Name : _____ **Group :** _____
Matric No: _____ **Date:** _____18/2/2021_____

1a) Write down both the Galilean and Lorentz Transformation equations.

$$\text{Galilean}: \quad x' = (x - vt)$$
$$y' = y$$
$$z' = z$$
$$t' = t$$

$$\text{Lorentz}: \quad x' = (x - vt)\gamma$$
$$y' = y$$
$$z' = z$$
$$t' = \left(t - \frac{vx}{c^2}\right)\gamma$$

1b) What are the important or counter intuitive difference(s) between the 2 types of transformations?

The main difference is that time is now treated on the same footing as space. Thus it is susceptible to differences between different frames of reference. This would thus indicate that there is no notion of simultaneous events.

1c) Which of the 2 transformations is commonsensical (or intuitive) to us as human beings? Why?

Galilean transformation is more intuitive as we would tend to believe that time is equal from all perspectives.

1d) If the x'- axis correspond to the $ct' = 0$ line in the Lorentz Transformation equations, what is
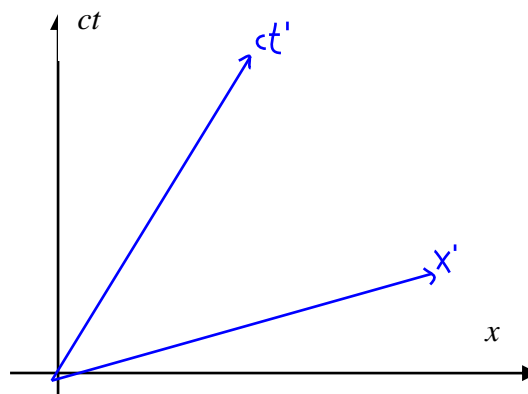$ct =$ ___$\frac{c}{v}x$___ and the gradient is ___$\frac{c}{v}$___ ?
Hence draw this line, $ct =$ ___$\frac{c}{v}x$___ on the graph below.

e) If ct' – axis corresponds to the $x' = 0$ line in the Lorentz Transformation equations, what is
$ct =$ ___$\frac{v}{c}x$___ and the gradient is ___$\frac{v}{c}$___ ?
Hence draw this line, $ct =$ ___$\frac{v}{c}x$___ on the same graph below.

After this assignment, do think about the ***implications of the above space-time diagram in regard to time dilation and length contraction.***