85. A circle C has centre D and equation

$$x^2 + y^2 + 2x - 8y + 8 = 0.$$

(a) Find the coordinates of D and the radius of C. [3]

(b) A line is drawn through the point $P(4, 6)$ so that it touches the circle C at the point T.

(i) Show that $PT = \sqrt{20}$.

(ii) Find the equation of the circle centre P which passes through the point T. [5]

June 2006

86. A circle C_1 with centre A has equation

$$x^2 + y^2 - 6x + 8y - 75 = 0.$$

(a) Find the coordinates of A and the radius of C_1. [3]

(b) A second circle C_2 has centre $B(-6, 8)$ and radius 5.

(i) Show that C_1 and C_2 touch.

(ii) Given that the circles touch at the point $P(-3, 4)$, find the equation of the common tangent. [7]

Jan 2007

87. The circle $x^2 + y^2 + 4x - 16y + 18 = 0$ has centre A and radius r.

(a) Find the coordinates of A and the value of r. [3]

(b) The line $y = x + 2$ and the circle $x^2 + y^2 + 4x - 16y + 18 = 0$ intersect at the points B and C. Find the coordinates of B and C. [4]

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88. The circle C has centre A and equation

$$x^2 + y^2 - 4x + 6y - 12 = 0.$$

(a) Find the coordinates of A and the radius of C. [3]

(b) The point P has coordinates $(5, 1)$ and lies on C. Find the equation of the tangent to C at P. [4]

(c) The line L has equation $y = x + 3$. Show that L and C do not intersect. [4]

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