AIME I, Problem #3) In isosceles trapezoid $ABCD$, parallel bases $\overline{AB}$ and $\overline{CD}$ have lengths 500 and 650, respectively, and $AD = BC = 333$. The angle bisectors of $\angle A$ and $\angle D$ meet at P, and the angle bisectors of $\angle B$ and $\angle C$ meet at Q. Find PQ.

15. (2004 AIME I, Problem #8) Define a *regular n-pointed star* to be the union of n line segments $\overline{P_1P_2}$, $\overline{P_2P_3}$, ..., $\overline{P_nP_1}$ such that

- the points P_1, P_2, ..., P_n are coplanar and no three of them are collinear,
- each of the n line segments intersects at least one of the other line segments at a point other than an endpoint,
- all of the angles at P_1, P_2, ..., P_n are congruent,
- all of the n line segments $\overline{P_1P_2}$, $\overline{P_2P_3}$, ..., $\overline{P_nP_1}$ are congruent, and
- the path $P_1P_2 \dots P_nP_1$ turns counterclockwise at an angle of less than 180° at each vertex.

There are no regular 3-pointed, 4-pointed, or 6-pointed stars. All regular 5-pointed stars are similar, but there are two non-similar regular 7-pointed stars. How many non-similar regular 1000-pointed stars are there?

2. Answer Key

Problem	Letter	Value
1	B	72
2	D	50
3	D	39
4	A	108
5	E	$r = 1$
6	E	15°
7	D	one
8	D	175°
9	B	$\angle m = \frac{1}{2}(\angle p + \angle q)$
10	B	36°
11	C	4
12	D	75°
13	E	$a + b$
14		242
15		199