**Velocity and Speed**

***(By: Zappa)***

The **velocity** is the vector quantity that contains the magnitude (speed) and the direction of an Entity,  
while the **speed** is the scalar quantity containing the magnitude of the velocity, measured in distance divided by time. (units/second)  
  
As you know, every Entity has a .velocity vector, and from this vector we can extract the speed of an entity.  
  
To get the velocity from a player, we simply use:

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| local.velocity = local.player.velocity; // assuming local.player is a Player Entity |

Then, to get the speed we use the following formula (Pythagorean theorem):

local.speed = sqrt(pow local.velocity[0] 2 + pow local.velocity[1] 2);

This will return the player's speed relative to the X and Y axis (North, South, East and West) in units per second.  
This can be used to get the walking/running speed of a player  
  
If we want to convert the speed from units/s to a real life unit like feet/s or meters/s we can do the following:

local.unit["ft"] = 0.0625; // 1/16 = 0.0625

local.unit["mt"] = 0.01905; // (1/16) \* 0.3048 = 0.01905

local.unit["cm"] = 1.905; // (1/16) \* 30.48 = 1.905

local.ft\_speed = local.speed \* local.unit["ft"]; // feet/second

local.mt\_speed = local.speed \* local.unit["mt"]; // meters/second

local.cm\_speed = local.speed \* local.unit["cm"]; // centimeters/second

Now if for some reason we want to get the speed relative to the X, Y and Z axis (North, South, East, West, Up and Down)  
we simply add the value of the Z axis in the velocity vector to the speed formula:

local.speed = sqrt(pow local.velocity[0] 2 + pow local.velocity[1] 2 + pow local.velocity[2] 2);

// or alternatively

local.speed = vector\_length local.player.velocity;

This can be used to show the speed of a flying Entity

A simple demo script:

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| local.unit["ft"] = 0.0625; // 1/16  local.unit["mt"] = 0.01905; // (1/16) \* 0.3048 = 0.01905  local.unit["cm"] = 1.905; // (1/16) \* 30.48 = 1.905  // assuming local.player is a Player Entity  while (local.player) {  local.velocity = local.player.velocity;  local.speed = sqrt(pow local.velocity[0] 2 + pow local.velocity[1] 2);  local.ft\_speed = local.speed \* local.unit["ft"];  local.mt\_speed = local.speed \* local.unit["mt"];  local.cm\_speed = local.speed \* local.unit["cm"];  local.player iprint("");  local.player iprint("velocity: " + local.velocity);  local.player iprint("speed: " + string(int(local.speed)) + " u/s");  local.player iprint("speed: " + string(int(local.ft\_speed)) + " ft/s");  local.player iprint("speed: " + string(int(local.mt\_speed)) + " mt/s");  // local.player iprint("speed: " + string(int(local.cm\_speed)) + " cm/s");  waitframe;  } |

How it looks in-game:

<https://www.youtube.com/watch?v=voaAAQfMBt0>