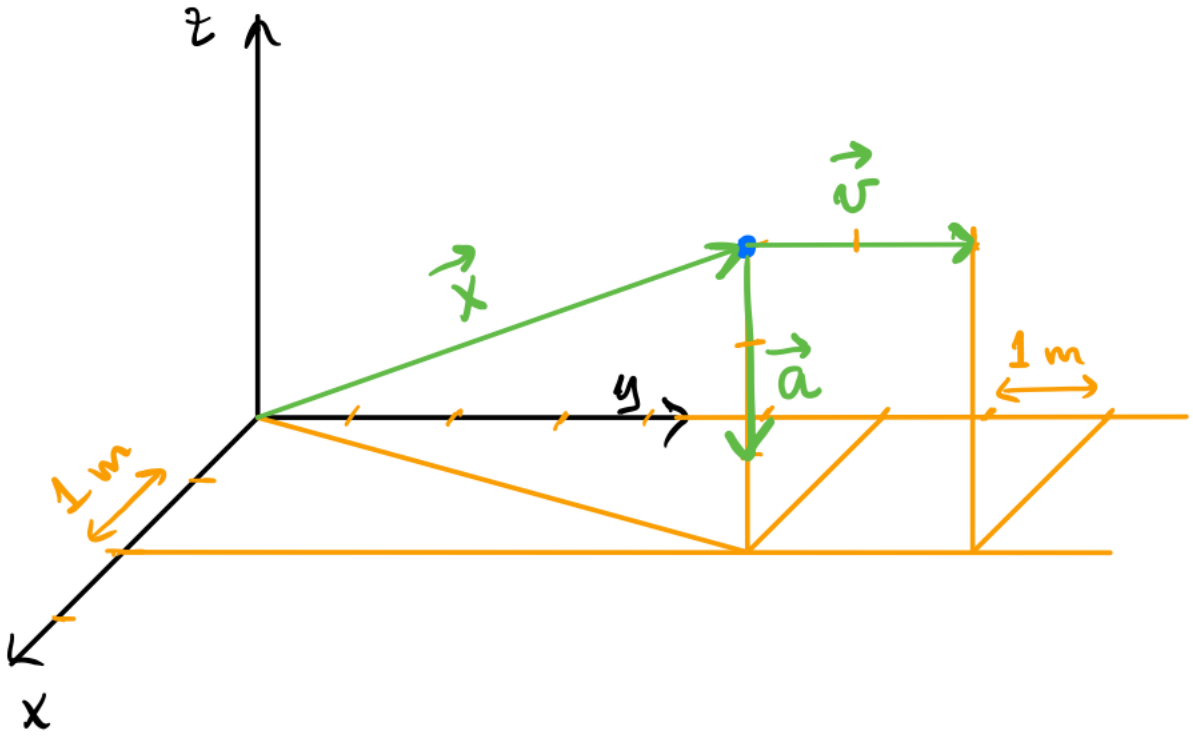
Today's worksheet consists of a few questions related to the concepts covered in Lecture 5.

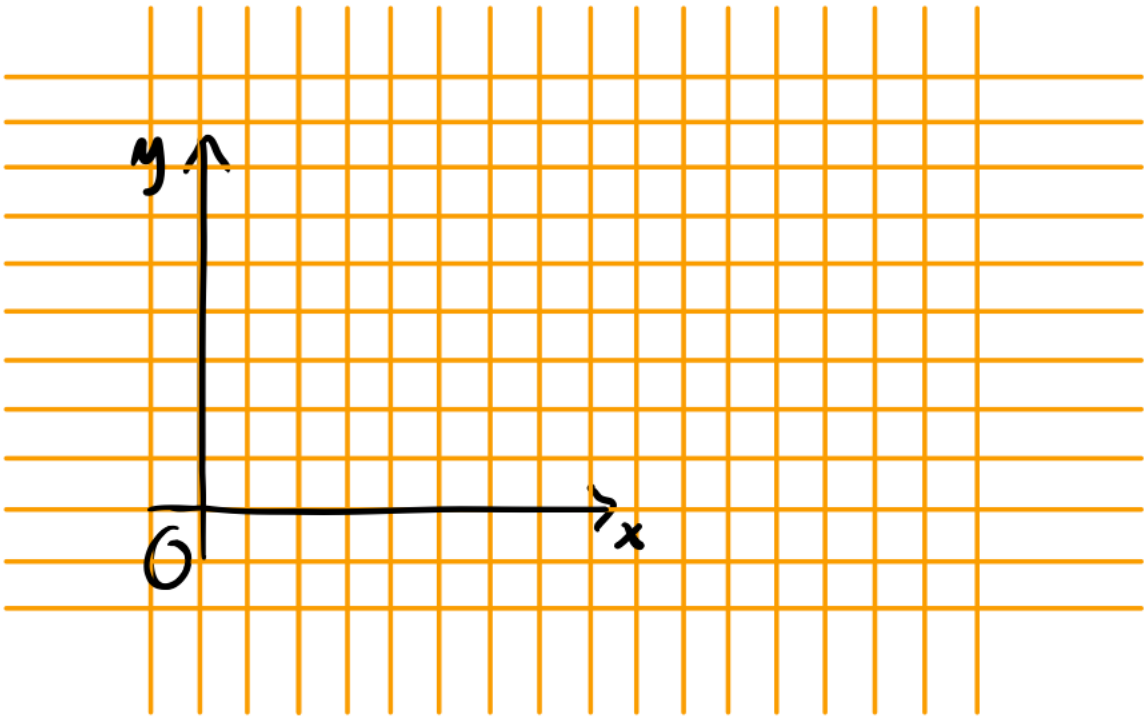
1. Translate the following mathematical statements into the language of symbols and equations. Choose your symbols appropriately.
   1) $A$ equals two times $B$.
   2) $A$ equals $B$ to the power of three, plus $C$.
   3) The distance $d$ between an observer and the object is equal to the magnitude of the position vector $\vec{x}$.
   4) Time equals minus five seconds.
   5) A velocity vector has components $v_x = 5\ m/s$, $v_y = 0\ m/s$ and $v_z = -4\ m/s$.
   6) The kinetic energy $K$ of an object is equal the mass times the velocity squared, divided by two.
   7) The separation vector $\vec{s}$ joining two objects is equal to the position vector of one of them $\vec{x}_1$ minus the position vector of the other $\vec{x}_2$.
   8) The force vector due to gravity between two masses is proportional to the product of the masses times the separation vector, divided by the distance between the masses to the third power.

2. Write down the three vectors (position, velocity and acceleration) from the figure below in terms of their components.



**NAME:**

3. Do the opposite. Given the following position, velocity and acceleration vectors. Represent them in the two dimensional grid below. $\vec{x} = (10, 6)\ m$, $\vec{v} = (-5, -2)\ m/s$, $\vec{a} = (4, 3)\ m/s^2$




4. Can you think of a physical situation where a two dimensional grid is enough to describe motion?

5. Classify in scalar or vector the following physical quantities: position of a particle, atmospheric pressure, temperature, velocity of a projectile, acceleration of the moon, mass of the Sun.

6. Does the velocity vector of an object varies depending on the observer's own velocity? Think about it and explain your answer.

7. Think of a physical example where:

   a) The position, velocity and acceleration vectors of the object don't change in time.
   b) The position and velocity change in time but the acceleration doesn't.
   c) The position, velocity and acceleration vector they all change in time.
   d) The position and velocity vector change in time but the speed remains constant in time.