



When we talk of world coordinate system we refer to **WORLD**. When we talk about viewport's coordinate system, then we refer to **VIEWPORT: INTRINSIC**'s coordinate system (rendering canvas)

The units of the coordinate systems are at least: px (pixels), t (tile), and maybe more in the future.

To begin with we have to define the relationship between tiles and pixels, e.g. 1x1 tile might correspond to 32x32 pixels. Ideally the size of the tile corresponds to the size of tiles in sprite sheets. (texture atlas)

Mapping From world coordinate system and viewports.

$(x_w, y_w)$  is the point in world's coordinate system undergoing mapping.  $(x_i, y_i)$  is the same point in viewport's (intrinsic) coordinate system.  $(x_e, y_e)$  is the coordinates of the upper left corner of the viewport in world's coordinate system.

$(w_e, h_e)$  is the width and height of the viewport in world's coordinate system.  $(w_i, h_i)$  is the width and height of the viewport in viewport's (intrinsic) coordinate system.

WORLD  $\rightarrow$  VIEWPORT

$$\begin{cases} \bullet x_i = (x_w - x_e) \cdot \left( \frac{w_i}{w_e} \right) \\ \bullet y_i = (y_w - y_e) \cdot \left( \frac{h_i}{h_e} \right) \end{cases}$$

VIEWPORT  $\rightarrow$  WORLD

$$\begin{cases} \bullet x_w = x_e + x_i \cdot \left( \frac{w_e}{w_i} \right) \\ \bullet y_w = y_e + y_i \cdot \left( \frac{h_e}{h_i} \right) \end{cases}$$

Currently g-viewport has functions to map points between spaces.

### DEFAULT

By default, everything is positioned in terms of the world's coordinate system. E.g. a player might have position (20, 32) then that's the position in WCS.

### MOUSE

The mouse's xy-coordinates are defined in terms of the viewport's coordinate system.

## OCCLUDER

An object that casts shadows. E.g.