

Reciprocal Graphs of Linear Functions

Definition → Flipped version of $y = mx + b$. Graphs look like 2 parabolas in opposite quadrants, bounded by asymptotes.

Examples →



$$f(x) = \frac{1}{mx+b}$$

General Form

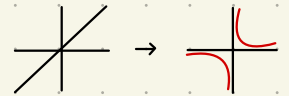
Key Points → 1. Horizontal Asymptote is always $y = 0$ as graph never touches x -axis.

2. Vertical Asymptote can be found by solving $mx+b=0$ [denominator]

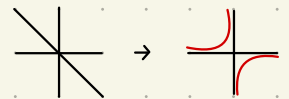
3. No x -intercepts but y -intercept can be found using $x=0$

2 types of Graphs

If slope of $y = mx + b$ is positive then curves go quadrant I & III



If slope of $y = mx + b$ is negative then curves go quadrant II & IV



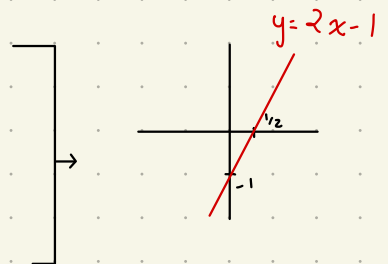
Example

Sketch line of $y = 2x - 1$

Slope = 2

$$x\text{-intercept, } y = 0 \rightarrow 0 = 2x - 1 \\ x = \frac{1}{2}$$

$$y\text{-intercept, } x = 0 \rightarrow y = 0 \cdot x - 1 \\ y = -1$$



Equation of reciprocal → $y = \frac{1}{2x-1}$

Vertical Asymptote, $2x - 1 = 0$
 $2x = 1$
 $x = \frac{1}{2}$

y -intercept, $y = \frac{1}{0-1}$
 $y = -1$

