

Geogebra Lab - Where does a Line and a Circle intersect?

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Websites

Geogebra Homepage: <http://www.geogebra.org/cms/>

Click on Download to get a free stand alone version for PC or Android (phone).

Geogebra Forum: <http://www.geogebra.org/forum/>

Community of Geogebra users, bug reports and feature requests

Geogebra Facebook Group: <http://www.facebook.com/home.php#!/geogebra>

Pretty active, conference news, lots of helpful stuff

Geogebra Wiki: <http://www.geogebra.org/en/wiki/index.php/English>

Collection of re-usable teaching resources

University of Limerick: <http://www.ul.ie/cemtl/resources.htm>

Excellent GeoGebra step by step demos

LaTeX online equation editor:

<http://www.numberempire.com/texequationeditor/equationeditor.php>

Indispensible if you want to put mathematics into Moodle and don't know any LaTeX!



Click on the Start Menu and look for the GeoGebra icon or search for it.

At the bottom of the screen is the *Input Line*, and on the left of the screen is the *Algebra View*.



Click on the *Panning Tool*, then on the screen, and you can drag the axes around if you wish. Click the little arrow at the bottom right of each command button for other commands.

In the input line type

$$3*x + 2*y = 4$$

press return

$$x^2 + y^2 = 9$$

press return

Note: **always** use lower case x and y.

You will see a straight line and a circle centre (0,0) and radius 3 on the drawing pad with their formulas in the algebra view. Geogebra will accept the formula for a straight line in many forms

e.g. $y = 2x + 1$, $y/2 + x/3 = 5$, $3 = 2(1 - x) + 4(y - x)$

will all be drawn as straight lines. Geogebra will, however, convert them to the form $ax + by = c$ in the algebra view.

You now have two objects on the screen. Jazz them up a bit by right clicking on each (or its formula), go to *Properties*.. and change the colour and line thickness (in *Style*).

The Solution of the Equations

We want to solve the two simultaneous equations we have. Each equation has been represented as a straight line and a circle respectively. Geometrically speaking, *solve* means to find where the line and circle *intersect*. We can see that this is at 2 points.



Click the little arrow on the *Point Tool* then choose the intersect option. Click on the line then the circle and should get two points called A and B where they intersect. Hold the mouse over A and it should tell you that it is the intersection of a line and a circle.

That is pretty much it, but we can add a bit of text too.

Show some text for your solutions



Click on the Insert Text Tool then the drawing pad. In the text box type

One intersect point is
 $x = \boxed{x(A)}$ and $y = \boxed{y(A)}$

The other intersect point is
 $x = \boxed{x(B)}$ and $y = \boxed{y(B)}$

click on OK

You get the boxes by clicking Object, Empty Box before inputting the text $x(A)$ and $y(A)$.

The command $x(A)$ is the x-coordinate of the point A and $y(A)$ its y-coordinate. If you right click the text and go to properties you can change the font etc.

That's it!

Change the problem



Click the Input Box Tool then the drawing pad. In the Caption type **The first Equation is** and for the linked object choose the line equation. Repeat for a second Input box and the circle equation.

To solve a new problem simply change the equations in your input boxes.

Problems

Solve the following simultaneous equations using pen and paper **and** using your solver.

(i) $x - 3y = 19$
 $(x - 5)^2 + (y + 4)^2 = 16$

(ii) $y = -2x + 3$
 $x^2 + y^2 - 8x - 4y + 10 = 0$