

- C4** The function $f(x) = x + 4$ could be a vertical translation of 4 units up or a horizontal translation of 4 units to the left. Explain why.

$f(x)$ = the transformation

let's name the base parent as $p(x)$

the 2 options given

Vertical Transf. $\Rightarrow f(x) = p(x) + 4$
4 units up

Horizontal Transf. $\Rightarrow f(x) = p(x+4)$
4 units Left

For $f(x)$ to be both we need the following equality to happen:

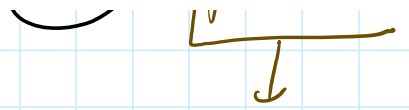
$$f(x) = p(x+4) = p(x) + 4 = x + 4$$

H. Shift
V. Shift

$$p(x) + 4 = x + 4$$

from this we can say
 $p(x) + 4 = x + 4$ | -4

$$p(x) = x$$



plug this into the ~~xx~~ part
of the equality

$$\begin{cases} p(x+4) = x+4 \\ \text{and} \\ p(x) = x \end{cases}$$

← this is consistent
w/ the horizontal
shift to the Left

The conditions of this problem resolve
into the following parent function:

$$\boxed{p(x) = x}$$

For this function we can apply

Horiz. Shift: $f(x) = p(x+4) = x+4$
to the Left
by 4 OR

Vertical Shift: $f(x) = p(x) + 4 = x+4$
up by 4

The two results are identical.