

Springburn Academy : Mathematics Department

Higher Mathematics : Lesson Starters

Block 2

Logs

Only use a calculator if necessary.

Task 1

- 1 A is the point (2, -5, 6), B is (6, -3, 4) and C is (12, 0, 1). Show that A, B and C are collinear and determine the ratio in which B divides AC.
- 2 Find algebraically the values of x for which the function $f(x) = 2x^3 - 3x^2 - 36x$ is increasing.
- 3 Find the value of
(a) e^2 (b) e^{-4} (c) $7e^3$ (d) $2e^{-2}$ (d) $\log_2 2$ (e) $\log_5 5$

Task 2

- 1 A curve has equation $y = x^4 - 4x^3 + 3$. Find algebraically the coordinate of the stationary points and determine their nature.
- 2 Find a real root of the equation $2x^3 - 3x^2 + 2x - 8$ and show there are no other real roots.
- 3 Write in logarithmic form:
(a) $16 = 4^2$ (b) $343 = 7^3$ (c) $10000 = 10^4$ (d) $p = q^4$ (e) $2^5 = 32$ (f) $5^0 = 1$

Task 3

- 1 Differentiate $3\cos 2x + 4\sqrt{x}$.
- 2 Find the x -coordinate of each of the points on the curve $y = 2x^3 - 3x^2 - 12x + 20$ at which the tangent is parallel to the x -axis.
- 3 Simplify
(a) $\log_4 16$ (b) $\log_2 32$ (c) $\log_5 125$ (d) $\log_3 81$ (e) $\log_{10} 10000$ (f) $2\log_e e$

Task 4

- 1 Find all the values of x in the interval $0 < x < 2\pi$ for which $\tan x = -\sqrt{3}$.
- 2 The point $P(x, y)$ lies on the curve with equation $y = 6x^2 - x^3$. Find the value of x for which the gradient of the tangent at P is 12.
- 3 Simplify:
(a) $\log_{10} 5 + \log_{10} 20$ (b) $2\log_{10} 5 + \log_{10} 40$ (c) $\log_2 4 + \log_2 8$
(d) $\log_{10} 50 - \log_{10} 5$ (e) $4\log_3 3 - \log_3 27$ (f) $\log_5 16 - 2\log_5 2$

