



Another Transformations of Functions Problem - A Square Root Example

Video Notes

[Video Link](#)

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Background Knowledge:

- Transformations of Functions Part V

Reminder: $y = af(K(x-d)) + c$

Function Rule points to $y = af(K(x-d)) + c$

watch out for this points to $(x-d)$

SO IMPORTANT!!!!!!

Vertical translation

- $c > 0$ (pos): shifts up
- $c < 0$ (neg): shifts down

Horizontal Translation

- $d > 0$ (pos): shifts right
- $d < 0$ (neg): shifts left

Vertical stretch/compression

- stretch ($|a| > 1$) or compression ($0 < |a| < 1$)

Vertical reflection (reflection in the x-axis) (a is negative)

Horizontal stretch/compression

- stretch ($|k| > 1$) or compression ($0 < |k| < 1$)

Horizontal reflection (reflection in the x-axis) (k is negative)

S.F. = $\frac{1}{k}$

K must be factored out!

Consider the function, $h(x) = -4\sqrt{-\frac{1}{3}x + 6} + 7$. Determine the parent function and describe the transformations done to the parent function to result in $h(x)$. Graph the function.

$h(x) = -4\sqrt{-\frac{1}{3}x + 6} + 7$ *Factor out the k!
BE CAREFUL!
 $h(x) = -4\sqrt{-\frac{1}{3}(x-18)} + 7$

Transformations:

- $a = -4$ → vertical stretch, s.f. = 4
reflection in x-axis
- $k = -\frac{1}{3} \rightarrow \frac{1}{k} = -3$ → horizontal stretch, s.f. = 3
reflection in y-axis
- $d = 18$ → horizontal translation 18 units to the right
- $c = 7$ → vertical translation 7 units up.

Parent Graph: $f(x) = \sqrt{x}$

x	f(x)
0	0
1	1
4	2
9	3
16	4
25	5

Dilatons

$-3x$	$-4y$
0	0
-3	-4
-12	-8
-27	-12
-48	-16
-75	-20

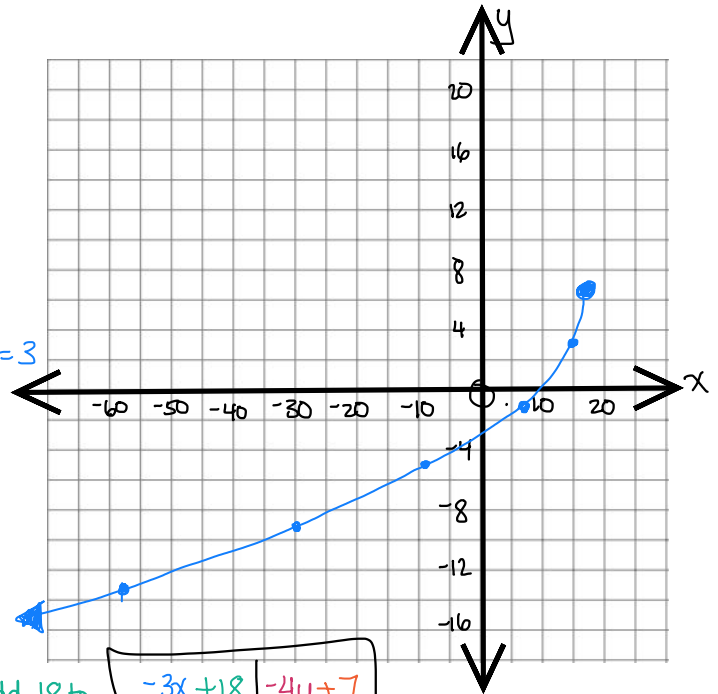
Multiply x by -3
Multiply y by -4

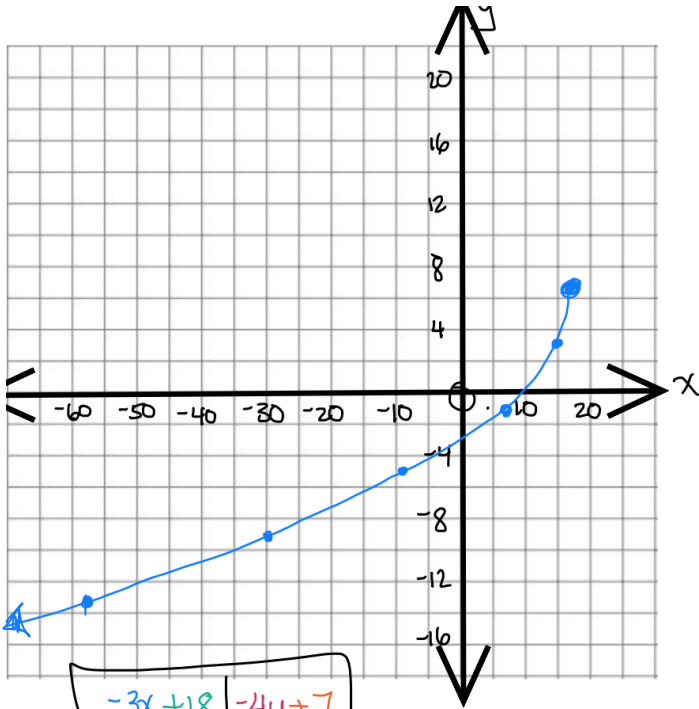
Translations

Add 18 to x
Add 7 to y

$-3x + 18$	$-4y + 7$
18	7
15	3
6	-1
-9	-5
-30	-9
-57	-13

$h(x)$





$-3x+18$	$-4y+7$
18	7
15	3
6	-1
-9	-5
-30	-9

$h(x)$

Domain:

$$\{x \in \mathbb{R} \mid x \leq 18\}$$

OR

$$(-\infty, 18]$$

Range:

$$\{y \in \mathbb{R} \mid y \leq 7\}$$

OR

$$(-\infty, 7]$$