Tips and Tricks to solve questions quickly:

Trick-1

In lecture Prof, talked about equation of circle that passes through three non-collinear points, and lots of algebra is done to get it. It is helpful to understand the process. But for exam, one must have a trick to remember things that are bit complicated. Here is one,

→ Equation of circle through three non-collinear points $P(x_1, y_1)$, $Q(x_2, y_2)$ and $R(x_3, y_3)$ is

$$\begin{vmatrix} x^2 + y^2 & x & y & 1 \\ x_1^2 + y_1^2 & x_1 & y_1 & 1 \\ x_2^2 + y_2^2 & x_2 & y_2 & 1 \\ x_3^2 + y_3^2 & x_3 & y_3 & 1 \end{vmatrix} = 0.$$

With coordinates putted in place, it is a simple determinats problem.

Area of circle = πr^2

Perimeter = $2\pi r$, where r is the radius.

Trick-2

In JEE exams many a times it is asked to find equation of circle whose diameter end points are given. One should understand how to solve it. But for exam one can remember a trick formula to get the job done quickly.

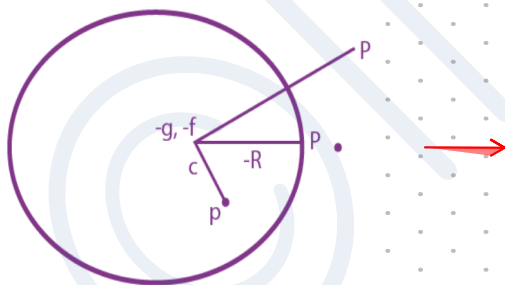→ Equation of circle with points $P(x_1, y_1)$ and $Q(x_2, y_2)$ as extremities of diameter is

$(x - x_1)(x - x_2) + (y - y_1)(y - y_2) = 0$

Focus on structure of the formula and devise a simple mental note to remember it.

Trick-3

Prof, also talked about how to know position of a point wrt a circle. Here is a simple diagram to show concept summary.

Let the circle be $x^2 + y^2 + 2gx + 2fy + c = 0$ and $p(x_1, y_1)$ be the point.

R – radius

cp > R , {Point lie outside}

cp = R , {on the curve}

cp < R , {inside the curve}

Illustration 3: Find the equation of the circle whose diameter is the line joining the points (-4, 3) and (12, -1). Find also the length of intercept made by it on the y-axis.

Solution:

The required equation of the circle is

Application of Trick-2

$(x + 4)(x - 12) + (y - 3)(y + 1) = 0.$

NOTE: For second part of above question see next lecture tricks and notes.