**Precalc takeaways** **Name:**

# Math 3 Unit 8: Modeling with Functions

**Standards**

M3 8.1 I can describe functions as transformations of parent functions. (M)
M3 8.2 I can interpret the parameters of a function in context. (M)
M3 8.3 I can add, subtract, multiply, and compose functions. (M)

**function transformations**

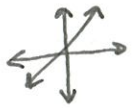
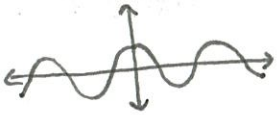
function family: a group of functions of the same type

the function formulas usually have similar forms but different numbers (parameters)

parent function:

the basic function on which a function family is based

put these in order

| family | parent function | formula | graph |
|---|---|---|---|
| quadratic | $y=x$ | $y=mx+b$ |  |
| radical | $y=e^x$ | $y=a\cdot b^x$ |  |
| trigonometric | $y=x^2$ | $y=ax^2+bx+c$ or $y=a(x-h)^2+k$ or $y=a(x-\#)(x-\#)$ |  |
| exponential | $y=\sqrt{x}$ | $y=a\cdot\sqrt[n]{x}$ |  |
| linear | $y=\frac{1}{x}$ | $y=\frac{a}{x-h}+k$ (many other forms) |  |
| rational | $y=\cos(x)$ or $y=\sin(x)$ | $y=a\cos(b(x-c))+d$ or $y=a\sin(b(x-c))+d$ |  |

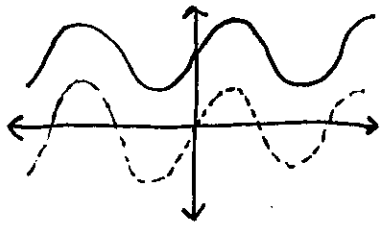
← incomplete list of function families

☆ fill in your own descriptions of what happens to the graphs! ☆

Transformations that affect *y* values:

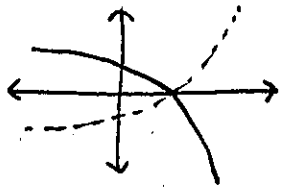
translate vertically: $f(x) + k$

adding a number to the y-value translates the function up that many units



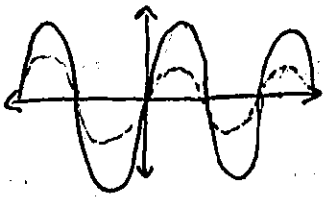
reflect across *x*-axis: $-f(x)$

making the y-values negative...



vertical dilations: $a \cdot f(x)$

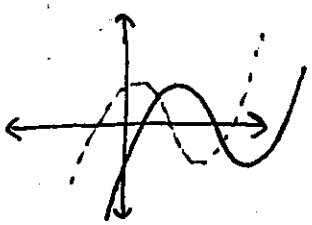
multiplying the y-values by a number...



Transformations that affect *x* values: always the opposite of what you expect!

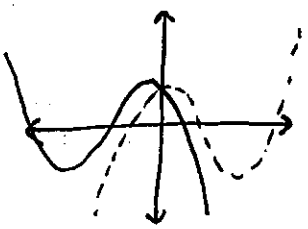
translate horizontally: $f(x-h)$

subtracting a number from the x-values...



reflect across *y*-axis: $f(-x)$

making the x-values negative...



horizontal dilations: $f(b \cdot x)$

multiplying the x-values by a number...