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A LEVEL MATHS

(32) Circles and Straight Lines (Intersections)

WORKING AT D/E

(1) Show, using simultaneous equations, the line with equation $y = 3$ intersects the circle with centre $(0,0)$ and radius 5 in two places giving the coordinates of the points of intersection.

(2) (a) Find where the circle with equation $(x-3)^2 + (y+2)^2 = 45$ crosses the y axis.

(b) Sketch the graph of $(x-3)^2 + (y+2)^2 = 45$ showing that the circle crosses the x axis at the points $(3+\sqrt{41}, 0)$ and $(3-\sqrt{41}, 0)$

(3) By drawing two graphs, show that the line $y = -x$ is not a tangent or a chord to the circle with equation $(x+5)^2 + (y+6)^2 = 1$

WORKING AT B/C

(1) Show, using algebra, that the line $y = x$ is a chord to the circle with equation $(x-4)^2 + (y-3)^2 = 1$ finding the points where the two graphs meet.

(2) A circle has equation

$$(x+3)^2 + (y-5)^2 = 25$$

(a) Write down the centre of the circle and the radius length.
(b) Show that the line with equation $3x - 4y + 29 = 0$ passes through the circle at two points, finding the points of intersection.
(c) Hence, show that the line creates the diameter of the circle.

(3) Prove, using the discriminant, that The line with equation $y = \frac{4x-31}{3}$ is a tangent to the circle with equation $(x-3)^2 + (y-2)^2 = 25$

WORKING AT A*/A

(1) The line with equation $y = mx$ is a tangent to the circle with equation $(x+2)^2 + (y+1)^2 = 1$. Show, using algebra, that either $m = 0$ or $m = \frac{3}{4}$

(2) Given that the line with equation $y = \frac{1}{2}x + c$ is a chord to the circle with equation $x^2 + (y-8)^2 = 20$, find the range of possible values of c.