



QUESTION WORKBOOK

Hyperbolic functions and identities

Hyperbolic functions · Year FM

7 questions · 25 marks

PRINT EDITION

SECTION A · Warm-up

- A1** Write down the definitions of $\cosh x$ and $\sinh x$ in terms of exponentials, and state the value of each at $x = 0$. [2]

- A2** Using the definitions, find the exact values of $\cosh(\ln 2)$ and $\sinh(\ln 2)$. [3]

SECTION B · Standard

- B1** Solve $\sinh x = 2$, giving the answer in exact logarithmic form. [3]

- B2** Solve $\cosh x = 5/4$, giving both answers exactly, and explain why there are two. [4]

- B3** Starting from $\cosh^2 x - \sinh^2 x = 1$, derive an identity connecting $\tanh^2 x$ and $\operatorname{sech}^2 x$. [2]

- B4** Using $\cosh^2 x = 1 + \sinh^2 x$, solve $2 \cosh^2 x - \sinh x = 2$, giving exact answers. [5]

SECTION C · Stretch

- C1** Solve $5 \cosh x - 4 \sinh x = 3$, giving your answer in exact form, and explain why the equation has only one solution. [6]