

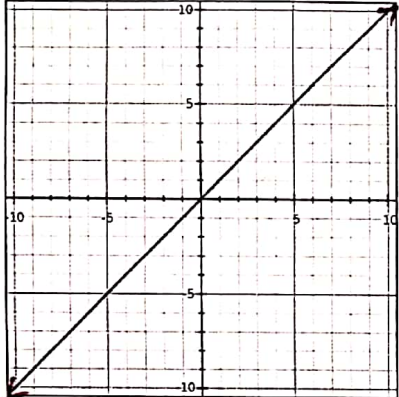
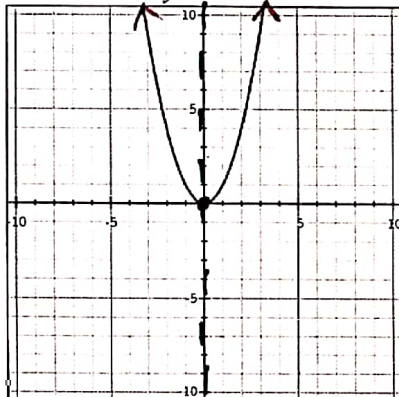
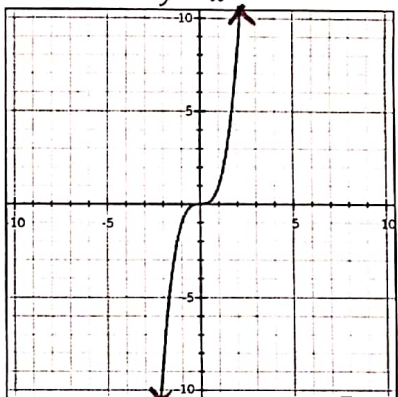
Name: _____

Date: _____

Period: _____

2.5 Parent Functions & Their Graphs

Every function family has a parent function from which the characteristics are usually derived from. The graphs in the function family usually perform some type of transformation on the parent functions listed below. Let's explore the different characteristics of these parent functions to help us better understand all functions in their family.

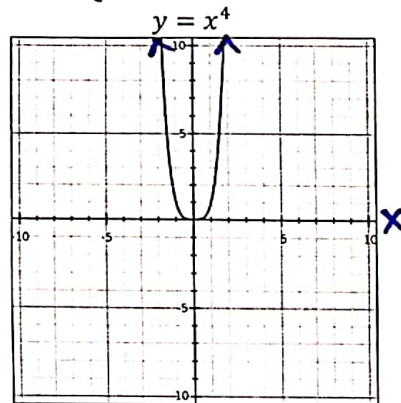
Linear Functions $y = x$ 	Quadratic Functions $y = x^2$ 	Cubic Functions $y = x^3$ 
Domain: $(-\infty, \infty)$ or $-\infty < x < \infty$ Range: $(-\infty, \infty)$ x-intercept(s): $(0, 0)$ y-intercept: $(0, 0)$ axis of symmetry: N/A asymptote(s): N/A maximum(s): N/A minimum(s): N/A end behavior: As $x \rightarrow -\infty, y \rightarrow -\infty$ As $x \rightarrow \infty, y \rightarrow \infty$	Domain: $(-\infty, \infty)$ or $-\infty < x < \infty$ Range: $[0, \infty)$ or $0 \leq y < \infty$ x-intercept(s): $(0, 0)$ y-intercept: $(0, 0)$ axis of symmetry: $x = 0$ asymptote(s): N/A maximum(s): N/A minimum(s): $(0, 0)$ "vertex" end behavior: As $x \rightarrow -\infty, y \rightarrow \infty$ As $x \rightarrow \infty, y \rightarrow \infty$	Domain: $(-\infty, \infty)$ Range: $(-\infty, \infty)$ x-intercept(s): $(0, 0)$ y-intercept: $(0, 0)$ axis of symmetry: N/A asymptote(s): N/A maximum(s): N/A minimum(s): N/A end behavior: As $x \rightarrow -\infty, y \rightarrow -\infty$ As $x \rightarrow \infty, y \rightarrow \infty$

Points: (x, y) intervals: $[\quad , \quad)$
 vertical lines: $x =$ (\quad , \quad) or $-\infty < x < \infty$
 horizontal lines: $y =$ $(\quad , \quad]$ or $-\infty \leq y < \infty$

EB: As $x \rightarrow -\infty, y \rightarrow \underline{\quad}$
 As $x \rightarrow \infty, y \rightarrow \underline{\quad}$



Quartic Functions



Domain: $(-\infty, \infty)$

Range: $[0, \infty)$

x-intercept(s): $(0,0)$

y-intercept: $(0,0)$

axis of symmetry: $x=0$

asymptote(s): N/A

maximum(s): N/A

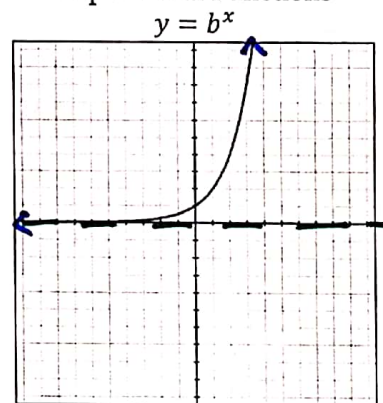
minimum(s): $(0,0)$

end behavior:

As $x \rightarrow -\infty, y \rightarrow \infty$

As $x \rightarrow \infty, y \rightarrow \infty$

Exponential Functions



Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

x-intercept(s): N/A

y-intercept: $(0,1)$

axis of symmetry: N/A

asymptote(s): $y=0$

maximum(s): N/A

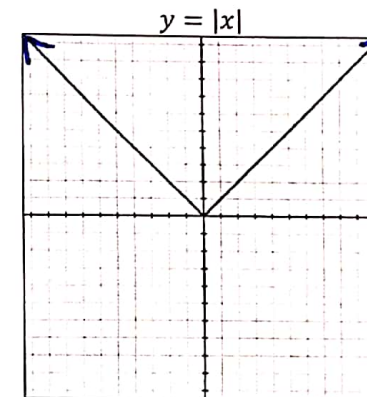
minimum(s): N/A

end behavior:

