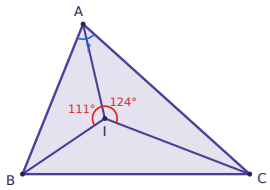
Expert Angle Problems: Triangle Centers, Circles & Polygons · 1

The interior angles of a convex polygon form an arithmetic sequence. The smallest angle is 107° and the angles increase by 8° each time. How many sides does the polygon have?

Expert Angle Problems: Triangle Centers, Circles & Polygons · 2

I is the incenter of triangle ABC (the point where its angle bisectors meet). If ∠AIB = 111° and ∠AIC = 124°, find ∠BAC.

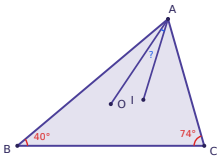


Expert Angle Problems: Triangle Centers, Circles & Polygons · 3

The interior angles of a convex polygon form an arithmetic sequence. The smallest angle is 96° and the angles increase by 6° each time. How many sides does the polygon have?

Expert Angle Problems: Triangle Centers, Circles & Polygons · 4

Acute triangle ABC has circumcenter O and incenter I. If ∠ABC = 40° and ∠ACB = 74°, find ∠OAI.

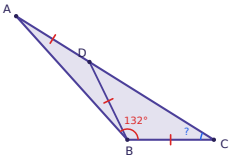


Expert Angle Problems: Triangle Centers, Circles & Polygons · 5

A regular star is drawn by joining every 3rd vertex of a regular polygon. Each point of the star measures 45°. How many points does the star have?

Expert Angle Problems: Triangle Centers, Circles & Polygons · 6

In triangle ABC, point D lies on side AC so that AD = DB = BC. If ∠ABC = 132°, find ∠ACB.

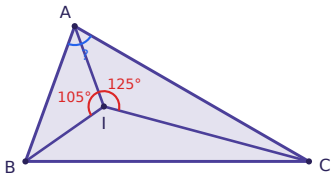


Expert Angle Problems: Triangle Centers, Circles & Polygons · 7

The interior angles of a convex polygon form an arithmetic sequence. The smallest angle is 98° and the angles increase by 5° each time. Find the largest angle.

Expert Angle Problems: Triangle Centers, Circles & Polygons · 8

I is the incenter of triangle ABC (the point where its angle bisectors meet). If ∠AIB = 105° and ∠AIC = 125°, find ∠BAC.



Expert Angle Problems: Triangle Centers, Circles & Polygons · 2

ANSWER

70°

Expert Angle Problems: Triangle Centers, Circles & Polygons · 1

ANSWER

8

Expert Angle Problems: Triangle Centers, Circles & Polygons · 4

ANSWER

17°

Expert Angle Problems: Triangle Centers, Circles & Polygons · 3

ANSWER

5

Expert Angle Problems: Triangle Centers, Circles & Polygons · 6

ANSWER

32°

Expert Angle Problems: Triangle Centers, Circles & Polygons · 5

ANSWER

8

Expert Angle Problems: Triangle Centers, Circles & Polygons · 8

ANSWER

80°

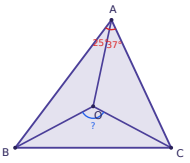
Expert Angle Problems: Triangle Centers, Circles & Polygons · 7

ANSWER

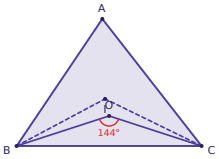
118°

The interior angles of a convex polygon form an arithmetic sequence. The smallest angle is 102° and the angles increase by 3° each time. How many sides does the polygon have?

O is the circumcenter of acute triangle ABC. If ∠OAB = 25° and ∠OAC = 37°, find ∠BOC.

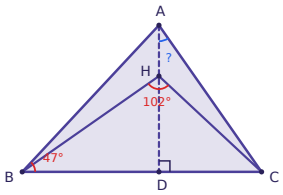


Acute triangle ABC has circumcenter O and incenter I. If ∠BOC = 144°, find ∠BIC.

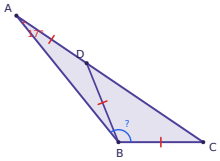


The interior angles of a convex polygon form an arithmetic sequence. The smallest angle is 108° and the angles increase by 8° each time. How many sides does the polygon have?

