

# Springburn Academy : Mathematics Department

## Higher Mathematics : Lesson Starters

### Block 3 ( Trig Equations 2)

Without using a calculator :

#### Task 1

- 1 A circle has equation  $x^2 + y^2 - 8x + 2y - 1 = 0$ .  
What is the radius of this circle?
- 2 What is the value of  $\cos \frac{5\pi}{3} - \tan \frac{7\pi}{4}$ ?
- 3 Given that  $f(x) = 2x^4 - 5x$ , find  $f'(2)$ .
- 4 Find the exact value of  $\sin (x + 60)^\circ - \cos (x + 30)^\circ$ .

#### Task 2

- 1 Given that  $x - 1$  is a factor of  $x^3 - 6x^2 + px - 6$ , find the value of  $p$ .
- 2 What is the maximum value of  $9 - 4\sin\left(x - \frac{\pi}{5}\right)$ ?
- 3 Find  $\int (x-3)(3x+1) dx$ .
- 4 If  $\cos x^\circ = \frac{3}{\sqrt{10}}$  find the exact value of  $\sin 2x^\circ$

#### Task 3

- 1 P and Q have coordinates  $(2, -3, 2)$  and  $(1, 0, 5)$ .  
What is the distance between P and Q?
- 2 If  $x^2 - 8x + 3$  is expressed in the form  $(x-p)^2 + q$ , what is the value of  $q$ ?
- 3 Find  $\int (3x-11)^4 dx$ .
- 4 If  $\tan x^\circ = \frac{1}{\sqrt{15}}$  find the exact value of  $\cos 2x^\circ$

**Task 4**

1 Given that  $f(x) = \frac{1}{3x^5}$ , find  $f'(x)$ .

2 A straight line passes through the points  $(4, 3)$  and  $(0, -1)$ .

What is the equation of the line?

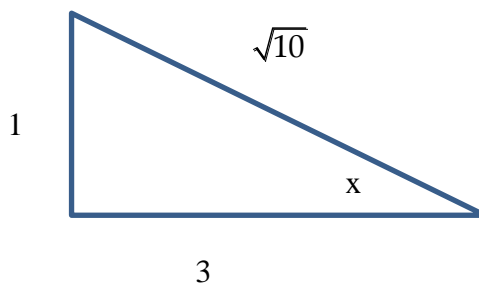
3 Functions  $f$  and  $g$  are defined on the set of real numbers by

$$f(x) = x^2 + 1 \text{ and } g(x) = 3x - 5$$

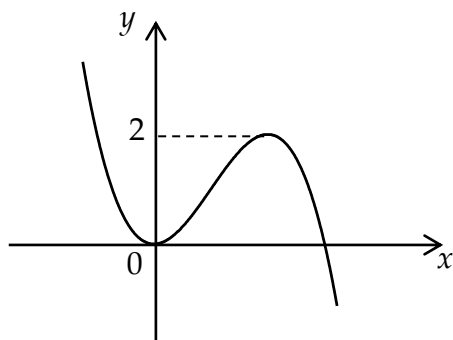
What is the value of  $g(f(-1))$ ?

4 The diagram shows a right-angled triangle with sides 1, 3 and  $\sqrt{10}$ .

What is the value of  $\cos 2x$ ?

**Task 5**

1 The diagram shows the graph of  $y = f(x)$ .



Sketch the graph of  $y = 2 - f(x)$ .

2 Solve  $2\sin 2x = 5\cos x$  for  $0 \leq x < 2\pi$ .