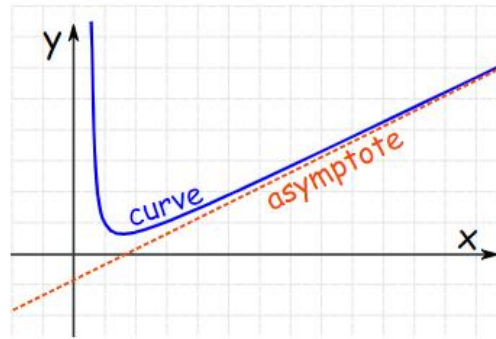


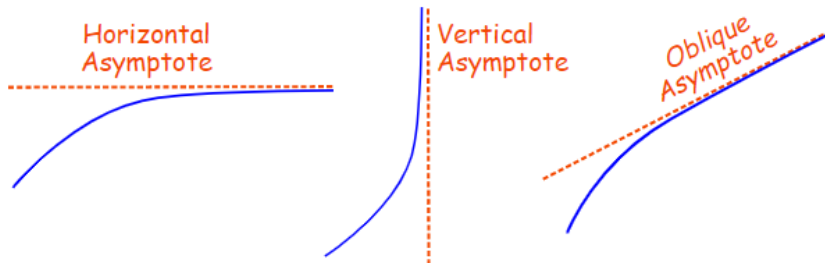
Asymptote

An asymptote is a **line** that a curve approaches, as it heads towards infinity:

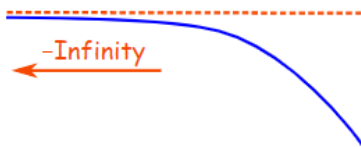


Types

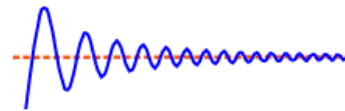
There are three types: horizontal, vertical and oblique:



The direction can also be negative:



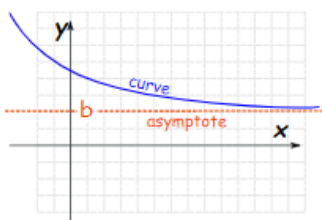
The curve can approach from any side (such as from above or below for a horizontal asymptote), or may actually cross over (possibly many times), and even move away and back again.



The important point is that:

The **distance** between the curve and the asymptote **tends to zero** as they head to infinity (or $-\infty$)

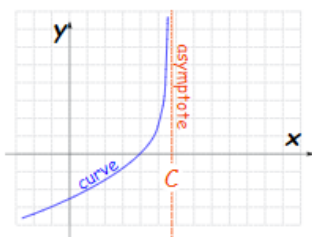
Horizontal Asymptotes



It is a Horizontal Asymptote when:

as x goes to infinity (or $-\infty$) the curve approaches some constant value b

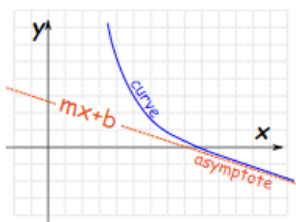
Vertical Asymptotes



It is a Vertical Asymptote when:

as x approaches some constant value c (from the left or right) then the curve goes towards infinity (or $-\infty$).

Oblique Asymptotes



It is an Oblique Asymptote when:

as x goes to infinity (or $-\infty$) then the curve goes towards a line $y=mx+b$

(note: m is not zero as that is a Horizontal Asymptote).

Example: $(x^2-3x)/(2x-2)$

The graph of $(x^2-3x)/(2x-2)$ has:

- A vertical asymptote at $x=1$
- An oblique asymptote: $y=x/2 - 1$

