Task 1.3.4: MATCHING PARENT FUNCTIONS

Solutions

Solutions to Task 1.3.4 can easily be determined, so they are not given here.

Math notes

Being able to quickly identify certain types of functions based upon the "shape" of their graph or being able to graph the general "shape" of a function based upon its type is extremely useful function-sense for later courses in pre-calculus and calculus. This global, relational understanding of functions is important for success in later courses.

Teaching notes

Prepare a set of activity cards for each group of four students. The set of cards consists of the function rule cards, description of transformation cards, parent function rule cards, parent function graph cards, graph cards, family of functions cards, domain cards (interval notation), domain cards (set notation), and range cards. It is a good idea to use two types of colored paper to make these card sets—for example it is helpful to have the parent function rule cards on a different color of paper than the function rule cards, etc.

Divide the participants into groups of four. Give each group a set of cards. Have each group match the function rules with the appropriate function name, graph, domain, and range. Some of these functions have the same domains and/or ranges, but there are enough cards for each function rule to be partnered with a name of family of functions card, parent function graph card, parent function rule card, description of transformation card, graph card, a domain card, and a range card. Ask groups to record their findings on the task sheet.

Function Rule Cards

$y = .5x^2$	$y = 9x^3 - 1$
$y = \sqrt{-x}$	$y = \lvert x - 3 \rvert$
$y = (2x)^2$	$y = 10^{x+2}$
$y = \lvert x^3 \rvert$	$y = -\log x - 1$
$y = \sqrt{\lvert x \rvert}$	$y = -\lvert x \rvert + 1$
$y = 2(10^x)$	$y = \log(x - 1)$

Description of Transformation (or Composition)

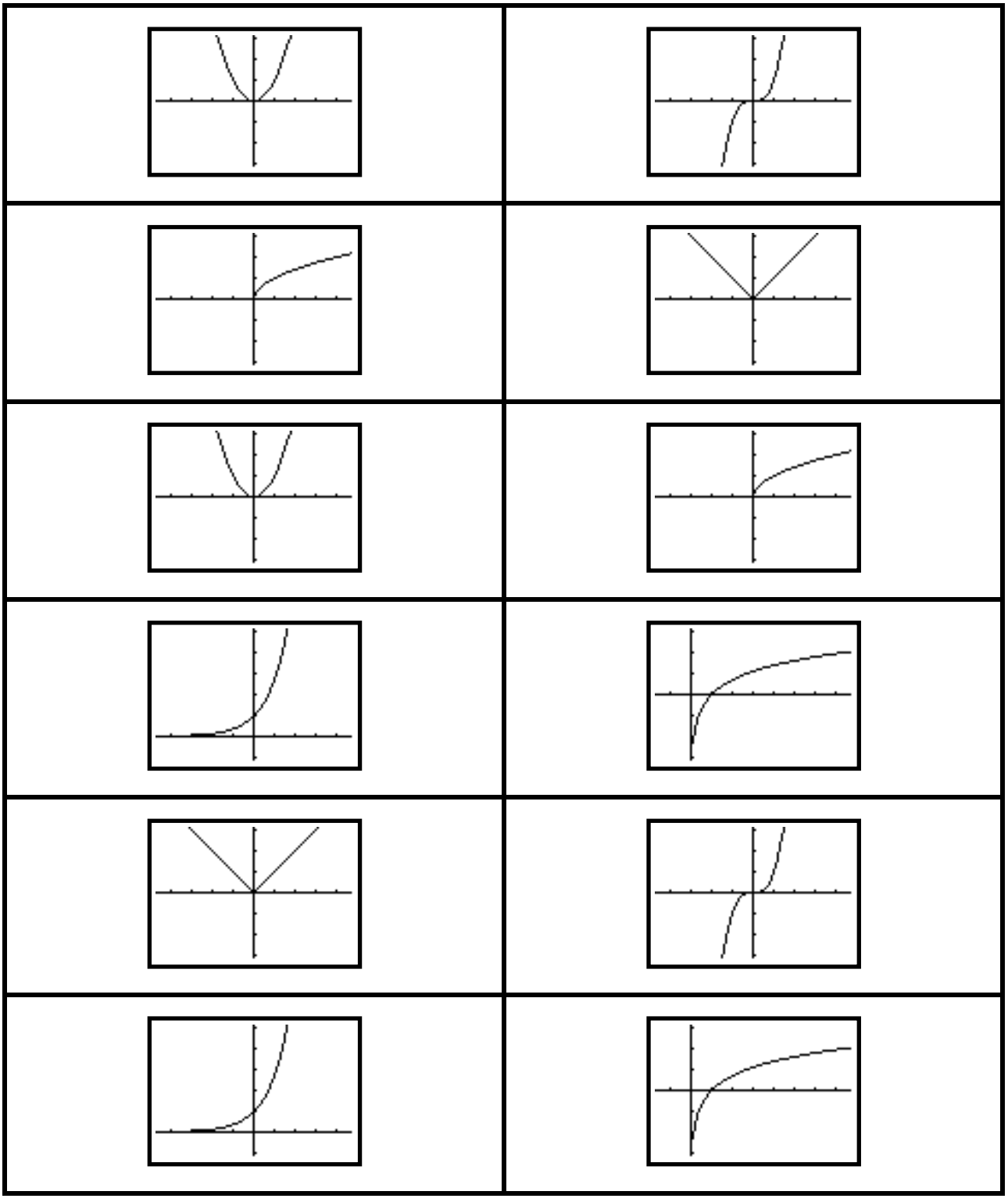
Vertical Compression	Vertical Stretch followed by a vertical shift downward
Reflection about the y-axis	Horizontal shift to the right
Horizontal compression	Horizontal shift to the left
Negative y-values made positive	Reflection about the x-axis followed by a vertical shift downward
The graph of the function in Quadrants I and IV is copied onto Quadrants II and III	Reflection about the x-axis followed by a vertical shift upward

