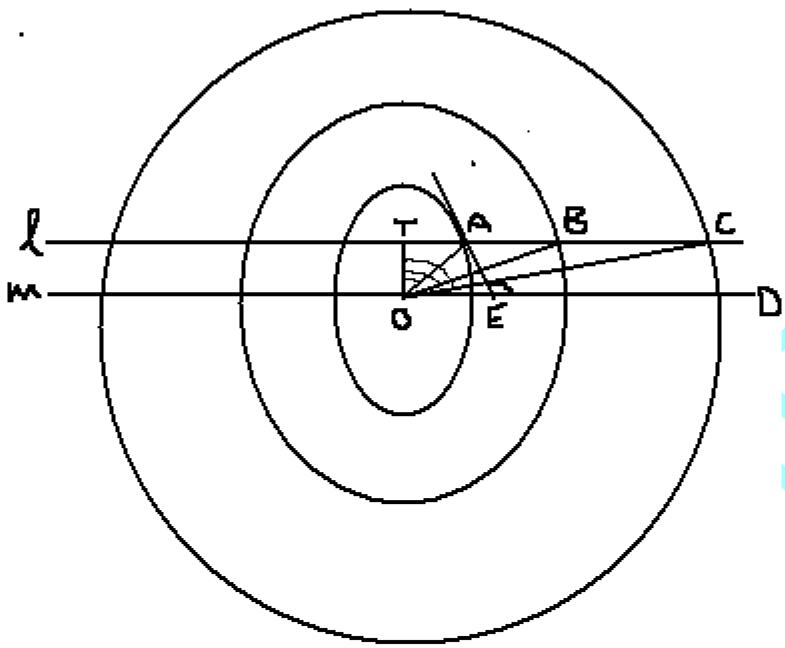
According to the question,
The area of the triangle formed by the tangents to the circle at points A,B and C must be proved equal to 1/2p.AB.BC.CA.



In the above figure, l is the line talked about. OT = p; where O is the centre of the concentric circles and m is a line || l & passing through O.

First of all let's talk about the co-ordinates of the point A. Let O be the origin.

The y-coordinate y=p; Let <AOD=a1,<BOD=a2,<COD=a3;

The x-coordinate x=TA=tan(pi/2-a1)*p=p*cot a1;

The slope of the tangent AE to the point A is tan (pi/2+a1) =-cot(a1);…………………………[External Angle Theorem]

Therefore the equation of the tangent at A can be obtained by the slope-point form of a line as

$x \cot a_1 + y - p(1+\cot^2 a_1) = 0$ ……………………….(1)

|||ly, the equation of the tangent at B is
$x \cot a_2 + y - p(1+\cot^2 a_2) = 0$;…………………………….(2)

Now solving the above two equations by the rule of cross multiplication, we get

$x = p(\cot a_2 + \cot a_1)$, $y = p*(1+\cot a_1 . \cot a_2)$;
This is the same as $x = TA+TB$;($p\cot a_2 = TB$ and $p\cot a_1 = TA$)

& $y = (p^2+OA.OB)/p$;
Now , $x_1 = TA+TB$, $x_2 = TB+TC$, $x_3 = TC+TA$;
And $y_1 = (p^2+TA.TB)/p$, $y_2 = (p^2+TB.TC)/p$,
$y_3 = (p^2+TC.TA)/p$;
where x_1,x_2,x_3 are the x-coordinates of the three meeting points of the tangents and y_1,y_2,y_3 are the y-coordinates of the points.
Now the area of the required triangle is, using determinants

$$\frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} = 1/2 \begin{vmatrix} TA + TB & (p^2+TA.TB)/p & 1 \\ TB + TC & (p^2+TB.TC)/p & 1 \\ TA + TC & (p^2+TA.TC)/p & 1 \end{vmatrix}$$

After taking $1/p$ common from the 2nd column and applying $R_1 \to R_1 - R_2$ and $R_2 \to R_2 - R_3$, take (TC-TA) and (TB-TA) common and then evaluating, we get
Area=1/2p*(TC-TA)*(TB-TA)*(TC-TB)
=1/2p*AC*AB*BC ;
Hence the result.

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