

18. Use translations to describe how the graph of $y = \frac{1}{x}$ compares to the graph of each function.

a) $y - 4 = \frac{1}{x}$

b) $y = \frac{1}{x+2}$

c) $y - 3 = \frac{1}{x-5}$

d) $y = \frac{1}{x+3} - 4$

the base function $y = f(x) = \frac{1}{x}$

a) $y - 4 = \frac{1}{x} \quad (+4)$

$$y = \frac{1}{x} + 4$$

$$= f(x) + 4$$

this shows a vertical shift by 4 units up.

b) $y = \frac{1}{x+2}$

$$f(x) = \frac{1}{x} \Rightarrow \frac{1}{x+2} = f(x+2)$$

$$y = f(x+2)$$

a horizontal shift
to the left by 2 units.

$$c) y - 3 = \frac{1}{x-5} \quad | (+3)$$

$$y = \frac{1}{x-5} + 3$$

$$f(x) = \frac{1}{x} \Rightarrow \frac{1}{x-5} = f(x-5)$$

$$y = f(x-5) + 3$$

H. shift to the
right by 5 units

V. shift up
by 3 units.

$$d) y = \frac{1}{x+3} - 4$$

$$f(x) = \frac{1}{x} \Rightarrow \frac{1}{x+3} = f(x+3)$$

$$y = f(x+3) - 4 \rightarrow \begin{array}{l} \text{v. shift down} \\ \text{by} \\ 4 \text{ units} \end{array}$$

$\swarrow$
H. shift to the
Left by 3
units