Warm Up:

1. Let $f(x) = 2x + 3$ and let $g(x) = 2 - 3x$. Find the value of $(fg)(x)$ when $x = 1$.

A) 1　　B) 7　　C) -1　　D) 5
E) -5　　F) 3　　G) 9　　H) -3

2. Let $f(x) = \sqrt{x^2 - 4}$ and $g(x) = \sqrt{x + 1}$. Find the domain of $\left(\frac{g}{f}\right)(x)$. $\frac{\sqrt{x+1}}{\sqrt{x^2-4}}$

A) $(-\infty, -2] \cup [2, \infty)$　　B) $(\infty, -2) \cup (2, \infty)$　　C) $(-1, \infty)$　　D) $[-1, \infty)$
E) $[2, \infty)$　　F) $(2, \infty)$　　G) $(-1, 2)$　　H) $\mathbb{R}$

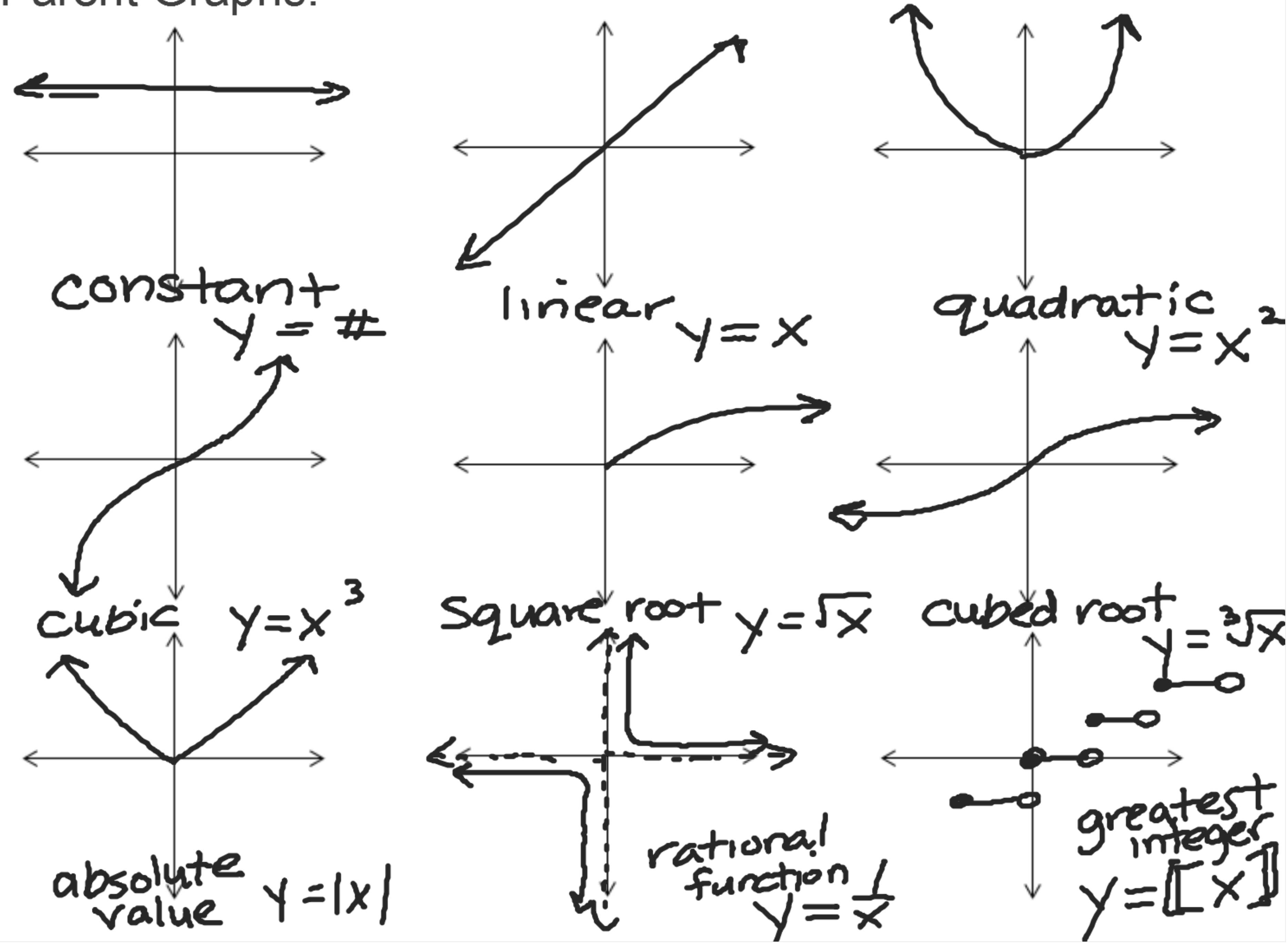
3. Let $f(x) = x^2$ and let $g(x) = 2x$. Find the value of $(g \circ f)(x)$ when $x = 3$.

