



Transformations of Functions from Descriptions

Part I

Video Notes

[Video Link](#)

Transformations of Functions from Descriptions

Part II

Background Knowledge:

- Transformations of Functions Part V

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

Function Rule

vertical translation

horizontal translation

- vertical stretch or compression
- vertical reflection
- horizontal stretch or compression
- horizontal reflection

Scale factor = $1/K$

SO IMPORTANT!!!!!!

K MUST be factored out!

Find the equation of $f(x)$, an absolute value function, after performing the transformations listed below on the parent function. Determine the domain and range of $f(x)$.

Parent Function: $f(x) = |x|$

- ✓ • Reflection in the x-axis
- Translation three units up and four units to the left $(0,0) \rightarrow (-4,3)$
- ✓ • A vertical compression with a scale factor of $\frac{1}{2}$
- ✓ • A horizontal stretch with a scale factor of 3

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

$a = -\frac{1}{2}$ $K = \frac{1}{3}$ $d = -4$ $c = 3$

↳ absolute value

S.f. = 3

$\frac{1}{K} = 3$ do the reciprocal to find K $\rightarrow K = \frac{1}{3}$

Domain:

$$\{x \in \mathbb{R}\} \text{ or } (-\infty, \infty)$$

Range:

$$\{y \in \mathbb{R} \mid y \leq 3\}$$

$$(-\infty, 3]$$

$$f(x) = -\frac{1}{2} \left| \frac{1}{3}(x+4) \right| + 3$$

$$f(x) = -\frac{1}{2} \left| \frac{1}{3}x + \frac{4}{3} \right| + 3$$

Find the equation of $g(x)$, a square root function, after performing the following transformations listed below on the parent function. Determine the domain and range of $g(x)$. Parent graph: $f(x) = \sqrt{x}$

$$\text{s.f.} = 1/k$$

$$\frac{1}{k} = 2.5 = 2\frac{1}{2} = \frac{5}{2}$$

$$\frac{1}{k} = \frac{5}{2} \rightarrow k = \frac{2}{5}$$

- Reflection in the y-axis
- Translation two units down and five units right
- A horizontal stretch with a scale factor of 2.5

$$y = a f(k(x-d)) + c$$

$a=1$ $k=\frac{-2}{5}$ $d=5$ $c=-2$

Domain:

$$\{x \in \mathbb{R} \mid x \leq 5\}$$
$$(-\infty, 5]$$

Range:

$$\{y \in \mathbb{R} \mid y \leq -2\}$$
$$(-\infty, -2]$$

$$g(x) = \sqrt{\frac{-2}{5}(x-5)} - 2$$

$$g(x) = \sqrt{\frac{-2}{5}x + 2} - 2$$