AQA – Further vectors – A2 Further Mathematics P2

1. June/2020/Paper_2/No.1

   Three of the four expressions below are equivalent to each other.

   Which of the four expressions is **not** equivalent to any of the others?

   Circle your answer.

   [1 mark]

$$\mathbf{a} \times (\mathbf{a} + \mathbf{b}) \qquad (\mathbf{a} + \mathbf{b}) \times \mathbf{b} \qquad (\mathbf{a} - \mathbf{b}) \times \mathbf{b} \qquad \mathbf{a} \times (\mathbf{a} - \mathbf{b})$$

2. June/2020/Paper_2/No.15

The points $A(7, 2, 8)$, $B(7, -4, 0)$ and $C(3, 3.2, 9.6)$ all lie in the plane Π.

(a) Find a Cartesian equation of the plane Π.

[3 marks]

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2. June/2020/Paper_2/No.15

(b) The line L_1 has equation $\mathbf{r} = \begin{bmatrix} 5 \\ -0.4 \\ 4.8 \end{bmatrix} + \mu \begin{bmatrix} 15 \\ 3 \\ 4 \end{bmatrix}$

(b) (i) Show that L_1 lies in the plane Π.

[2 marks]

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(b) (ii) Show that every point on L_1 is equidistant from B and C.

[4 marks]

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(c)   The line L_2 lies in the plane Π, and every point on L_2 is equidistant from A and B.

Find an equation of the line L_2

[4 marks]

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(d) The points *A*, *B* and *C* all lie on a circle *G*.
The point *D* is the centre of circle *G*.

Find the coordinates of *D*.

[3 marks]

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3. June/2019/Paper_2/No.7

The points A, B and C have coordinates $A(4, 5, 2)$, $B(-3, 2, -4)$ and $C(2, 6, 1)$

(a) Use a vector product to show that the area of triangle ABC is $\dfrac{5\sqrt{11}}{2}$

[4 marks]

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(b) The points A, B and C lie in a plane.

Find a vector equation of the plane in the form $\mathbf{r}.\mathbf{n} = k$

[1 mark]

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(c)   Hence find the exact distance of the plane from the origin.

[1 mark]

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4. June/2019/Paper_2/No.11

The line L_1 has equation

$$\frac{x-2}{3} = \frac{y+4}{8} = \frac{4z-5}{5}$$

The line L_2 has equation

$$\left(\mathbf{r} - \begin{bmatrix} -2 \\ 0 \\ 3 \end{bmatrix}\right) \times \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix} = \mathbf{0}$$

Find the shortest distance between the two lines, giving your answer to three significant figures.

[8 marks]

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4. June/2019/Paper_2/No.11