Vertical Stretch	Horizontal shift to the right

Parent Function Rule Cards

$y = x^2$	$y = x^3$
$y = \sqrt{x}$	$y = \lvert x \rvert$
$y = x^2$	$y = 10^x$
$y = x^3$	$y = \log x$
$y = \sqrt{x}$	$y = \lvert x \rvert$
$y = 10^x$	$y = \log x$

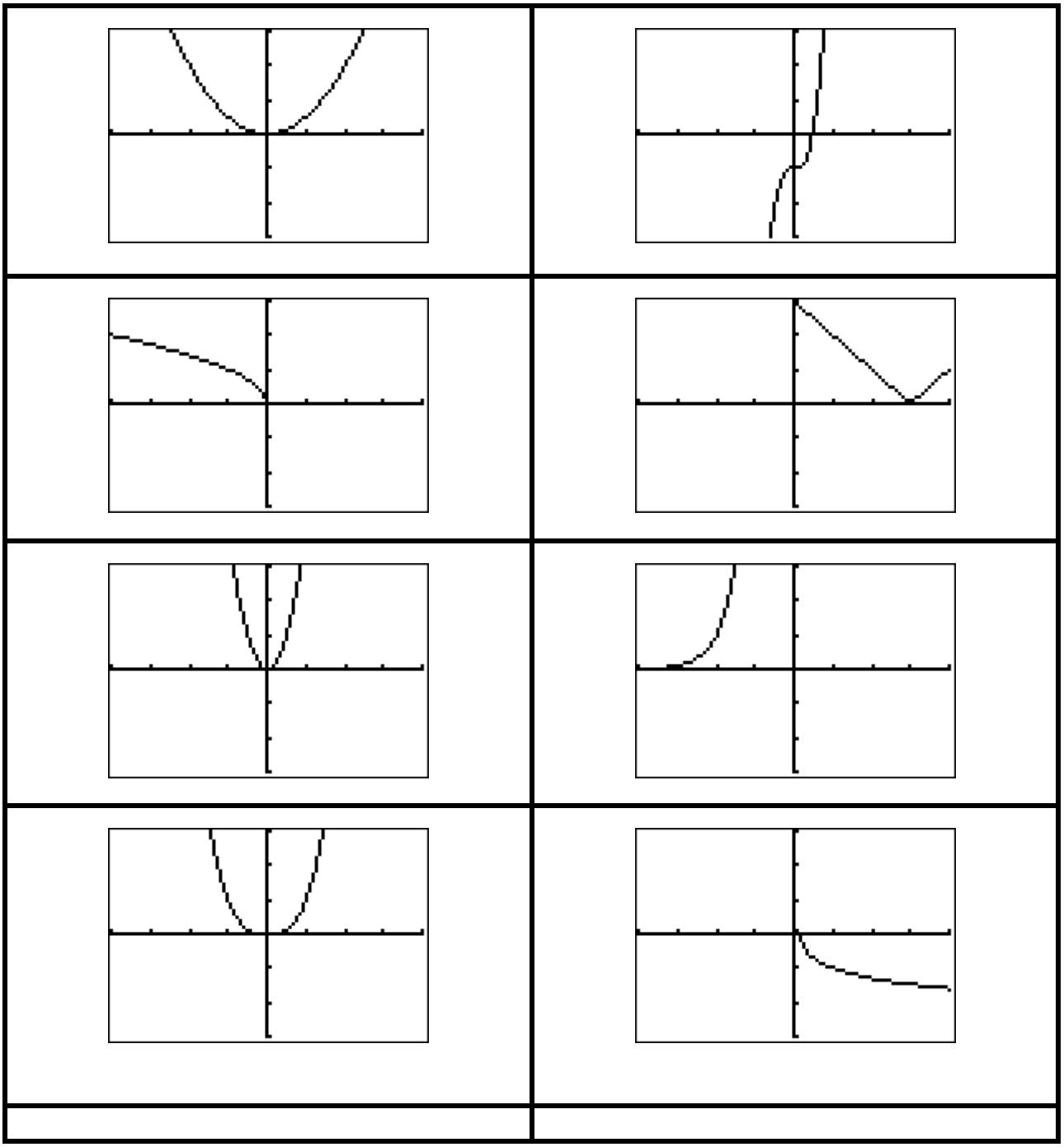
Parent Function Graph Cards

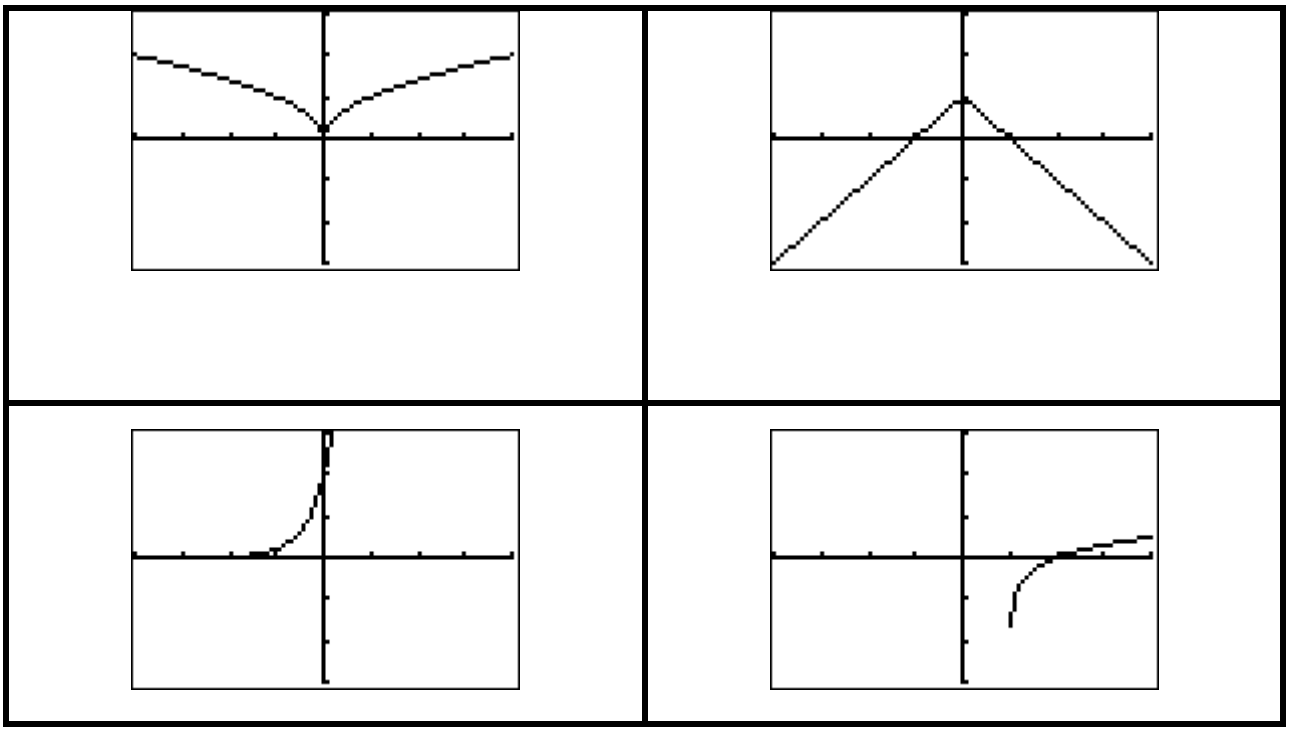


Name of Family of Functions

quadratic	quadratic
radical	radical
exponential	exponential
logarithmic	logarithmic
absolute value	absolute value
cubic	cubic

Graph Cards





Domain Cards

Domain: {all real numbers}	Domain: {all real numbers}
Domain: $\{x \leq 0\}$	Domain: {all real numbers}
Domain: {all real numbers}	Domain: {all real numbers}
Domain: {all real numbers}	Domain $\{x > 0\}$
Domain: {all real numbers}	Domain: {all real numbers}
Domain: {all real numbers}	Domain: $\{x > 1\}$

Domain Cards

Domain: $(-\infty, \infty)$	Domain: $(-\infty, \infty)$
Domain: $(-\infty,0]$	Domain: $(-\infty, \infty)$
Domain: $(-\infty, \infty)$	Domain: $(-\infty, \infty)$
Domain: $(-\infty, \infty)$	Domain: $(0, \infty)$
Domain: $(-\infty, \infty)$	Domain: $(-\infty, \infty)$
Domain: $(-\infty, \infty)$	Domain: $(1,\infty)$

Range Cards

Range: $\{y > 0\}$	Range: {all real numbers}
Range: $\{y \geq 0\}$	Range: $\{y \geq 0\}$
Range: $\{y \geq 0\}$	Range: $\{y > 0\}$
Range: {all real numbers}	Range: {all real numbers}
Range: $\{y \geq 0\}$	Range: $\{-\infty < y \leq 1\}$
Range: $\{y \geq 0\}$	Range: {all real numbers}