NAME _____

DO ALL 5 PROBLEMS.

1. Proof: A Locus (25 points)

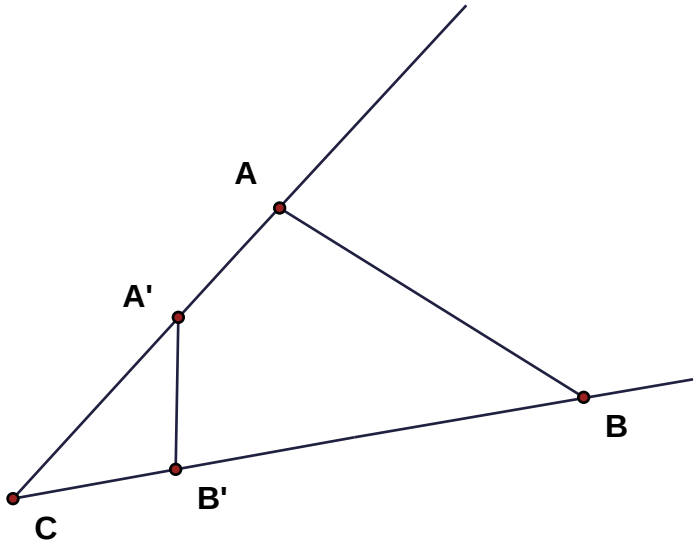
Given two points A and B in the plane.

- Tell, as precisely as possible, what is the set of all points P so that APB is a right angle.

- Prove your statement. You can use all the results that we have proved about similar triangles, parallels and angles, etc. EXCEPTION: Do *not* use statements about right triangles that are just restatements of what you are proving here. Also, do not use the inscribed angle theorems from the circle chapter.

2. Problem: A Distance (15 points)

In the figure, point A' is on ray CA and point B' is on ray CB. Suppose |CA| = a and |CA'|= 3/a. Also |CB| = b and |CB'| = 3/b. If |AB| = 7, what is |A'B'|?
Show your work and give (brief) reasons.

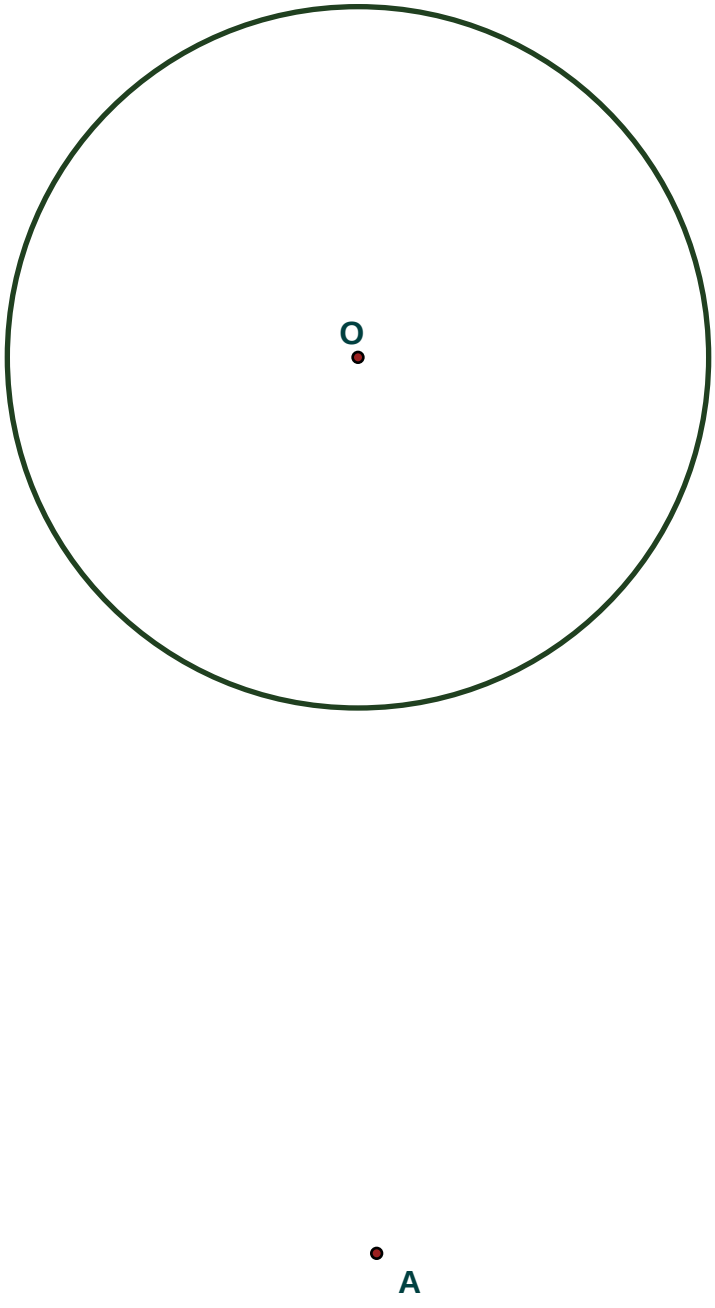


Answer: |A'B'| = _____

Work:

