Math HL Name: ______________________________________

Vectors – Chap 11 Review Period: _____

1. The vectors $\boldsymbol{u}$, $\boldsymbol{v}$ are given by $\boldsymbol{u} = 3\boldsymbol{i} + 5\boldsymbol{j} + \boldsymbol{k}$, $\boldsymbol{v} = \boldsymbol{i} - 2\boldsymbol{j} + 3\boldsymbol{k}$.

a.) Find the unit vectors in the same directions as $\boldsymbol{u}$ and $\boldsymbol{v}$.

b.) Find $u \times v$

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2. Consider the points A(1, 2, 1), B(0, –1, 2), C(1, 0, 2) and D(2, –1, –6).

(a) Calculate $\overrightarrow{AB} \times \overrightarrow{BC}$.

(b) Hence, or otherwise find the area of triangle ABC.

(c) Find the Cartesian equation of the plane P containing the points A, B and C.

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3. A triangle has its vertices at A(–1, 3, 2), B(3, 6, 1) and C(–4, 4, 3). Find $m\angle BAC$.

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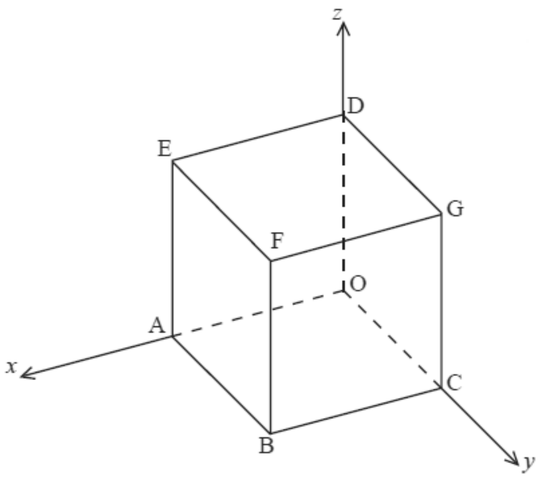
4. The diagram shows a cube OABCDEFG.



Let O be the origin, (OA) the x-axis, (OC) the y-axis and (OD) the z-axis. Let M, N and P be the midpoints of [FG], [DG] and [CG], respectively. The coordinates of F are (2, 2, 2).

(a) Find the position vectors $\overrightarrow{\mathrm{OM}}, \overrightarrow{\mathrm{ON}}$ and $\overrightarrow{\mathrm{OP}}$ in component form.

(b) Find $\overrightarrow{MP} \times \overrightarrow{MN}$.

(c) **Hence**,

(i) calculate the area of the triangle MNP;

(ii) show that the line (AG) is perpendicular to the plane MNP;

(iii) find the equation of the plane MNP.

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5. The angle between the vector $\boldsymbol{a} = \boldsymbol{i} - 2\boldsymbol{j} + 3\boldsymbol{k}$ and the vector $\boldsymbol{b} = 3\boldsymbol{i} - 2\boldsymbol{j} + m\boldsymbol{k}$ is 30°. Find the values of m.

Topic Overview

- Unit vector in particular direction
- Converting between all 3 forms of a line (vector, parametric, Cartesian)
- Finding angle formed between any combination of vectors, lines, and planes (window formulas)
- Computing dot product and its interpretation (type of angle including acute, right, obtuse)
- Computing cross product and its applications, including normal vectors of planes, and areas of parallelograms and triangles
- Equations of planes in Cartesian form using coordinates and normal vectors

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