Springburn Academy : Mathematics Department

Higher Mathematics : Lesson Starters

Block 2 Trig Graphs

Only use a calculator if necessary

Task 1

1 Express $f(x) = x^2 + x + 8$ in the form $f(x) = (x - a)^2 + b$.

(b) On the same diagram sketch:

(i) the graph of $y = f(x)$;

(ii) the graph of $y = f(x + 8)$.

2 Sketch $y = -cos(x - 45)^0$

3 Given that $\boldsymbol{a} = (3, 4, 0)$ and $\boldsymbol{a}.(\boldsymbol{a} + \boldsymbol{b}) = 7$, what is the value of $\boldsymbol{a}.\boldsymbol{b}$?

4 Differentiate $2\sqrt{x}(x+2)$ with respect to x.

Task 2

1 Sketch $y = -asin(2x)^o + 5$

2 Sketch $y = 10cos(x + 30)^0 - 2$

3 (a) Show that $f(x) = 2x2 - 4x + 5$ can be written in the form $f(x) = a(x + b)^2 + c$.

(b) Hence write down the coordinates of the stationary point of $y = f(x)$ and state its nature.

4 Evaluate $\log_5 2 + \log_5 50 - \log_5 4$.

Task 3

1 Write down the exact value of $\sin 150^o$.

2 Write down the exact value of $\cos 240^o$.

3 The point Q divides the line joining P(-1,-1, 0) to R(5, 2,-3) in the ratio 2 : 1.

Find the coordinates of Q.

4 When f (x) = $2x^4 - x^3 + px^2 + qx + 12$ is divided by (x - 2), the remainder is 114.

One factor of f (x) is (x + 1). Find the values of p and q

Task 4

1 Convert 45° to radian measure.

2 Convert $\frac{3\pi}{4}$ to degree measure.

3 The vertices of a triangle are P(-1, 1), Q(2, 1) and R(-6, 2). Find the equation of the altitude of triangle PQR, drawn from P.

4 What is the solution of $x^2 + 4x > 0$, where x is a real number?

Task 5

1 Find the maximum value of $2 - 3\sin\left(x - \frac{\pi}{3}\right)$ and the value of x where this occurs in the interval $0 \leq x \leq 2\pi$.

2 Sketch $y = 5 - 2\cos\left(x + \frac{\pi}{4}\right)$

3 Express $7 - 2x - x^2$ in the form $a - (x + b)^2$ and write down the values of a and b.
(b) State the maximum value of $7 - 2x - x^2$ and justify your answer.

4 The diagram shows the graph of $y = f(x)$ where f is a logarithmic function.

What is *f(x)?*