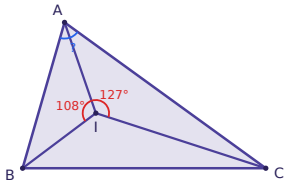
H is the orthocenter of acute triangle ABC (the point where its altitudes meet). If ∠BHC = 102° and ∠ABC = 47°, find ∠HAC.



In triangle ABC, point D lies on side AC so that AD = DB = BC. If ∠BAC = 17°, find ∠ABC.



I is the incenter of triangle ABC (the point where its angle bisectors meet). If ∠AIB = 108° and ∠AIC = 127°, find ∠BAC.



The interior angles of a convex polygon form an arithmetic sequence. The smallest angle is 120° and the angles increase by 5° each time. How many sides does the polygon have?

Expert Angle Problems: Triangle Centers, Circles & Polygons · 10

ANSWER

124°

Expert Angle Problems: Triangle Centers, Circles & Polygons · 9

ANSWER

5

Expert Angle Problems: Triangle Centers, Circles & Polygons · 12

ANSWER

9

Expert Angle Problems: Triangle Centers, Circles & Polygons · 11

ANSWER

126°

Expert Angle Problems: Triangle Centers, Circles & Polygons · 14

ANSWER

129°

Expert Angle Problems: Triangle Centers, Circles & Polygons · 13

ANSWER

35°

Expert Angle Problems: Triangle Centers, Circles & Polygons · 16

ANSWER

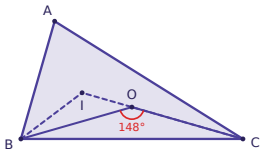
9

Expert Angle Problems: Triangle Centers, Circles & Polygons · 15

ANSWER

70°

Acute triangle ABC has circumcenter O and incenter I. If ∠BOC = 148°, find ∠BIC.

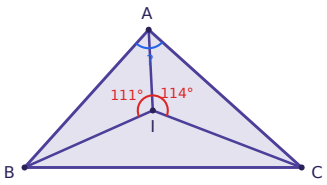


A regular star is drawn by joining every 5th vertex of a regular polygon. Each point of the star measures 105°. How many points does the star have?

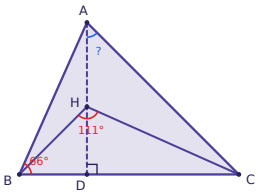
Inside acute angle XOY, points P_1, P_3, P_5, … lie on ray OX and points P_2, P_4, … lie on ray OY, each point farther from O than the one before it on the same ray, so that $OP_1 = P_1P_2 = \dots = P_4P_5$. The last segment P_4P_5 is perpendicular to OY (the ray through P_4). Find $\angle OP_2P_3$.

The interior angles of a convex polygon form an arithmetic sequence. The smallest angle is 116° and the angles increase by 6° each time. How many sides does the polygon have?

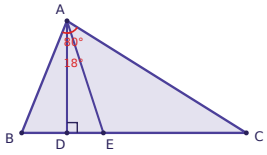
I is the incenter of triangle ABC (the point where its angle bisectors meet). If ∠AIB = 111° and ∠AIC = 114°, find ∠BAC.



H is the orthocenter of acute triangle ABC (the point where its altitudes meet). If ∠BHC = 111° and ∠ABC = 66°, find ∠HAC.



In triangle ABC, AD is the altitude to BC and AE bisects ∠BAC (D and E lie on BC). If ∠DAE = 18°, ∠BAC = 80° and ∠ABC > ∠ACB, find ∠ABC.



The interior angles of a convex polygon form an arithmetic sequence. The smallest angle is 121° and the angles increase by 4° each time. Find the largest angle.

Expert Angle Problems: Triangle Centers, Circles & Polygons · 18

ANSWER

24

Expert Angle Problems: Triangle Centers, Circles & Polygons · 17

ANSWER

127°

Expert Angle Problems: Triangle Centers, Circles & Polygons · 20

ANSWER

9

Expert Angle Problems: Triangle Centers, Circles & Polygons · 19

ANSWER

126°

Expert Angle Problems: Triangle Centers, Circles & Polygons · 22

ANSWER

45°

Expert Angle Problems: Triangle Centers, Circles & Polygons · 21

ANSWER

90°

Expert Angle Problems: Triangle Centers, Circles & Polygons · 24

ANSWER

149°

Expert Angle Problems: Triangle Centers, Circles & Polygons · 23

ANSWER

68°