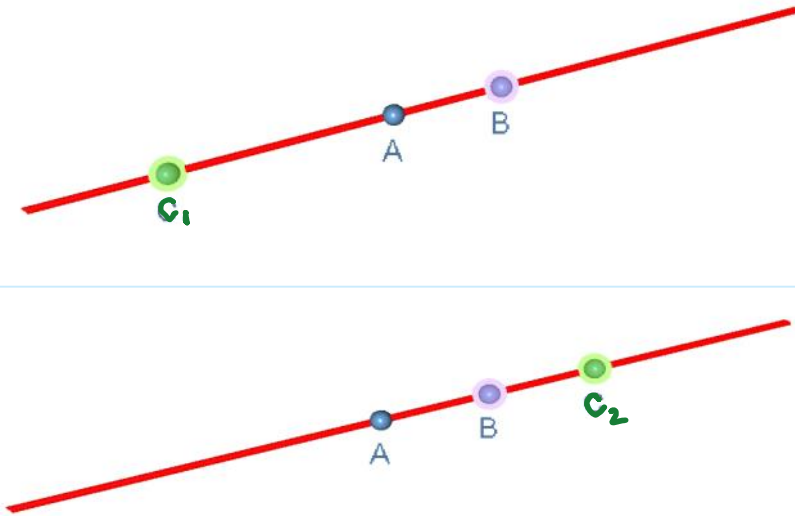A line L passes through the points A(0,2,-4) and B(3,-3,2)

Point C also lies on the line L. Find the posibble coordinates of C given that $\left|\overrightarrow{AC}\right| = 2\left|\overrightarrow{AB}\right|$

There are two possible solutions

Find vector equation of line

$$\overrightarrow{AB} = \begin{pmatrix} 3 \\ -3 \\ 2 \end{pmatrix} - \begin{pmatrix} 0 \\ 2 \\ -4 \end{pmatrix} = \begin{pmatrix} 3 \\ -5 \\ 6 \end{pmatrix}$$

$$\underline{r} = \begin{pmatrix} 0 \\ 2 \\ -4 \end{pmatrix} + \lambda \begin{pmatrix} 3 \\ -5 \\ 6 \end{pmatrix}$$

when $\lambda = 1$ this defines the point B

For C_1 $\lambda = -2$

$$\underline{r} = \begin{pmatrix} 0 \\ 2 \\ -4 \end{pmatrix} + (-2) \begin{pmatrix} 3 \\ -5 \\ 6 \end{pmatrix} \qquad \overrightarrow{OC_1} = \begin{pmatrix} -6 \\ 12 \\ -16 \end{pmatrix} \qquad C_1(-6, 12, -16)$$

For C_2 , $\lambda = 2$

$$\underline{r} = \begin{pmatrix} 0 \\ 2 \\ -4 \end{pmatrix} + 2 \begin{pmatrix} 3 \\ -5 \\ 6 \end{pmatrix} \qquad \overrightarrow{OC_2} = \begin{pmatrix} 6 \\ -8 \\ 8 \end{pmatrix} \qquad C_2(6, -8, 8)$$