

Algebra 2Unit 3.3 : Transformations of Functions

- Identify transformations of functions of the 8 types listed in U3.2

This is from the previous lesson. I would not write any of this slide down. Identify the following based on their general form:

$$y = a(x - h)^3 + k$$

Cubic

$$y = ax + k$$

line

$$y = a\sqrt{x - h} + k$$

Square root

$$y = a(x - h)^2 + k$$

quadratic

$$y = a\sqrt[3]{x - h} + k$$

Cube root

$$y = a\log_b(x - h) + k$$

logarithm

$$y = a(b)^{x - h} + k$$

Exponential

Each of the letters in the general form indicate a specific transformation to the graph. Today we will only focus on Identifying the transformations, U3.4 will show them graphically.

Even without knowing what the functions look like, we can still determine their transformations by seeing what a , h , and k are.

Changing K .

k is the number that is added or subtracted to the function, usually at the end, and **it is responsible for moving the entire graph up or down** by whatever k is.

$$f(x) = 3(x+2)^2 - 1 \quad (-) \quad \text{Down } 1$$

$$f(x) = -2\sqrt{x} + 5 \quad \text{UP } 5$$

$$y = \log_3(x-3)$$

$$y = e^x - 10 \quad \text{Down } 10$$

Changing H.

When you see an "x - h", the graph will move right h units.

When you see an "x + h", the graph will move left h units.

$$y = -\sqrt[3]{x+5} - 2 \quad \text{Left } 5$$

$$\therefore f(x) = 4(2)^{x-6} \quad \text{Right } 6$$

$$\cdot y = \ln(x) + 1$$

$$g(x) = (x-8)^3 - 7 \quad \text{Right } 8$$

Changing A.

if $a > 1$, your graph will be vertically stretched by whatever a is.

if $0 < a < 1$, your graph will be vertically shrank by whatever a is.

Finally, if a is negative your graph will reflect over the x-axis.

- $f(x) = 4x^2 - 3$ $4 > 1$ | Vertical Stretch
by 4
- $y = \frac{2}{3}(x+4)^3 - 9$ Vertical Shrink
by $\frac{2}{3}$
- $g(x) = -\sqrt{x} + 1$
Reflect over x-axis

U3.3 Transformations of Functions (No Graphing)

List all of the transformations of the functions.

$y = 2\sqrt[3]{x+3} + 6$
 $y = \sqrt[3]{x}$

V. stretch by 2 ← 3 ↑ 6

$k(x) = -\frac{1}{2}(4)^{x-1} + 2$
 $K(x) = 4^x$

Reflect over x-axis V. shrink by 1/2 ↑ 2

$y = \log_2(x-10) - 7$
 $y = \log_2 x$

→ 10 ↓ 7

Homework:

U3.3 Worksheet

QA over this Lesson!