

Graphs of Logarithms

Starter

1. **(Review of last lesson)** Find the gradient of the curve $y = 5e^{0.5x}$ at the points:
 (a) $x = -2$ (b) $x = 2$.
 Leave your answers in exact form.

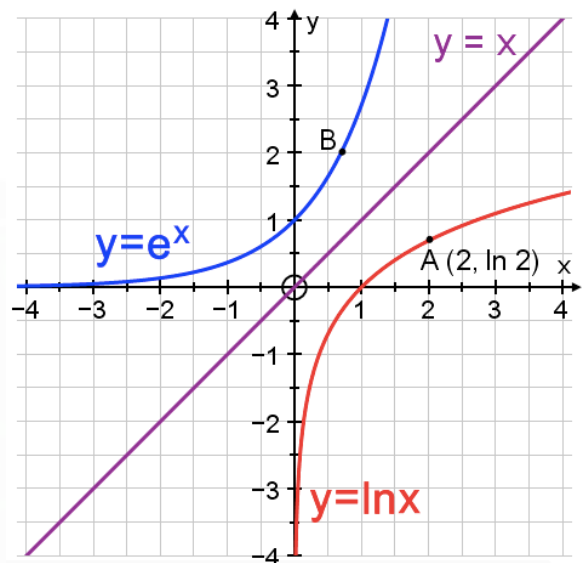
Working:

(a) The gradient of $5e^{0.5x}$ is $5 \times 0.5e^{0.5x} = 2.5e^{0.5x}$
 When $x = 2$, the gradient is $2.5e^{0.5 \times 2} = 2.5e^1 = \frac{5}{2}e$
 When $x = -2$, the gradient is $2.5e^{0.5 \times -2} = 2.5e^{-1} = \frac{5}{2e}$

(b) When $x = -2$, the gradient is $2.5e^{0.5 \times -2} = 2.5e^{-1} = \frac{5}{2e}$

- E.g. 1** The graph of $y = \ln x$ is a reflection of the graph of $y = e^x$ in the line $y = x$
 Point A has coordinates $(2, \ln 2)$ and B is at the reflection of A.

- (a) Write down the coordinates of B.
 (b) Find the gradient of $y = e^x$ at B.
 (c) Find the gradient of $y = \ln x$ at A.
 (d) Generalise your result from (c).



Working:

(a) Swap the x - and y -coordinates over so $B(\ln 2, 2)$
 (b) B is on the curve $y = e^x$
 The gradient of $y = e^x$ is $y = e^x$
 The x -coordinate of B is $\ln 2$ so replace x by $\ln 2$
 The gradient at B is $e^{\ln 2} = 2$
 (c) When a line of gradient 2 is reflected in the line $y = x$, its gradient becomes $\frac{1}{2}$.
 So the gradient at A is $\frac{1}{2}$.
 (d) $\frac{1}{x}$

Video: [Transformations of exponential graphs](#)

[Solutions to Starter and E.g.s](#)

Exercise

No exercise