

*Analytical etiquette
(almost everything that is essential
when repeating coordinate geometry)*

The vertices of a triangle are: $A(-5; 4)$, $B(2; 5)$ and $C(-1; -4)$ in the coordinate plane.

1. With a diagram, justify that the configuration really is a triangle!
2. Find the coordinates and length of the AC vector!
3. Where is B' midpoint of the AC side?
4. Give the equation of the AC side's perpendicular bisector!
5. Find the coordinates of the circumscribed circle's central point (mark it with K) and radius! Give the equation of the circle as well!
6. Apart from the vertices of the triangle, find all the points on the circle with both integer coordinates!
7. Give the equation of the triangle's altitude that passes through the B vertex! Show the point of intersection with the side opposite of B vertex!
8. Determine the area of the triangle!
9. Give the coordinates of the triangle's orthocenter! (Mark it with M!)
10. Where is the triangle's center of mass? (Mark it with S!)
11. Decide whether S point is on KM straight line or not!
12. Determine the position of KM straight line compared to the AC side!
13. Reflect the M orthocenter to the AC straight line! (Mark the reflection with M' !)
Decide whether the M' is on the circumscribed circle of the triangle!
14. Reflect the M orthocenter to the AC side's B' midpoint! (Mark the new point with M'' !) Is M'' reflection on the circumscribed circle?
15. Reduce the circumscribed circle of the triangle to 50% from M orthocenter! Mark the new circle's central point with K' ! Give the new radius and find the equation of this circle!
16. Decide whether the following statement is true or false! The midpoints of the triangle's sides are on the above mentioned circle with K' central point.
17. Draw tangents for the circumscribed circle in the triangle's vertices!
18. Justify that the above mentioned tangents define a right-angled triangle!
19. What can we say about the $AKBC_1$ quadrilateral, if C_1 is the tangents' (passing through A and B vertices) point of intersection?
20. Give the equation of the parabola with directrix defined by A_1B_1 segment! The focus point shall be the midpoint of the BM segment.
21. Determine the position of the $(4; 1)$ point compared to the above mentioned parabola. Mark the point with P! If it's possible, give the equation of the straight line(s) that touch(es) the parabola!
22. Ask other questions and answer them in connection with this topic! (For example: Is the following statement true? The ACPB quadrilateral is a symmetric trapezium.)