Warm up:

1. $(x^3 - 4x^2 + 2x + 5) \div (x - 2)$

$x^2 - 2x - 2$ r 1

$x^2 + 3x + 9$

$x - 3 \overline{)\, x^3 - 27}$

$-x^3 + 3x^2$

$3x^2 - 27$

$-3x^2 + 9x$

$9x - 27$

$-9x + 27$

0

2. $(x^3 - 27) \div (x - 3)$

$x^2 + 3x + 9$

3. $(4x^3 - 2x^2 - 3) \div (2x^2 - 1)$

$2x - 1$

$2x^2 - 1 \overline{)\, \cancel{4x^3} - 2x^2 - 0x - 3}$

$-\cancel{4x^3} - 0x^2 - 2x$

$-\cancel{2x^2} + 2x - 3$

$-(\cancel{2x^2} - 0x + 1)$

$2x - 4$

$\boxed{2x - 1 \text{ r } 2x - 4}$

Objective: SWBAT classify functions and predict their end behavior.

Agenda:
- Warm Up
- Notes
- Practice
- Reflection

HW: Study for the quiz

Notes: Power Functions

A power function is any function of the form

$$f(x) = k * x^n$$

$$= kx^n$$

where k is any real number and n is any integer.

We will investigate and classify their end behavior (how the function acts at large values of x).

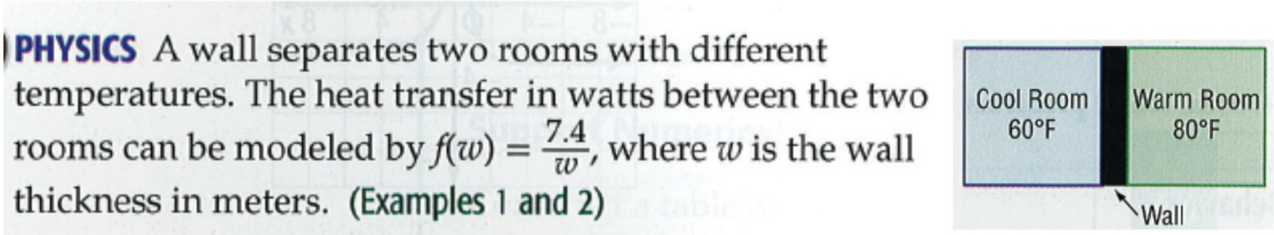
Notes

Type	as $x \to \infty$	as $x \to -\infty$	values of k and n
1	$f(x) \to +\infty$	$f(x) \to -\infty$	$k > 0$; n is odd, (+)
2	$f(x) \to -\infty$	$f(x) \to +\infty$	$k < 0$; n is odd, (+)
3	$f(x) \to +\infty$	$f(x) \to +\infty$	$k > 0$; n is even (+)
4	$f(x) \to -\infty$	$f(x) \to -\infty$	$k < 0$; n is even (+)
5	$f(x) \to 0$	$f(x) \to 0$	$k > 0$; n is odd (-)
6	$f(x) \to 0$	$f(x) \to 0$	$k < 0$; n is odd (-)
7	$f(x) \to 0$	$f(x) \to 0$	$k > 0$; n is even (-)
8	$f(x) \to 0$	$f(x) \to 0$	$k < 0$; n is even (-)

Jigsaw

1. Graph your functions and fill in their end behavior in your chart. Try to also figure out the rules for k and n.
2. Form groups with people from other tables and use each other's work to fill in your charts.

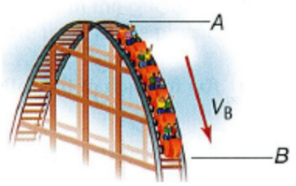
1) $y = 4x^3$
2) $y = -5x^3$
3) $y = 2x^2$
4) $y = -3x^4$
5) $y = 1/x$
6) $y = -1/(2x)$
7) $y = 1/(2x^2)$
8) $y = -1/(3x^2)$



PHYSICS A wall separates two rooms with different temperatures. The heat transfer in watts between the two rooms can be modeled by $f(w) = \frac{7.4}{w}$, where w is the wall thickness in meters. **(Examples 1 and 2)**

What happens as w approaches infinity? What does this mean in the context of the situation?

ROLLER COASTERS The speed of a roller coaster after it drops from a height A to a height B is given by $f(h_A) = \sqrt{2g(h_A - h_B)}$, where h_A is the height at point A, h_B is the height at point B, and g is the acceleration due to gravity. What happens to $f(h_A)$ as h_B decreases to 0?



Practice

Take the functions and group them by the end behavior of the lead term (because polynomials are just power functions added together).

Once you have grouped them, solve them (find ALL the zeros). Some of them can be factored!

Reflection

What can you infer about a function if you know its end behavior?