Power Functions
Alg2 CC

Name: Answers

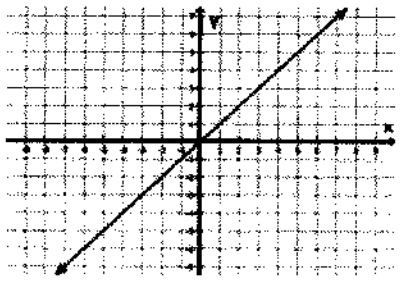
A Power Function is a function in the form $f(x) = ax^b$ where a and b are real non-zero numbers.
(**Note**: Every power function is a monomial, i.e. ONE term. All of our "parent functions" are power functions!)

Some common examples of power functions:

$C = 2\pi r$ (circumference of a circle)	$A = \pi r^2$ (area of a circle)	$F = k/d^2$ (force of gravity)	$V = k/P$ (Boyle's Law)

1) Identify the value of a and b. Then determine whether the function is even, odd, or neither.

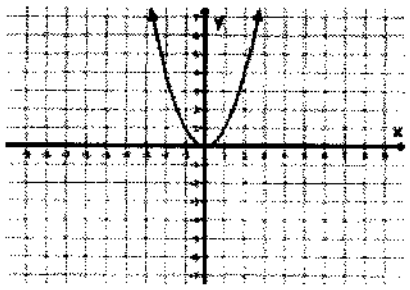
A) $f(x) = x$



$a =$ 1 $b =$ 1

Is this function even, odd, or neither? odd

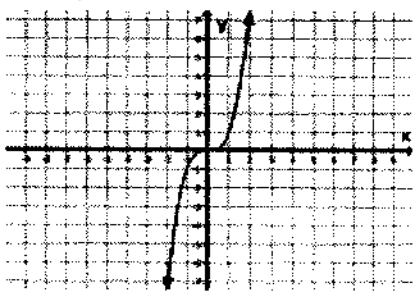
B) $f(x) = x^2$



$a =$ 1 $b =$ 2

Is this function even, odd, or neither? even

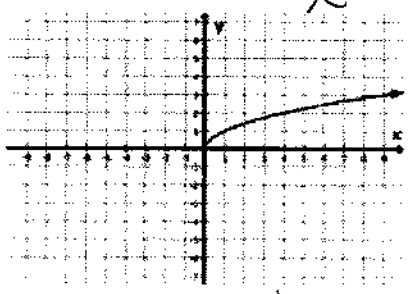
C) $f(x) = x^3$



$a =$ 1 $b =$ 3

Is this function even, odd, or neither? odd

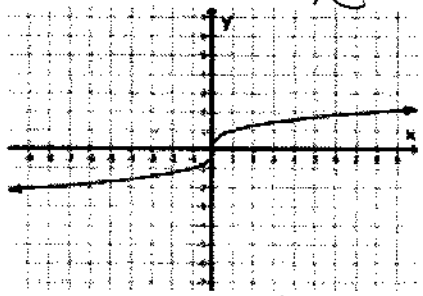
D) $f(x) = \sqrt{x} = x^{\frac{1}{2}}$



$a =$ 1 $b =$ $\frac{1}{2}$

Is this function even, odd, or neither? neither

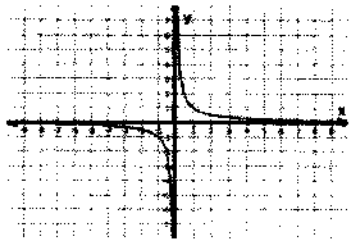
E) $f(x) = \sqrt[3]{x} = x^{\frac{1}{3}}$



$a =$ 1 $b =$ $\frac{1}{3}$

Is this function even, odd, or neither? odd

F) $f(x) = \frac{1}{x} = x^{-1}$



$a =$ 1 $b =$ -1

Is this function even, odd, or neither? odd

2) Describe the end behavior of function A, function B, function C, and function F.