A) 36　　B) 144　　C) 48　　D) 72
E) 18　　F) 4　　G) 9　　H) 6

4. Let $f(x) = 2x$ and let $(f \circ g)(x) = x^2$. Find the value of $g(4)$.

A) 6　　B) 2　　C) 16　　D) 8
E) 0　　F) 1　　G) 12　　H) 4

Parent Graphs:



End Behavior:

what happens as x approaches positive & negative infinity

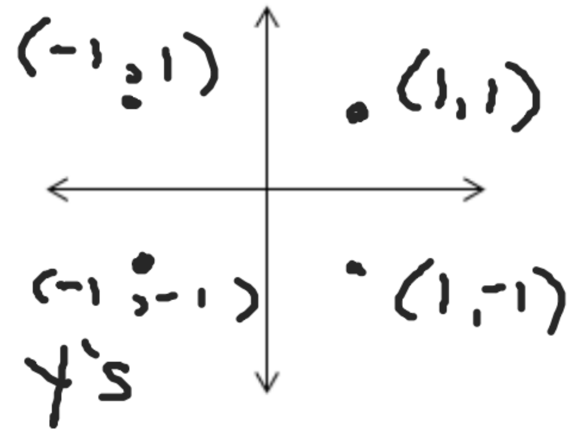
Even Powered Functions:

- graph ends in quad I & II
- if leading coef. is neg
  ↳ ends in quad III & IV

Odd Powered Functions:

- graph ends in quad I & III
- if leading coef is neg
  ↳ ends in quad II & IV

Symmetry



x-axis: $(x, y) \rightarrow (x, -y)$

- plug in $(-y)$ for all y's

y-axis: $(x, y) \rightarrow (-x, y)$

- plug in $(-x)$ for all x's

* even function

* always test odd first

origin: $(x, y) \rightarrow (-x, -y)$

- plug in $(-x)$ for x & $(-y)$ for y

* odd function

Examples:

Is each relation even, odd, neither, or ~~both~~?

$$y = |x| + 2x^2$$

odd:

$(-y) = |(-x)| + 2(-x)^2$

$-y = |x| + 2x^2$

even:

$y = |(-x)| + 2(-x)^2$

$y = |x| + 2x^2$

even

$$xy^2 = -x + x^3$$

odd:

$(-x)(-y)^2 = -(-x) + (-x)^3$

$-xy^2 = x - x^3$

$xy^2 = -x + x^3$

odd

Transformations of Parent Graphs

$y = x^2$

* c is pos.

Horizantal & Veritcal Shifts:

1. $y = (x - c)^2$ * c units right
2. $y = (x + c)^2$ * c units left
3. $y = x^2 - c$ * c units down
4. $y = x^2 + c$ * c units up

Reflections:

1. $y = (-x)^2$ * y-axis reflection
2. $y = -x^2$ * x-axis reflection

Horizantal & Vertical Dialations: $c > 1$

1. $y = cx^2$ * Stretched vert by a factor of c

2. $y = \frac{x^2}{c}$ * shrunk vert by a factor of c

3. $y = (cx)^2$ * shrunk horiz by a factor of c

4. $y = \left(\frac{x}{c}\right)^2$ * Stretched horiz by a factor of c

Describe the translations given the following function:

$f(x) = x^2 - 8x + 10$

When the equation of the parabola is not in standard form, how can we determine what the translations are?

Completing the Square:

$$f(x) = x^2 - 8x + 10$$
$$f(x) - 10 + \underline{16} = x^2 - 8x + \underline{16}$$
$$f(x) + 6 = (x-4)^2$$
$$f(x) = (x-4)^2 - 6$$

Here is another example:

$f(x) = -x^2 + 4x - 6$

$$-f(x) = x^2 - 4x + 6$$
$$-f(x) - 6 + \underline{4} = x^2 - 4x + \underline{4}$$
$$-f(x) - 2 = (x-2)^2$$
$$-f(x) = (x-2)^2 + 2$$
$$f(x) = -(x-2)^2 - 2$$