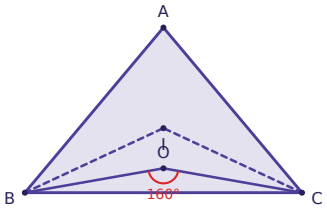
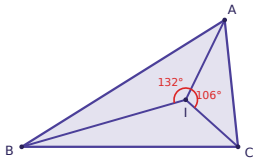
Task card 1 Expert Angle Problems: Triangle Ce...

Acute triangle ABC has circumcenter O and incenter I. If ∠BOC = 160°, find ∠BIC.



Task card 2 Expert Angle Problems: Triangle Ce...

Acute triangle ABC has incenter I and orthocenter H. If ∠AIB = 132° and ∠AIC = 106°, find ∠BHC.



Task card 3 Expert Angle Problems: Triangle Ce...

The interior angles of a convex polygon form an arithmetic sequence. The smallest angle is 135° and the angles increase by 3° each time. How many sides does the polygon have?

Task card 4 Expert Angle Problems: Triangle Ce...

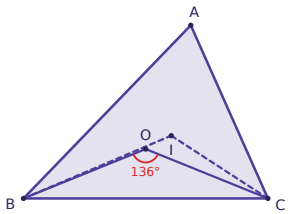
A regular star is drawn by joining every 4th vertex of a regular polygon. Each point of the star measures 20°. How many points does the star have?

Task card 5 Expert Angle Problems: Triangle Ce...

The interior angles of a convex polygon form an arithmetic sequence. The smallest angle is 105° and the angles increase by 6° each time. Find the largest angle.

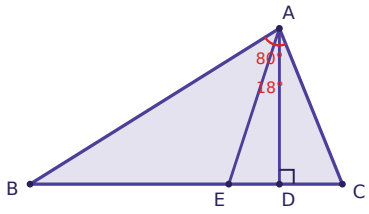
Task card 6 Expert Angle Problems: Triangle Ce...

Acute triangle ABC has circumcenter O and incenter I. If ∠BOC = 136°, find ∠BIC.



Task card 7 Expert Angle Problems: Triangle Ce...

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 ∠ACB > ∠ABC, find ∠ACB.

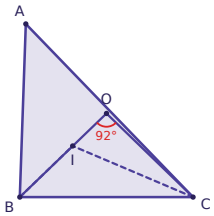


Task card 8 Expert Angle Problems: Triangle Ce...

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 $OP_1 = P_1P_2 = \ldots = P_9P_{10}$. The last segment P_9P_{10} is perpendicular to OX (the ray through P_9). Find $\angle OP_6P_7$.

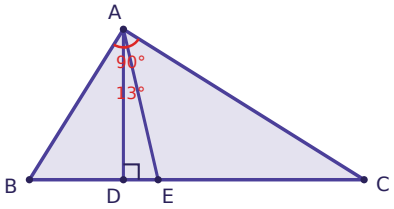
Task card 9 Expert Angle Problems: Triangle Ce...

Acute triangle ABC has circumcenter O and incenter I. If ∠BOC = 92°, find ∠BIC.



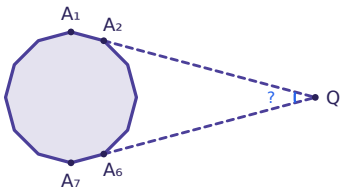
Task card 10 Expert Angle Problems: Triangle Ce...

In triangle ABC, AD is the altitude to BC and AE bisects ∠BAC (D and E lie on BC). If ∠DAE = 13°, ∠BAC = 90° and ∠ABC > ∠ACB, find ∠ABC.



Task card 11 Expert Angle Problems: Triangle Ce...

The sides A_1A_2 and A_6A_7 of a regular 12-sided polygon $A_1A_2\ldots A_{12}$ are extended beyond A_2 and A_6 until they meet at Q. Find $\angle A_2QA_6$.

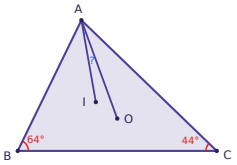


Task card 12 Expert Angle Problems: Triangle Ce...

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 $OP_1 = P_1P_2 = \ldots = P_9P_{10}$. The last segment P_9P_{10} is perpendicular to OX (the ray through P_9). Find $\angle OP_3P_4$.

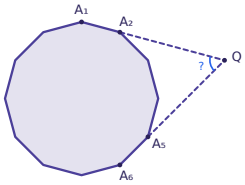
Task card 13 Expert Angle Problems: Triangle Ce...

