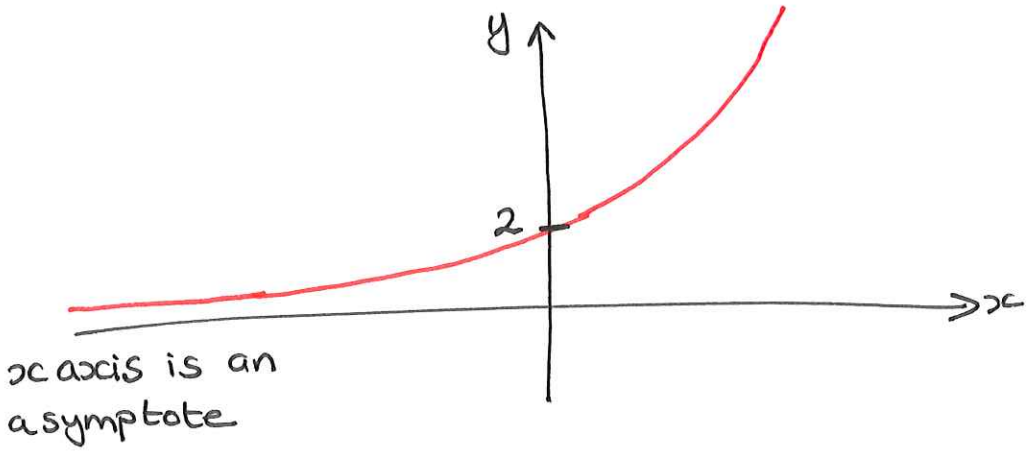
YEAR 1 PURE Chapter 14 EXPONENTIALS + LOGS

– EXPONENTIALS

$$y = 2^x$$

Index is a variable



– SPECIAL EXPONENTIAL

$$y = e^x \qquad e \approx 2.71828$$

used for modelling

$$f(x) = e^{kx}$$

$$f'(x) = ke^{kx}$$

— LOGARITHMS

$$3^2 = 9$$

$$\log_3 9 = 2$$

— LAWS OF LOGARITHMS

multiplication law $\log x + \log y = \log xy$

division law $\log x - \log y = \log \frac{x}{y}$

power law $k \log x = \log x^k$

WATCH OUT FOR:

Only apply multiplication + division law after applying power law.

$$5 \log 2 + \log 3$$

$$= \log 2^5 + \log 3$$

$$= \log 32 + \log 3 = \log = 96$$

— SOLVING EQUATIONS USING LOGS

$$3^x = 2^{x+1}$$

$$\log 3^x = \log 2^{x+1}$$

$$x \log 3 = (x+1) \log 2$$

$$x \log 3 = x \log 2 + \log 2$$

$$x \log 3 - x \log 2 = \log 2$$

factorise

$$x(\log 3 - \log 2) = \log 2$$

$$x = \frac{\log 2}{\log 3 - \log 2}$$

— QUADRATICS + LOGS

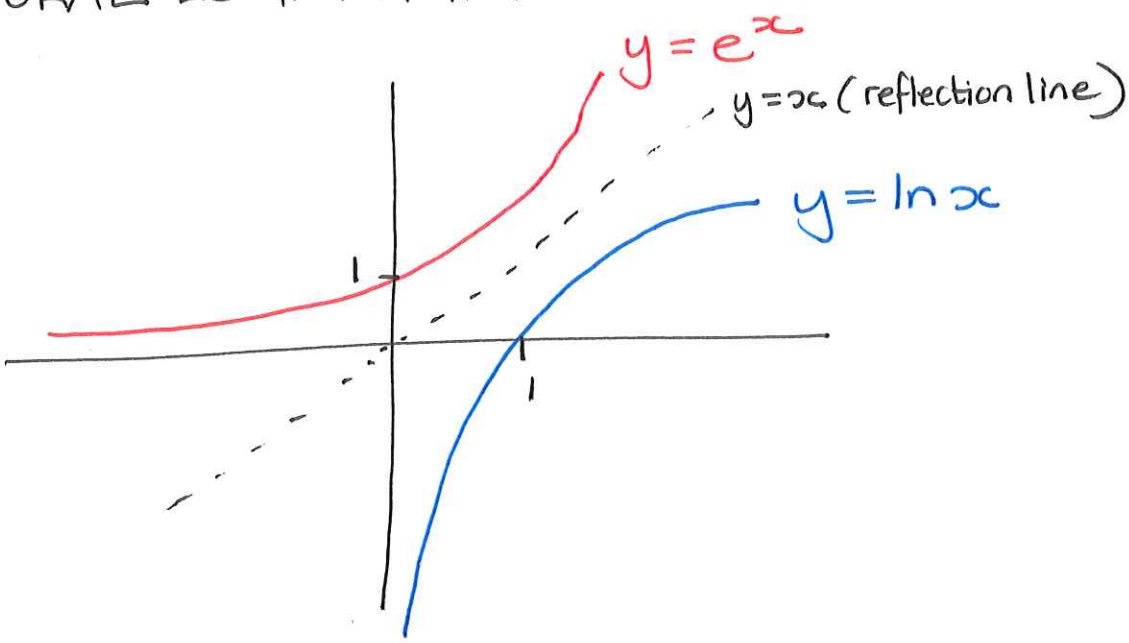
$$2^{2x} - 6(2^x) + 5 = 0$$

$y = 2^x$

$$(2^x)^2 - 6(2^x) + 5 = 0$$

$$y^2 - 6y + 5 = 0$$

— NATURAL LOGARITHM



$$e^x = 5$$

$$\ln e^x = \ln 5$$

$$x = \ln 5$$

— QUADRATIC

$$e^{2x} + 5e^x - 14 = 0$$

$$(e^x + 7)(e^x - 2) = 0$$

$e^x = -7$ or $e^x = 2$

no solutions

e^x is always positive

$x = \ln 2$