$g(x) = 2\cdot 3^{-2x+10} - 11 = y$

Find $g^{-1}(x)$:

Swap x & y.
Solve for y.

$2\cdot 3^{-2y+10} - 11 = x$

$2\cdot 3^{-2y+10} = x+11$

$3^{-2y+10} = \frac{x+11}{2}$

Isolate 3 stuff

ADD 11
Divide by 2

$\log_3\left(3^{-2y+10}\right) = \log_3\left(\frac{x+11}{2}\right)$

Extract stuff w/ $\log_3(*)$

$-2y+10 = \log_3\left(\frac{x+11}{2}\right)$

See LHS?
$\log_3(*)$ brought that "stuff" down to earth.

$-2y = \log_3\left(\frac{x+11}{2}\right) - 10$

Isolate $-2y$ by subtracting 10

$$\boxed{y = \frac{\log_3\left(\frac{x+11}{2}\right) - 10}{-2} = f(x).} = g^{-1}(x)$$

So, $f(x) = g^{-1}(x)$, if we did it right.

$(f\circ g)(x) \stackrel{?}{=} x$

$$f(g(x)) = \frac{\log_3\left(\frac{g(x)+11}{2}\right) - 10}{-2}$$

$$= \frac{\log_3\left(\frac{2\cdot 3^{-2x+10} - 11 + 11}{2}\right) - 10}{-2} = \frac{\log_3\left(2\cdot 3^{-2x+10}\right) - 10}{-2}$$

$$= \frac{\log_3(2) + \log_3\left(3^{-2x+10}\right) - 10}{2}$$

$$2\cdot 3^{-2y+10}-11=x$$

Logs bring exponents down to Earth.

$$2\cdot 3^{-2y+10}=x+11$$

$$3^{-2y+10}=\frac{x+11}{2}$$

$$\log_3(\,*\,)=\log_3\left(\frac{x+11}{2}\right)$$

$$-2y+10=\log_3\left(\frac{x+11}{2}\right)$$

$$-2y=\log_3\left(\frac{x+11}{2}\right)-10$$

$$y=\frac{\log_3\left(\frac{x+11}{2}\right)-10}{-2}=g^{-1}(x)=f(x)$$

$$(f\circ g)(x)=f(g(x))=\frac{\log_3\left(\frac{g(x)+11}{2}\right)-10}{-2}$$

$$=\frac{\log_3\left(\frac{2\cdot 3^{-2x+10}-11+11}{2}\right)-10}{-2}=\frac{\log_3\left(\frac{2\cdot 3^{-2x+10}}{2}\right)-10}{-2}$$

$$=\frac{\log_3\left(3^{-2x+10}\right)-10}{-2}=\frac{-2x+10-10}{-2}=\frac{-2x}{-2}=x\,!$$

Computers are adding machines.

To multiply $64 \cdot 32$, take $\log_2$ (*)

$\log_2(y) = \log_2(64 \cdot 32) = \log_2(64) + \log_2(32)$

$= 6 + 5 = 11$, so

$2^{\log_2(y)} = y = 2^{11} = 64 \cdot 32$!