

# Springburn Academy : Mathematics Department

## Higher Mathematics : Lesson Starters

### Block 3 ( Circle 1)

Without using a calculator :

#### Task 1

- 1 Find the distance between  $(0,0)$  and  $(-3, 4)$ .
- 2 What is the min. value of  $5x^2 - 7$ ?
- 3 Determine the nature of the roots of  $2x^2 - 3x + 2$
- 4 If  $f(x) = 3x^2 + 2x - 5$  and  $g(x) = x - 3$ . Find the expression for  $f(g(x))$  and simplify.

#### Task 2

- 1 Find the distance between  $(2,-4)$  and  $(-5, 8)$ .
- 2 If  $u_{n+1} = -0.1u_n - 1.1$ , find  $l$ .
- 3 What is the min. value of  $(x - 3)^2 + 11$ ?
- 4 If  $f(x) = x^2 - 3x + 6$  and  $g(x) = 2x + 5$ . Find the expression for  $f(g(x))$  and simplify.

#### Task 3

- 1 Write down the equation of the circle center  $(0, 0)$  and radius  $\sqrt{5}$ .
- 2 Factorise  $x^2 + 4x - 21$ .
- 3 Solve  $16x^2 = 49$ .
- 4 Write down the exact value of  $\sin 135^\circ$ .

#### Task 4

- 1 Factorise  $3x^2 - 5x - 12$ .
- 2 Write down the exact value of  $\cos 180^\circ$ .
- 3 If  $f(x) = 18 - 3x - x^2$  and  $g(x) = 3x - 4$ . Find the expression for  $f(g(x))$  and simplify.
- 4 Find the midpoint of  $(4, 1)$  and  $(-6, 7)$ .

### Task 5

- 1 The face of a stopwatch can be modelled by the circle with equation

$$x^2 + y^2 - 10x - 4y + 5 = 0.$$

The centre is at C and the winder is at W.

The dial for the second hand is  $\frac{1}{3}$  the size of the face and is located half way between C and W.

(a) Find the coordinates of C and W.

(b) Hence find the equation of the dial for the second hand.

- 2 Convert  $30^\circ$  to radian measure.

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

- 4 Find the equation of the perpendicular bisector of A(1,7) and B (3,12)