As $x \rightarrow -\infty, y \rightarrow 0$

As $x \rightarrow \infty, y \rightarrow \infty$

Absolute Value Functions



Domain: $(-\infty, \infty)$

Range: $[0, \infty)$

x-intercept(s): $(0,0)$

y-intercept: $(0,0)$

axis of symmetry: $x=0$

asymptote(s): N/A

maximum(s): N/A

minimum(s): $(0,0)$

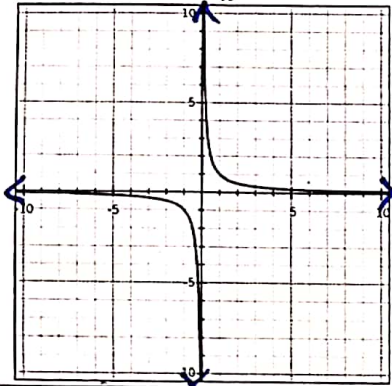
end behavior:

As $x \rightarrow -\infty, y \rightarrow \infty$

As $x \rightarrow \infty, y \rightarrow \infty$

Reciprocal Functions

$$y = \frac{1}{x}$$



Domain: $(-\infty, 0) \cup (0, \infty)$

Range: $(-\infty, 0) \cup (0, \infty)$

x-intercept(s): N/A

y-intercept: N/A

axis of symmetry: N/A for vertical or horizontal

asymptote(s): $x=0$ VA $y=0$ HA

maximum(s): N/A

minimum(s): N/A

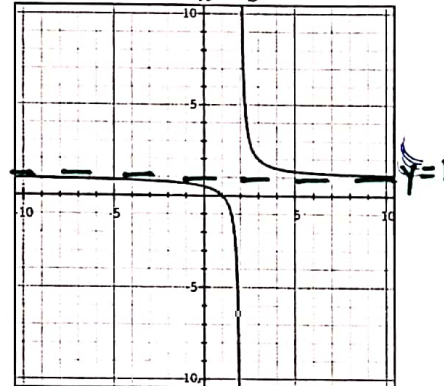
end behavior:

As $x \rightarrow -\infty, y \rightarrow 0$

As $x \rightarrow \infty, y \rightarrow 0$

Rational Functions

$$y = \frac{x-a}{x-b}$$



Domain: $(-\infty, b) \cup (b, \infty)$

Range: $(-\infty, 1) \cup (1, \infty)$

x-intercept(s): $(a, 0)$

y-intercept: $(0, ?)$ $\frac{0-a}{0-b} = \frac{-a}{-b} = \frac{a}{b}$

axis of symmetry: N/A

asymptote(s): $x=b$ VA $y=1$ HA

maximum(s): N/A

minimum(s): N/A

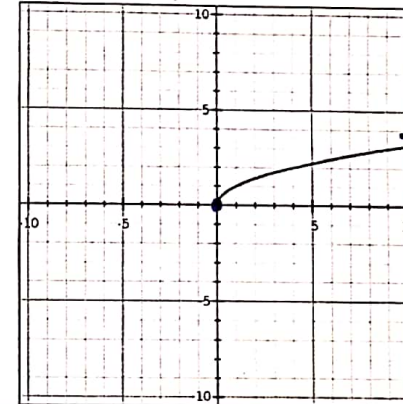
end behavior:

As $x \rightarrow -\infty, y \rightarrow 1$

As $x \rightarrow \infty, y \rightarrow 1$

Square Root Functions

$$y = \sqrt{x}$$



Domain: $[0, \infty)$

Range: $[0, \infty)$

x-intercept(s): $(0, 0)$

y-intercept: $(0, 0)$

axis of symmetry: N/A

asymptote(s): N/A

maximum(s): N/A

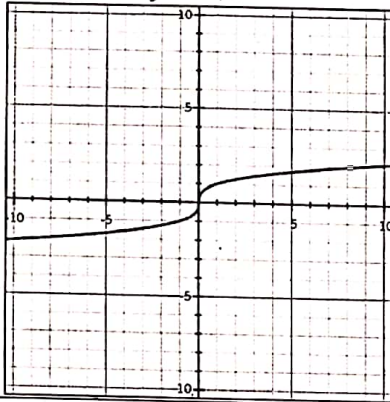
minimum(s): $(0, 0)$

end behavior:

As $x \rightarrow \infty, y \rightarrow \infty$

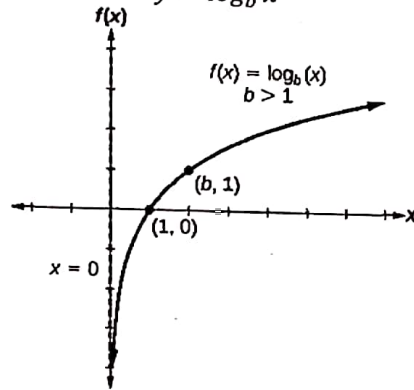
Cube Root Functions

$$y = \sqrt[3]{x}$$



Logarithmic Functions

$$y = \log_b x$$



Domain:

Range:

x-intercept(s):

y-intercept:

axis of symmetry:

asymptote(s):

maximum(s):

minimum(s):

end behavior:

Domain:

Range:

x-intercept(s):

y-intercept:

axis of symmetry:

asymptote(s):

maximum(s):

minimum(s):

end behavior: