6.2) Equation of a circle

Worked example	Your turn
Write down the equation of the circle with centre $(6, 7)$ and radius 2	Write down the equation of the circle with centre $(4, 5)$ and radius 9 $(x-4)^2+(y-5)^2=81$
Write down the equation of the circle with centre $(-6, 7)$ and radius 3	Write down the equation of the circle with centre $(-4, 5)$ and radius 8 $(x+4)^2+(y-5)^2=64$
Write down the equation of the circle with centre $(-6, -7)$ and radius 4	Write down the equation of the circle with centre $(-4, -5)$ and radius 7 $(x+4)^2+(y+5)^2=49$
Write down the equation of the circle with centre $(6, -7)$ and radius 5	Write down the equation of the circle with centre $(4, -5)$ and radius 6 $(x-4)^2+(y+5)^2=36$

Worked example	Your turn
Write down the equation of the circle with centre $(0, 0)$ and radius 3	Write down the equation of the circle with centre $(0, 0)$ and radius 5 $x^2 + y^2 = 25$
Write down the equation of the circle with centre $(0, 3)$ and radius 2	Write down the equation of the circle with centre $(0, -5)$ and radius 4 $x^2 + (y + 5)^2 = 16$
Write down the equation of the circle with centre $(-2, 0)$ and radius $2\sqrt{3}$	Write down the equation of the circle with centre $(4, 0)$ and radius $4\sqrt{5}$ $(x - 4)^2 + y^2 = 80$

Worked example

A circle has equation $(x+5)^2+(y-2)^2=80$.

a) Write down the centre and radius

b) Show that the circle passes through $(-1, 10)$

Your turn

A circle has equation $(x-3)^2+(y+4)^2=20$.

a) Write down the centre and radius

b) Show that the circle passes through $(5, -8)$

a) Centre $(3, -4)$, radius $2\sqrt{5}$

b) Shown via substitution

Worked example

A line segment AB is the diameter of a circle, where A and B have coordinates $(5,8)$ and $(-7,4)$ respectively. Determine the equation of the circle.

Your turn

A line segment AB is the diameter of a circle, where A and B have coordinates $(4,7)$ and $(-8,3)$ respectively. Determine the equation of the circle.

$$(x+2)^2+(y-5)^2=40$$

Worked example

Find the centre and radius of the circle with equation

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

Your turn

Find the centre and radius of the circle with equation

$$x^2 + y^2 - 14x + 16y - 12 = 0$$

Centre $(7, -8)$, radius $5\sqrt{5}$

Worked example

A circle has equation $x^2 + y^2 + 6x + 4y = k$, where k is a constant.
State the range of possible values of k

Your turn

A circle has equation $x^2 + y^2 + 10x + 8y = k$, where k is a constant.
State the range of possible values of k

$k > -41$

Worked example

The circle with equation $x^2 + (y - k)^2 = 41$ passes through the point $(5, 6)$.
Find the two possible values of k

Your turn

The circle with equation $(x - k)^2 + y^2 = 45$ passes through the point $(4, 3)$.
Find the two possible values of k

$k = -2, k = 10$