

Circles 1

Overview

This activity can be used by students to explore the link between the equation of a circle, the radius and the centre. The activity can be extended to consider points where the circle intercepts the axes and other points through which the circle passes. Students should be encouraged to think these ideas out for themselves.

There are many solutions to the activity. Students should be encouraged to move cards around giving an opportunity for thinking and discussion. There is one particularly challenging example, the translation, in that there is only one pair of cards that match this equation. The challenge for higher ability students is to find that pair of equations

Method

Give out copies of the circle equations and the statements. Ideally these should be photocopied onto card or laminated. Students should work in pairs to match the equations with the statements. There may be some cards left over. Students can make up criteria for these.

Solutions should be checked through whole class discussion. Throughout the activity students should be asked to justify their solutions.

Students could use their solution to generate notes, showing matching statements and equations with justification.

For further practise the cards can be used to sort into categories e.g.
all the circles that have the same radius.
all the circles that have the same centre.
all the circles that intersect the y axis.
all the circles that intersect the x axis etc

Students can be given blank cards and required to add a new equation to each category.

$$(x - 2)^2 + (y - 3)^2 = 4$$

$$(x - 1)^2 + (y - 3)^2 = 4$$

$$(x - 3)^2 + (y + 1)^2 = 4$$

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

$$(x - 2)^2 + (y - 3)^2 = 1$$

$$(x + 3)^2 + (y - 3)^2 = 18$$

$$(x + 4)^2 + (y + 4)^2 = 1$$

$$(x - 3)^2 + (y - 8)^2 = 20$$

$$(x + 2)^2 + (y - 3)^2 = 9$$

$$(x - 3)^2 + (y + 4)^2 = 9$$

$$(x - 3)^2 + (y + 1)^2 = 9$$

$$(x + 4)^2 + (y + 2)^2 = 9$$

$$(x - 2)^2 + (y - 3)^2 = 16$$

$$(x + 3)^2 + (y - 5)^2 = 16$$

$$(x + 4)^2 + (y + 3)^2 = 25$$

$$(x + 5)^2 + (y - 1)^2 = 16$$

$$(x - 4)^2 + (y - 13)^2 = 2$$

$$(x + 4)^2 + (y + 3)^2 = 16$$

$$(x - 5)^2 + (y + 3)^2 = 16$$

$$(x - 1)^2 + (y - 5)^2 = 9$$

$$(x - 4)^2 + (y - 3)^2 = 9$$

$$(x + 1)^2 + (y - 7)^2 = 16$$

$$(x + 1)^2 + (y + 2)^2 = 16$$

$$(x + 3)^2 + (y - 1)^2 = 20$$

$$(x - 2)^2 + (y - 3)^2 = 12$$

$$(x + 2)^2 + (y - 3)^2 = 10$$

These circles have the same radius.	This circle intersects the y axis but not the x axis.	These circles pass through the origin.
This circle intersects both axes.	These circles have the same centre.	This circle touches the y axis.
These circles have centre $(-2, 3)$.	This circle intersects the x axis but not the y axis.	These circles have radius 4.
The translation from one of these circles to the other is $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$	This circle does not intersect either axis.	This circle passes through the point $(5, 12)$.