Acute triangle ABC has circumcenter O and incenter I. If ∠ABC = 64° and ∠ACB = 44°, find ∠OAI.



Task card 14 Expert Angle Problems: Triangle Ce...

The sides A_1A_2 and A_5A_6 of a regular 12-sided polygon $A_1A_2\ldots A_{12}$ are extended beyond A_2 and A_5 until they meet at Q. Find $\angle A_2QA_5$.

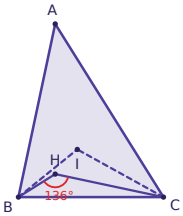


Task card 15 Expert Angle Problems: Triangle Ce...

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 $OP_1 = P_1P_2 = \ldots = P_4P_5$. The last segment P_4P_5 is perpendicular to OY (the ray through P_4). Find $\angle OP_3P_4$.

Task card 16 Expert Angle Problems: Triangle Ce...

Acute triangle ABC has orthocenter H and incenter I. If ∠BHC = 136°, find ∠BIC.



Task card 17 Expert Angle Problems: Triangle Ce...

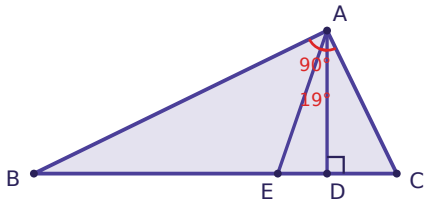
A regular star is drawn by joining every 3rd vertex of a regular polygon. Each point of the star measures 45°. How many points does the star have?

Task card 18 Expert Angle Problems: Triangle Ce...

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 $OP_1 = P_1P_2 = \ldots = P_4P_5$. The last segment P_4P_5 is perpendicular to OY (the ray through P_4). Find $\angle OP_1P_2$.

Task card 19 Expert Angle Problems: Triangle Ce...

In triangle ABC, AD is the altitude to BC and AE bisects ∠BAC (D and E lie on BC). If ∠DAE = 19°, ∠BAC = 90° and ∠ACB > ∠ABC, find ∠ACB.

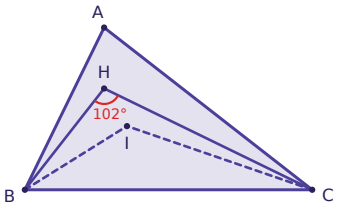


Task card 20 Expert Angle Problems: Triangle Ce...

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 $OP_1 = P_1P_2 = \ldots = P_5P_6$. The last segment P_5P_6 is perpendicular to OX (the ray through P_5). Find $\angle OP_1P_2$.

Task card 21 Expert Angle Problems: Triangle Ce...

Acute triangle ABC has orthocenter H and incenter I. If ∠BHC = 102°, find ∠BIC.

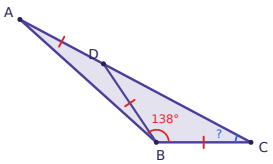


Task card 22 Expert Angle Problems: Triangle Ce...

A regular star is drawn by joining every 3rd vertex of a regular polygon. Each point of the star measures 72°. How many points does the star have?

Task card 23 Expert Angle Problems: Triangle Ce...

In triangle ABC, point D lies on side AC so that AD = DB = BC. If ∠ABC = 138°, find ∠ACB.



Task card 24 Expert Angle Problems: Triangle Ce...

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 $OP_1 = P_1P_2 = \ldots = P_8P_9$. The last segment P_8P_9 is perpendicular to OY (the ray through P_8). Find $\angle OP_2P_3$.

Expert Angle Problems: Triangle Centers, Circles & Polygons Task Cards

Recording sheet · Grade 10 · Solve each problem. Give angles in degrees. Equal tick marks show equal segments. Figures are not drawn to scale.

Scan to check your answers

Name: _____ Date: _____

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24

Expert Angle Problems: Triangle Centers, Circles & Polygons Task Cards: Answer Key

Grade 10 · Hard

The answers online

1. 130°	**2.** 116°	**3.** 15
4. 9	**5.** 135°	**6.** 124°
7. 68°	**8.** 117°	**9.** 113°
10. 58°	**11.** 30°	**12.** 144°
13. 10°	**14.** 60°	**15.** 108°
16. 112°	**17.** 8	**18.** 144°
19. 64°	**20.** 150°	**21.** 129°
22. 10	**23.** 28°	**24.** 150°