$$
\begin{aligned}
& 12 \cos \left(\frac{\pi}{3} x-5\right)+11 \begin{array}{l}
\frac{\pi}{3} x-5 \\
\\
\\
\cos (x) \longrightarrow \\
\longrightarrow 12 \cos (x)
\end{array} \\
& \longrightarrow 12 \cos \left(\frac{\pi}{3}\left(\frac{\pi}{3}\left(x-\frac{15}{\pi}\right)\right)\right.
\end{aligned}
$$

$$
\longrightarrow 12 \cos \left(\frac { \pi } { 3 } \left(x-\frac{15}{\pi}\right.\right.
$$


$\frac{\pi}{3} x$ changes
faster than $x$
so $\cos \frac{\pi}{3} x$ changes faster
shrinks graph to wands $y$-axis.

\# $T=\pi, A=1$, left phase shift by $\pi$
Down $\frac{3}{2}$
(1) Amps Vert. comp/stretch
(2) Hoiz. comp/stratch
(3) Rigid Translations

$$
T=\pi
$$

$$
a \cos (b(x+c))+d
$$

want $b x=2 \pi$ when $x=\pi$
Book
$\cos (2 x+2 \pi)$

$$
=\cos \left(n^{(x+1)}\right.
$$

$$
\begin{align*}
& b \pi=2 \pi \\
& b=2 \\
& a=1 \text { given } \tag{3x+2}
\end{align*}
$$

$$
y=\cos (2 x)
$$

Left shift by $\frac{\pi}{3}$

$$
y=\cos (2(x+\pi))
$$

Down $\frac{3}{2}$

$$
y=\cos \left(2(x+\pi)-\frac{3}{2} \quad \sqrt{3 x}\right.
$$

$a f(x)$ $\cos (2 x)$
$f(b x)$ 2. $\cos (2 x+\pi)$
$f(x+c)$

$$
f(x)+d
$$

$$
2\left(x+\frac{\pi}{2}\right)
$$

No rule for

$$
f(b x) \text { to } f(b x+c)
$$

Best we can do is

$$
f(b x) \text { to } f\left(b\left(x+\frac{c}{b}\right)\right)
$$


$x=\frac{\pi}{2}, x=-\frac{\pi}{2}$ ane vertical asymptotes

$$
T=\pi=\text { period }
$$

Amplitude does not apply

$$
y=\cot x
$$


sine is is oddulen $\frac{\text { sure }}{\cos \text { ne }}$ is odd

$$
\frac{-}{t}
$$








