The Equation of a Circle – www.m4ths.com – Steve B!

Remember! Where a line or circle crosses the x axis $y = 0$. *Where it crosses the y axis* $x = 0$.

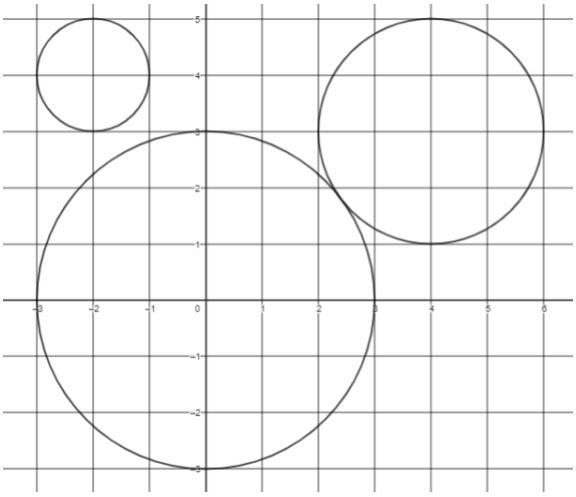
Sketching some of the problems may help!

(1) State the centre and radius of each circle below.

$x^2 + y^2 = 36$	$x^2 + y^2 = 121$
$x^2 + y^2 = 13$	$x^2 + y^2 = 20$
$(x-2)^2 + (y+1)^2 = 4$	$(x+5)^2 + (y+2)^2 = 1$
$(x+11)^2 + (y-3)^2 = 9$	$(x-9)^2 + y^2 = 8$

(2) Sketch each circle in question 1. A sketch is a sketch, not a plot! Just have the centre & radius length

(3) Write down the equation of each circle below



(4) A circle has equation $x^2 + y^2 = 100$

(a) Show that the point $(9, \sqrt{19})$ lies on the circle.

(b) Find where the circle crosses the x axis.

(c) State the length of the diameter of the circle.

(d) The point $A(-8, 6)$ and $B(6, 8)$ lie on the circle. Show that AB is NOT a diameter of the circle.

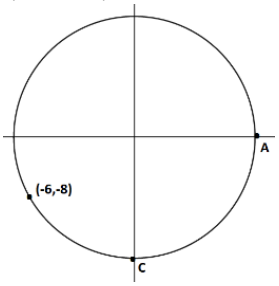
(5) A circle has centre $(3,5)$ and radius 4.

(a) Find the equation of the circle.

(b) Show that the point $P(7,5)$ lies on the circle.

(c) Find the two points on the circle that have an x coordinate of 3.

(6) The diagram below shows a circle. The point $(-6, -8)$ lies on the circle.

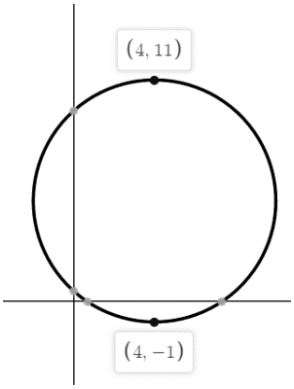


(a) Find the equation of the circle

(b) Hence the coordinates of A and C.

(c) Find the area of the triangle AOC.

(7) The diagram over shows a circle. The two points shown are at opposite ends of a diameter. Find the equation of the circle.



(8) Find the equation of the tangent to the circle with equation $x^2 + y^2 = 25$ at the point $(-3, -4)$.

(9) (a) Find the point of intersection of the circle with equation $x^2 + y^2 = 58$ and the line with equation $y = 2x + 1$.

(10) By completing the square, find the centre & radius of the circle with equation:

$x^2 + y^2 + 4x - 6y - 51 = 0$

(11) (a) Show that the circle with equation

$$(x-4)^2 + (y+2)^2 = 68$$

crosses the x axis at the points $(-4,0)$ and $(12,0)$

(b) Find where the circle crosses the y axis giving your answer in the form $(0,\ p \pm \sqrt{q})$

(12) Find the equation of the tangent to the circle with equation $x^2 + y^2 = 169$ at the point $P(5, q)$, where $q < 0$.

(13) Show that the x axis is a horizontal tangent to the circle with equation $(x-6)^2 + (y-6)^2 = 36$

(14) A circle has equation $x^2 + y^2 - 8x + 10y + 16 = 0$. Find the distance from the centre of the circle to the origin O.

(15) (a) Explain why the line with equation $y = 8$ doesn't interest the circle with equation $x^2 + y^2 = 49$

(b) Find the equations of the vertical tangents to the circle.

(16) Find a point that lies:

(a) inside, (b) on and (c) outside the circle with equation $x^2 + y^2 = 20$.

(17) A circle has the points $P(4,3)$and $Q(8,7)$. Given that PQ is a dimeter, Find the equation of the circle.

(18) The equation of the tangent $(x+3)^2 + (y-1)^2 = 25$ at the point $(-7,4)$ crosses the coordinate axes at A and B.

(a) Find the length of the line segment AB

(b) Find the area of the triangle AOB

(19) Find where the line $y + x = 0$ meets the circle with equation $(x+1)^2 + (y-2)^2 = 8$

(20) Find where the circle $x^2 + y^2 + 2x - 4y - 8 = 0$ crosses the coordinate axes.

(21) What is the largest square that will fit in the circle with equation $x^2 + y^2 = 36$