Function A: As $x \to \infty, y \to$ ∞. As $x \to -\infty, y \to$ $-\infty$

Function B: As $x \to \infty, y \to$ ∞. As $x \to -\infty, y \to$ ∞

Function C: As $x \to \infty, y \to$ ∞. As $x \to -\infty, y \to$ $-\infty$

Function F: As $x \to \infty, y \to$ 0. As $x \to -\infty, y \to$ 0

3) Identify which of the following are power functions. For each that is a power function, write it in the form $y = ax^b$, where a and b are real numbers.

(a) $y = 3\sqrt[5]{x}$ $\quad y = 3x^{\frac{1}{5}}$

(b) $y = 4x^3 - 7$ $\quad y =$

(c) $y = \frac{10}{x^5}$ $\quad y = 10x^{-5}$

(d) $y = \frac{6x^7}{2x^3}$ $\quad y = 3x^4$

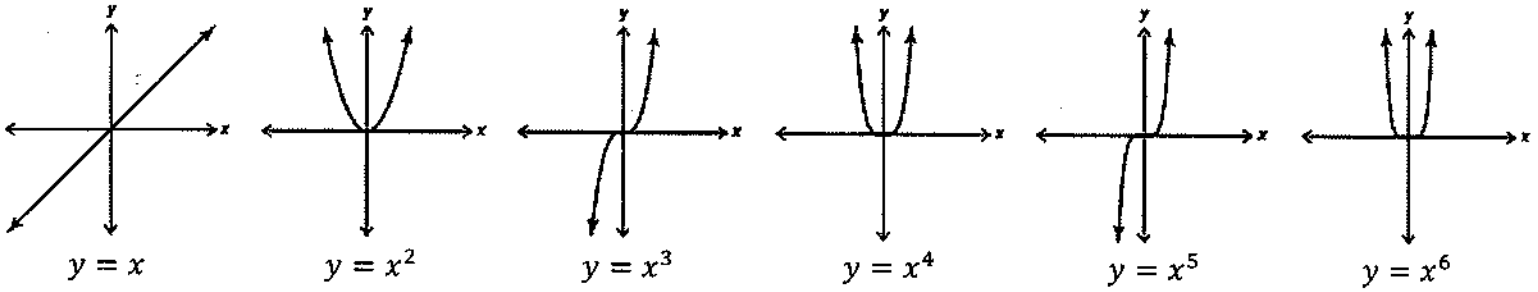
(e) $y = x^2 + 2x - 7$

(f) $y = \sqrt{48x^7}$ $\quad y = \sqrt{48}\,y^7$ or $y = 4\sqrt{3}\,y^7$

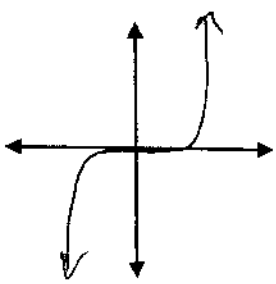
(g) $y = \sqrt{\frac{25}{x^4}} = \frac{5}{x^2}$ $\quad y = 5x^{-2}$ (Assume $x > 0$)

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

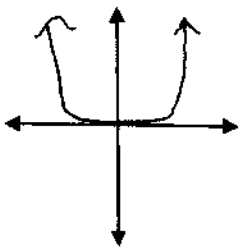
4) Consider each power function and its graph in the sequence shown.



a) Sketch and label the next two functions in the sequence.



$y = x^7$



$y = x^8$

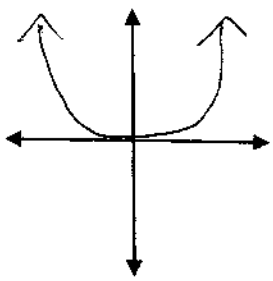
b) Make a conjecture about the graph of a power function raised to an odd degree.

Odd function i.e. graph has rotational or point symmetry through origin.

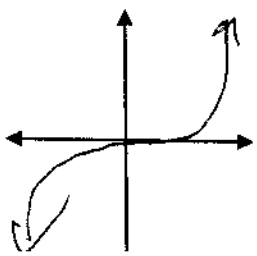
c) Make a conjecture about the graph of a power function raised to an even degree.

Even function i.e. graph has line symmetry over y-axis

d) Based on your conjecture, and without a calculator, sketch the graph of $y = x^{12}$ and $y = x^{27}$



$y = x^{12}$



$y = x^{27}$