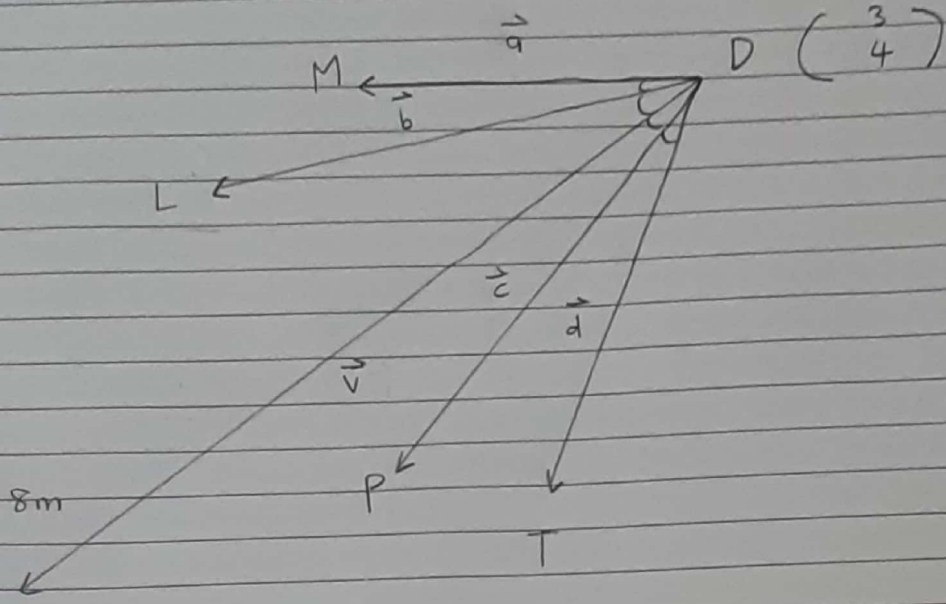
2b)

The direction of $\vec{v}$ is $\begin{pmatrix} -4 \\ -3 \end{pmatrix}$



$\overrightarrow{DM}$ is $\vec{a}$

$\overrightarrow{DL}$ is $\vec{b}$

$\overrightarrow{DP}$ is $\vec{c}$

$\overrightarrow{DT}$ is $\vec{d}$

2b)

$D = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$ $\quad |\vec{v}| = \sqrt{-4^2 + (-3)^2}$

$= \sqrt{25}$

(i) Find the distance between Dry bone and Mario.

$\vec{DM} = \vec{OM} - \vec{OD}$

$= \begin{pmatrix} -3 \\ -2 \end{pmatrix} - \begin{pmatrix} 3 \\ 4 \end{pmatrix}$

$= \begin{pmatrix} -6 \\ -6 \end{pmatrix}$

$|DM| = \sqrt{-6^2 + (-6)^2} = \sqrt{36 + 36}$

$= \sqrt{72} = 8.485281374$

$\approx 8.49\,m$

Find the angle between Dry bone and Mario.

$\cos\theta = \dfrac{\vec{DM} \cdot \vec{v}}{|DM||v|}$

$= \dfrac{(-6 \times (-4)) + (-6 \times (-3))}{\sqrt{72}\ \sqrt{25}}$

$= \dfrac{24 + 18}{\sqrt{72}\ \sqrt{25}} = \dfrac{42}{\sqrt{72}\sqrt{25}}$

$\cos^{-1}\left(\dfrac{42}{\sqrt{72}\sqrt{25}}\right) = 8.130102354$

$\approx 8.1^\circ$

Mario cannot been seen, Due to poor viewing of distance of 8m

No.

Date

(ii) Find the distance between Drybone and Luigi

$$\vec{DL} = \vec{OL} - \vec{OD}$$

$$= \begin{pmatrix} 0 \\ 0 \end{pmatrix} - \begin{pmatrix} 3 \\ 4 \end{pmatrix}$$

$$= \begin{pmatrix} -3 \\ -4 \end{pmatrix}$$

$$|DL| = \sqrt{-3^2 + (-4)^2} = \sqrt{25}$$

$$= 5 \text{ m}$$

Find the angle between Drybone and Luigi.

$$\cos\theta = \frac{\vec{DL} \cdot \vec{v}}{|DL|\,|v|}$$

$$= \frac{(-3 \times (-4)) + (-4 \times (-3))}{\sqrt{25}\sqrt{25}}$$

$$= \frac{12 + 12}{\sqrt{25}\sqrt{25}} = \frac{24}{\sqrt{25}\sqrt{25}}$$

$$\cos^{-1}\left(\frac{24}{\sqrt{25}\sqrt{25}}\right) = 16.26026471$$

$$\approx 16.3^\circ$$

Luigi can been seen.

(iii) Find the distance between Drybone and Peach

$$\vec{DP} = \vec{OP} - \vec{OD}$$

$$= \begin{pmatrix} -4 \\ 4 \end{pmatrix} - \begin{pmatrix} 3 \\ 4 \end{pmatrix}$$

$$= \begin{pmatrix} -7 \\ 0 \end{pmatrix}$$

$$|DP| = \sqrt{-7^2 + 0^2} = \sqrt{49}$$

$$= 7\,m$$

Find the angle between Drybone and Peach

$$\cos\theta = \frac{\vec{DP} \cdot \vec{v}}{|DP|\,|v|}$$

$$= \frac{(-7 \times (-4)) + (0 \times (-3))}{\sqrt{49}\ \sqrt{25}}$$

$$= \frac{28 + 0}{\sqrt{49}\ \sqrt{25}} = \frac{28}{\sqrt{49}\sqrt{25}}$$

$$\cos^{-1}\left(\frac{28}{\sqrt{49}\sqrt{25}}\right) = 36.86989765$$

$$\approx 36.9^\circ$$

Peach can been seen

No :

Date :

(iv) Find the distance between Drybone and Toad.

$$\vec{DT} = \vec{OT} - \vec{OD}$$

$$= \begin{pmatrix} 0 \\ -3 \end{pmatrix} - \begin{pmatrix} 3 \\ 4 \end{pmatrix}$$

$$= \begin{pmatrix} -3 \\ -7 \end{pmatrix}$$

$$|DT| = \sqrt{-3^2 + (-7)^2} = \sqrt{58}$$
$$= 7.615773106 \approx 7.62 \text{ m}$$

Find the angle between Drybone and Toad

$$\cos\theta = \frac{\vec{DT} \cdot \vec{v}}{|DT|\,|v|}$$

$$= \frac{(-3 \times (-4)) + (-7 \times (-3))}{\sqrt{58}\ \sqrt{25}}$$

$$= \frac{12 + 21}{\sqrt{58}\ \sqrt{25}} = \frac{33}{\sqrt{58}\sqrt{25}}$$

$$\cos^{-1}\left(\frac{33}{\sqrt{58}\sqrt{25}}\right) = 29.93151184$$
$$\approx 29.9^\circ$$

Toad can been seen