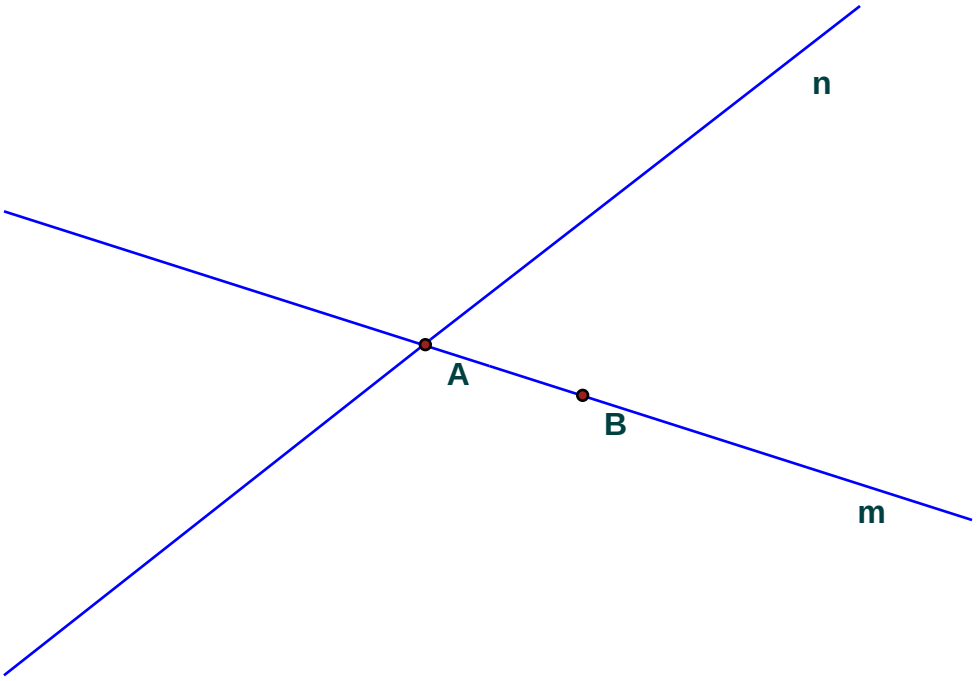
3. Construction: Tangents (15 points)

Construct the lines through point A that are tangent to the circle.
Write down the main steps of the construction. (The point O given in the figure is the center of the circle.)



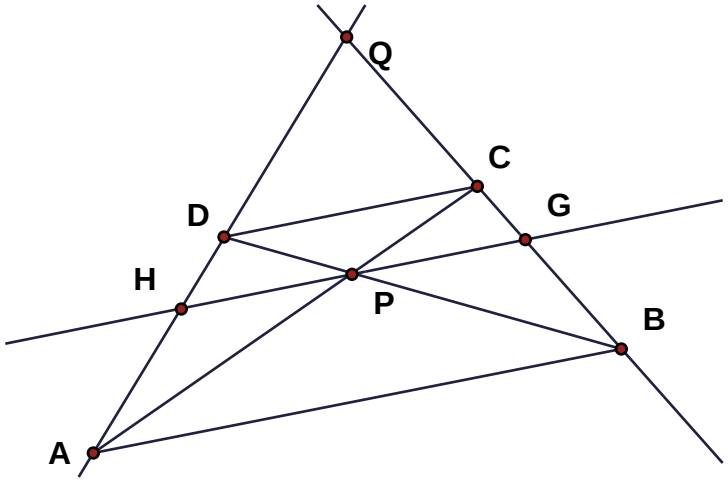
4. Construction: Circles (20 points)

The lines m and n intersect at A (the angle between them is not a special angle).
Construct with straightedge and compass all circles that are tangent to line n and are also tangent to line m at B.
Write down the key steps of the construction.



5. Problem: Ratios in a trapezoid (25 points)

Let ABCD be a trapezoid, with side AB parallel to CD.
Suppose that diagonal AC intersects diagonal BD at P and line BC intersects DA at Q.
Also, the line through P parallel to AB intersects BC at G and DA at H.
The length of AB = 13 and the length of CD = 4. (The figure is not to scale.)



For each question, write the answer in the blank space, but show your work below. (This is not a proof; just show how you solved it.)

(a) Find the ratio |GC|/|GB|. _____

(b) Find the ratio |QC|/|QB|. _____

(c) Find the ratio |HD|/|AD|. _____

(d) Find the ratio |PG|/|PH|. _____