Lagan College Mathematics Department

GCSE
FURTHER MATHS

Matrices

PP Questions

Answer **all eleven** questions

1 **(i)** Using the axes and scales in **Fig. 1** in your Supplementary Answer Booklet, **sketch** the graph of $y = \cos x$ for $0° \leqslant x \leqslant 360°$. [2]

(ii) **Hence**, using the axes and scales in **Fig. 2** in your Supplementary Answer Booklet, **sketch** the graph of $y = \cos (x + 90°)$ for $0° \leqslant x \leqslant 360°$. [2]

2 **(i)** Solve the equation

$$\sin \theta = -0.6$$

for $-180° < \theta \leqslant 180°$. [2]

(ii) **Hence** solve the equation

$$\sin \left(\frac{x}{2} - 20°\right) = -0.6$$

for $-360° < x \leqslant 360°$. [2]

3 **(i)** Find $\mathbf{A}^{-1}$ where $\mathbf{A} = \begin{bmatrix} 5 & -3 \\ 7 & -2 \end{bmatrix}$ [2]

(ii) **Hence**, using a matrix method, solve the following simultaneous equations for x and y.

$$5x - 3y = 6$$
$$7x - 2y = -7$$

[4]

4 **(a)** Find $\frac{dy}{dx}$ when $y = 5x^3 - \frac{3}{x^5}$ [2]

(b) Find $\int \left(9x^2 + \frac{2}{9x^2} - 4\right) dx$. [4]

Answer **all eleven** questions

1 **(i)** Using the axes and scales in **Fig. 1** in your Supplementary Answer Booklet, **sketch** the graph of $y = 2 \sin x$ for $-360° \leqslant x \leqslant 360°$. [2]

(ii) Using the axes and scales in **Fig. 2** in your Supplementary Answer Booklet, **sketch** the graph of $y = \sin (\frac{1}{2} x)$ for $-360° \leqslant x \leqslant 360°$. [2]

2 **(i)** Solve the equation

$$\tan x = 3$$

for $-180° < x \leqslant 180°$. [2]

(ii) **Hence** solve the equation

$$\tan \left(\frac{x}{2} - 10°\right) = 3$$

for $-360° < x \leqslant 360°$. [3]

3 **(i)** Find $\mathbf{A}^{-1}$ where $\mathbf{A} = \begin{bmatrix} 4 & -3 \\ -6 & 5 \end{bmatrix}$ [2]

(ii) **Hence**, using a matrix method, solve the following simultaneous equations for x and y.

$$4x - 3y = 18$$
$$-6x + 5y = -29$$

[4]

Answer **all eleven** questions

1 Using the axes and scales in **Fig. 1** in your Supplementary Answer Booklet, **sketch** the graph of $y = \sin(\frac{1}{3}x)$ for $-360° \leq x \leq 360°$. [4]

2 **(i)** Solve the equation

$$\cos\theta = 0.1$$

for $0° \leq \theta < 360°$. [2]

(ii) **Hence** solve the equation

$$\cos\left(\tfrac{4}{5}x + 30°\right) = 0.1$$

for $0° \leq x < 360°$. [3]

3 **(i)** Find $\mathbf{A}^{-1}$ where $\mathbf{A} = \begin{bmatrix} 2 & 3 \\ 1 & -6 \end{bmatrix}$ [2]

(ii) **Hence**, using a matrix method, solve the following simultaneous equations for x and y.

$$2x + 3y = 7$$

$$x - 6y = 6$$ [4]

Answer **all eleven** questions

1 **(i)** Using the axes and scales in **Fig. 1** in your Supplementary Answer Booklet, **sketch** the graph of $y = \tan x$ for $-75° \leqslant x \leqslant 75°$. [2]

(ii) **Hence**, using the axes and scales in **Fig. 2** in your Supplementary Answer Booklet, **sketch** the graph of $y = \tan(\frac{1}{2}x)$ for $-150° \leqslant x \leqslant 150°$. [2]

2 **(i)** Solve the equation

$$\sin\theta = -0.4$$

for $0° \leqslant \theta < 360°$. [2]

(ii) **Hence** solve the equation

$$\sin(2x + 60°) = -0.4$$

for $0° \leqslant x < 180°$. [3]

3 **(i)** Find $\mathbf{A}^{-1}$ where $\mathbf{A} = \begin{bmatrix} 5 & -4 \\ -3 & 2 \end{bmatrix}$ [2]

(ii) **Hence**, using a matrix method, solve the following simultaneous equations for x and y.

$$5x - 4y = -10$$

$$-3x + 2y = 4$$ [4]

Answer **all eleven** questions

1 **(i)** Using the axes and scales in **Fig. 1** in your Supplementary Answer Booklet, **sketch** the graph of $y = 2\cos x$ for $-180° \leqslant x \leqslant 180°$. [2]

(ii) Using the axes and scales in **Fig. 2** in your Supplementary Answer Booklet, **sketch** the graph of $y = \cos(2x)$ for $-180° \leqslant x \leqslant 180°$. [2]

2 **(i)** Solve the equation

$$\cos\theta = 0.3$$

for $0° \leqslant \theta < 360°$. [2]

(ii) **Hence** solve the equation

$$\cos\left(\tfrac{3}{4}x + 40°\right) = 0.3$$

for $0° \leqslant x < 360°$. [3]

3 **(i)** Find $\mathbf{A}^{-1}$ where $\mathbf{A} = \begin{bmatrix} -3 & -4 \\ 7 & 8 \end{bmatrix}$ [2]

(ii) **Hence**, using a matrix method, solve the following simultaneous equations for x and y.

$$-3x - 4y = 3$$

$$7x + 8y = -8$$ [4]