

# Springburn Academy : Mathematics Department

## Higher Mathematics : Lesson Starters

### Block 3 ( Applications of Integration 1)

Without using a calculator :

#### Task 1

- 1 Find the equation of the tangent to the curve  $y = x^3 - x - 10$  at the point where  $x = 1$ .
- 2 If  $\cos 2x = \frac{7}{15}$ , find the exact value of  $\cos^2 x$ .
- 3 Find  $\int \sqrt[5]{x^2} dx$ .
- 4 Find the x coordinates where  $y = x^2 - 4$  intersects  $y = 2x - x^2$

#### Task 2

- 1 K is the point  $(3, -2, 3)$ , L $(5, 0, 7)$  and M $(7, -3, -1)$ .  
Calculate the size of angle LKM.
- 2 Find the radius of the circle with equation  $x^2 + y^2 = 8x + 3$ .
- 3  $g(x) = \frac{1}{25 - x^2}$ .  
For what value(s) of x is  $g(x)$  undefined?
- 4 Find  $\int (2x + 7)^4 dx$ .

#### Task 3

- 1 If  $\log_6 y = 2\log_6 x + \log_6 12$  express y in terms of x.
- 2 Express  $4x^2 + 8x - 1$  in the form  $a(x + b)^2 + c$ .
- 3 What are the coordinates of the centre of the circle with equation  
$$3x^2 + 3y^2 - 6x + 18y - 5 = 0?$$
- 4 Given that  $f'(x) = 6x^2$  and  $f(1) = 5$ , find a formula for  $f(x)$  in terms of x.

#### Task 4

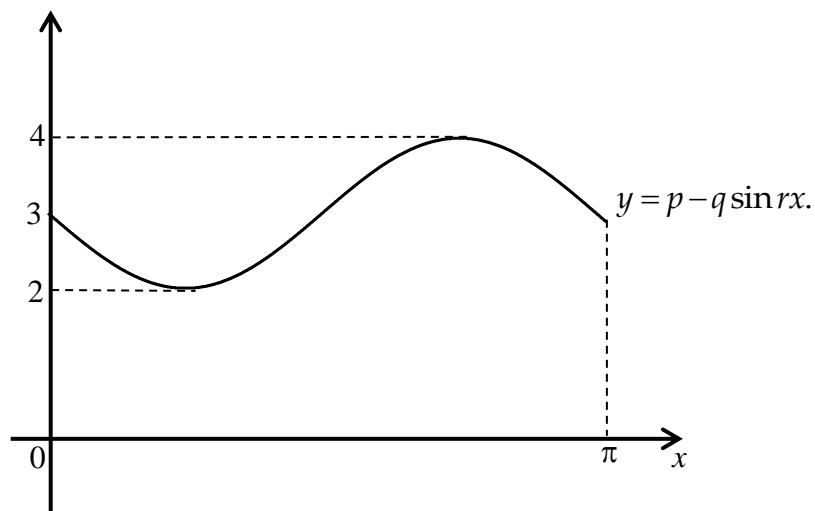
1 What is the value of  $\frac{\log_2 32}{\log_2 8}$ ?

2 If  $5^x = a^2$ , find an expression for  $x$ .

3 Find  $\int_{-2}^0 6x^2 dx$

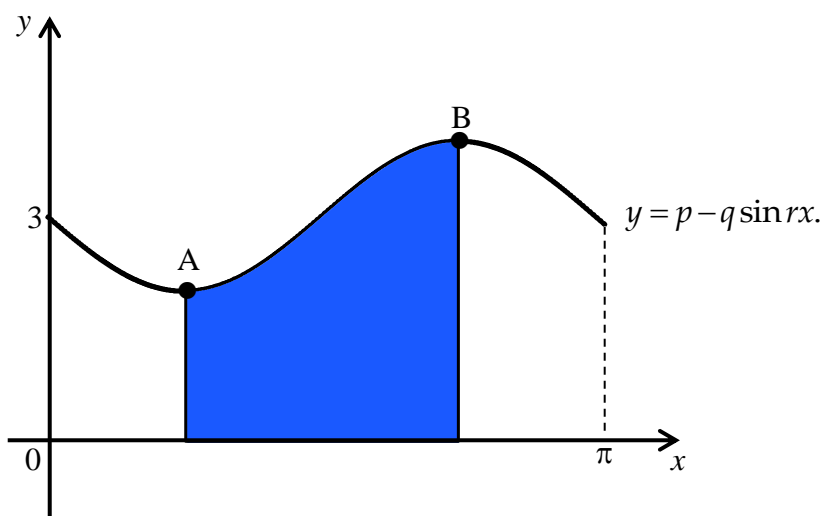
#### Task 5

The diagram below shows part of the graph of  $y = p - q \sin rx$ .



(a) Write down the values of  $p$ ,  $q$  and  $r$ .

The graph of  $y = p - q \sin rx$  has a minimum turning point at A and a maximum turning point at B.



(b) Calculate the shaded area in the diagram above.