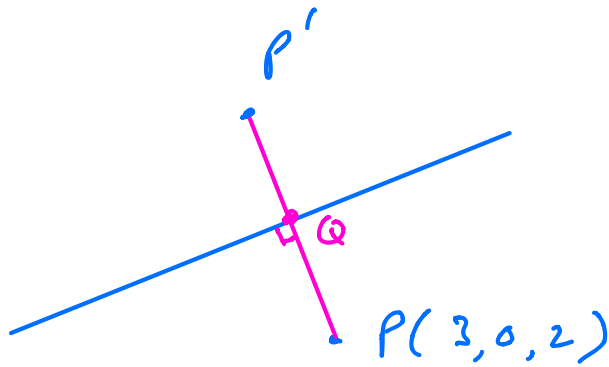


Vectors Exercise 9 F

$$7) \quad \ell \quad \underline{r} = \begin{pmatrix} 2 \\ -1 \\ 3 \end{pmatrix} + \lambda \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix}$$



$$Q(2+\lambda, -1+2\lambda, 3-\lambda)$$

$$\vec{PQ} = \begin{pmatrix} -1+\lambda \\ -1+2\lambda \\ 1-\lambda \end{pmatrix}$$

$\vec{PQ} \perp \text{to } \ell$

$$\Rightarrow \begin{pmatrix} -1+\lambda \\ -1+2\lambda \\ 1-\lambda \end{pmatrix} \cdot \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix} = 0$$

$$-1 + \lambda - 2 + 4\lambda - 1 + \lambda = 0$$

$$6\lambda = 4$$

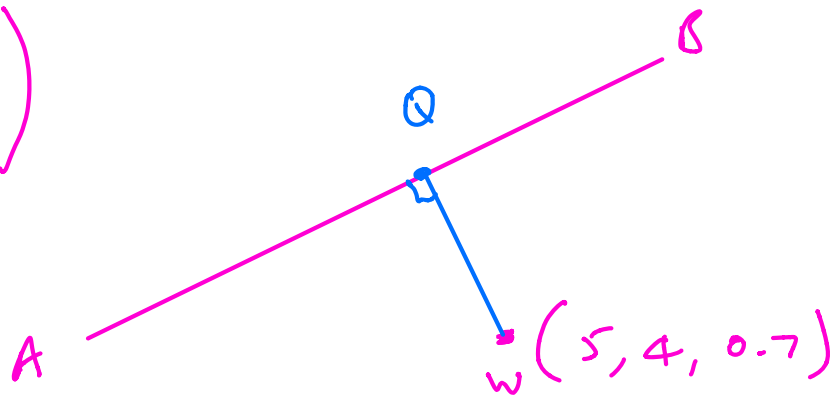
$$\lambda = \frac{2}{3}$$

$$Q\left(\frac{8}{3}, \frac{1}{3}, \frac{7}{3}\right)$$

Congruent Δ s

$$\Rightarrow P'\left(\frac{7}{3}, \frac{2}{3}, \frac{8}{3}\right)$$

9) $\vec{OW} = \begin{pmatrix} 5 \\ 4 \\ 0.7 \end{pmatrix}$



$\vec{OA} = \begin{pmatrix} 3 \\ 5 \\ 0 \end{pmatrix}$ $\vec{OB} = \begin{pmatrix} 12 \\ 0 \\ 1.2 \end{pmatrix}$

$\vec{AB} = \begin{pmatrix} 12-3 \\ 0-5 \\ 1.2-0 \end{pmatrix} = \begin{pmatrix} 9 \\ -5 \\ 1.2 \end{pmatrix}$

$\vec{r} = \begin{pmatrix} 3 \\ 5 \\ 0 \end{pmatrix} + \lambda \begin{pmatrix} 9 \\ -5 \\ 1.2 \end{pmatrix} = \begin{pmatrix} 3+9\lambda \\ 5-5\lambda \\ 0+1.2\lambda \end{pmatrix}$

Find shortest distance of line from W

$\vec{w} \cdot \vec{r} = \begin{pmatrix} 3+9\lambda & -5 \\ 5-5\lambda & -4 \\ 0+1.2\lambda & -0.7 \end{pmatrix} = \begin{pmatrix} -2+9\lambda \\ 1-5\lambda \\ -0.7+1.2\lambda \end{pmatrix}$

\perp so $\begin{pmatrix} -2+9\lambda \\ 1-5\lambda \\ -0.7+1.2\lambda \end{pmatrix} \cdot \begin{pmatrix} 9 \\ -5 \\ 1.2 \end{pmatrix} = 0$

$-18 + 81\lambda - 5 + 25\lambda - 0.84 + 1.44\lambda$

$107.44\lambda - 23.84 = 0$

$\lambda = \frac{23.84}{107.44} = \frac{298}{1343}$

$$|\vec{WQ}| = \sqrt{\left(-2 + 9\left(\frac{298}{1343}\right)\right)^2 + \left(1 - 5\left(\frac{298}{1343}\right)\right)^2 + \left(-0.7 + 1.2 \times \frac{298}{1343}\right)^2}$$

$$= 0.447 \text{ km}$$

This is less than 0.5 km so she can see the bird.

Classwork Exercise 9F Q8, 10, 12