

QQQ – Core Pure 2 – Chapter 6 – Hyperbolic Functions (Version 1)

Total Marks: 25

(25 = Platinum, 23 = Gold, 20 = Silver, 17 = Bronze)

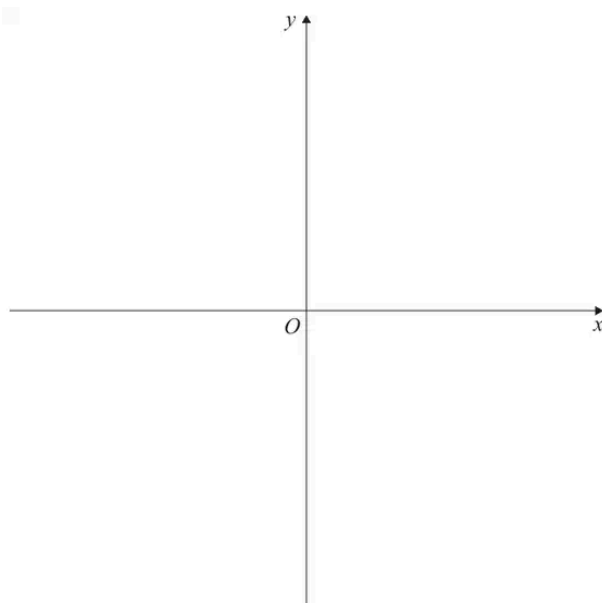
1.

(a) On the axes below, sketch the graph of

$$y = \cosh x$$

Indicate the value of any intercept of the curve with the axes.

[2 marks]



(b) Solve the equation

$$\cosh x = 2$$

Give your answers to three significant figures.

[2 marks]

(Total 4 marks)

2.

In this question you must show all stages of your working.

Solutions relying entirely on calculator technology are not acceptable.

Determine the exact values of x for which

$$\sinh 2x = 3 \sinh x$$

(5)

(Total 5 marks)

Edexcel A2 June 2025 Paper 1 Q2

3.

(a) Given that $y = \cosh^{-1} \left(\frac{1}{3}x \right)$, find $\frac{dy}{dx}$ in terms of x . **[1]**

(b) Determine an equation of the normal to the curve $y = \cosh^{-1} \left(\frac{1}{3}x \right)$ at the point where $x = 5$.

Give your answer in the form $ax + by = c + \ln d$, where a, b, c and d are integers. **[4]**

(Total 5 marks)

OCR A A2 June 2025 Paper 1 Q2

4.

(a) Find

$$\int \frac{1}{\sqrt{(4x^2 + 9)}} dx$$

(2)

(b) Use your answer to part (a) to find the exact value of

$$\int_{-3}^3 \frac{1}{\sqrt{(4x^2 + 9)}} dx$$

giving your answer in the form $k \ln(a + b\sqrt{5})$, where a and b are integers and k is a constant. **(3)**

(Total 5 marks)

Edexcel FP3 June 2013 Q2

5.

(a) Using the exponential definitions of $\sinh x$ and $\cosh x$, prove that

$$\coth^{-1}(x) = \frac{1}{2} \ln \left(\frac{x+1}{x-1} \right)$$

[3 marks]

(b) Hence, solve the equation

$$\coth^{-1}(x) = -\ln 5$$

Give your answer in an exact form.

[3 marks]

(Total 6 marks)