

# Teaching Mathematics with Technology - An exploration with Geogebra

Exploring Geogebra for teaching-learning

# Geogebra

a tool for exploration

extending and deepening our own conceptual understanding

- Line
- Linear Equation
- Simultaneous Linear Equation

# Line

One point on a plane - **infinite** lines can pass through it

Two points - One line will always pass through them

Two points - **ONLY** one line can pass through them

**ONE and ONLY ONE** line passes through two points on a plane

# Linear equation in Geogebra

A topic in Algebra - Form is  $ax+by+c=0$  or  $y=mx+c$

Geogebra allows to see the visualization of a linear equation (Algebra view) as a line (Geometry view)

where the  $x$  and  $y$  values satisfying the algebraic equation are coordinates of points on the line (Geometry view)

$x$  and  $y$  values that satisfy the equation have to be points on the line

Converse - if the point is on the line, its  $x$  and  $y$  coordinate will satisfy the equation

# Slope of the line

Slope – the ratio of change in y coordinates over the change in x coordinates, of two points on a line, this is a constant

As slope value increases from 0, the line becomes **steeper** to x axis in the 1st quadrant. As it reduces towards 0, it becomes flatter to the x axis

As slope decreases from 0, the line becomes **steeper** to x axis in the 3rd quadrant. As it increases towards 0, it becomes flatter to the x axis

The '-' sign signifies **reflection** of the original line about the y axis, where the 'extent' of the slope is the same, but the orientation is different

When the y intercept changes (slope remaining constant) the line moves parallel to the original line; meaning of 'slope remains the same'

# Simultaneous linear equations

A topic in Algebra

two equations when 'consistent' give value of  $x$  and  $y$

this value of  $x$  and  $y$ , is simultaneously the solution for both equations

# Simultaneous linear equation in Geogebra

Geometry view - two lines on a plane

Allows to see the visualization of two linear equations as two lines

- where the  $x$  and  $y$  values that satisfy the two equations simultaneously are coordinates of points on both lines.

Two lines can intersect in only one point, hence this is the point of intersection  
No two linear equations can have more than one such solution

Second case where two equations do not have a solution, no value of  $x$  or  $y$  can simultaneously satisfy both equations, e.g,  $y=-x+8$  and  $y=-x+10$   
- this is a case where the lines are parallel (do not intersect)