

**AQA – Further vectors – AS Further Mathematics P1**

1. [June/2021/Paper\\_7366/1/No.5](#)

Show that the vectors  $\begin{bmatrix} 1 \\ -3 \\ 5 \end{bmatrix}$  and  $\begin{bmatrix} 7 \\ 4 \\ 1 \end{bmatrix}$  are perpendicular.

**[2 marks]**

**2. June/2021/Paper\_7366/1/No.15**

Two submarines are travelling on different straight lines.

The two lines are described by the equations

$$\mathbf{r} = \begin{bmatrix} 2 \\ -1 \\ 4 \end{bmatrix} + \lambda \begin{bmatrix} 5 \\ 3 \\ -2 \end{bmatrix} \quad \text{and} \quad \frac{x-5}{4} = \frac{y}{2} = 4-z$$

**(a) (i)** Show that the two lines intersect.

**[3 marks]**

**(a) (ii)** Find the position vector of the point of intersection.

**[1 mark]**

**(b)** Tracey says that the submarines will collide because there is a common point on the two lines.

Explain why Tracey is not necessarily correct.

**[1 mark]**

- (c) Calculate the acute angle between the lines

$$\mathbf{r} = \begin{bmatrix} 2 \\ -1 \\ 4 \end{bmatrix} + \lambda \begin{bmatrix} 5 \\ 3 \\ -2 \end{bmatrix} \quad \text{and} \quad \frac{x-5}{4} = \frac{y}{2} = 4-z$$

Give your angle to the nearest  $0.1^\circ$

[3 marks]