

Working with Power Functions ... Set 1

Answers

POWER FUNCTIONS

Any function of the form: $f(x) = ax^b$ where a and b are real numbers not equal to zero.

Exercise #1: For each of the following power functions, state the value of a and b by writing the equation in the form $y = ax^b$.

(a) $y = \frac{3}{x^2} = 3x^{-2}$ (b) $y = \frac{1}{7x^3} = \frac{1}{7}x^{-3}$ (c) $y = 8\sqrt{x} = 8x^{\frac{1}{2}}$ (d) $y = \frac{6}{\sqrt[3]{x}} = 6x^{-\frac{1}{3}}$

$a=3$ $b=-2$ $a=\frac{1}{7}$ $b=-3$ $a=8$ $b=\frac{1}{2}$ $a=6$ $b=-\frac{1}{3}$

2) Fill in the values in the table below. Look for patterns as you do. (You may use your graphing calculator if you wish)

x	-3	-2	-1	0	1	2	3
x^2	9	4	1	0	1	4	9
x^3	-27	-8	-1	0	1	8	27
x^4	81	16	1	0	1	16	81
x^5	-243	-32	-1	0	1	32	243

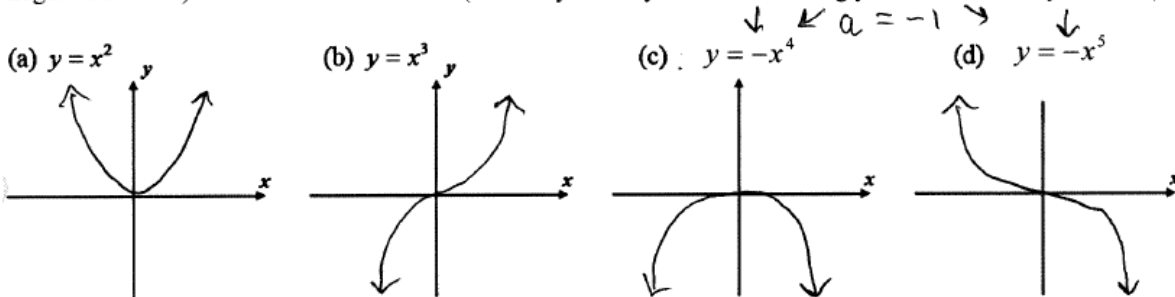
3) What do you notice in the table above?

$y = x^2$ & $y = x^4$
 $f(-x) = f(x)$

$y = x^3$ & $y = x^5$
 $f(-x) = -f(x)$

4) You may have noticed that when the power function has an even exponent, then positive and negative inputs (x values) have the **same outputs** (y values). When the power function has an odd exponent, then the positive and negative inputs (x values) have **opposite outputs** (y values).

Sketch each of these power functions without your calculator. What do you think the negative coefficient (i.e. a negative a value) will do in the last two?! (You may check your answers using your calculator if you wish!)



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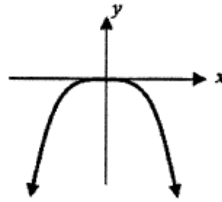
Exercise #5: Which of the following power functions is shown in the graph below? Explain your choice. Do without the use of your calculator.

(1) ~~$y = -4x^7$~~

(3) ~~$y = 6x^8$~~

(2) $y = -3x^{10}$

(4) ~~$y = 5x^9$~~



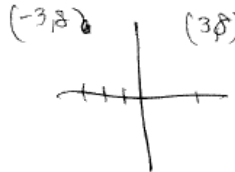
6) If the point $(-3, 8)$ lies on the graph of a power function with an even exponent, which of the following points must also lie its graph?

(1) $(3, -8)$

(3) $(-3, -8)$

(2) $(3, 8)$

(4) $(8, -3)$



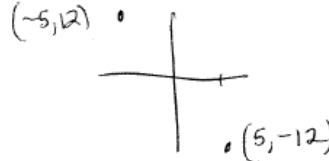
7) If the point $(-5, 12)$ lies on the graph of a power function with an odd exponent, which of the following points must also lie on its graph?

(1) $(5, -12)$

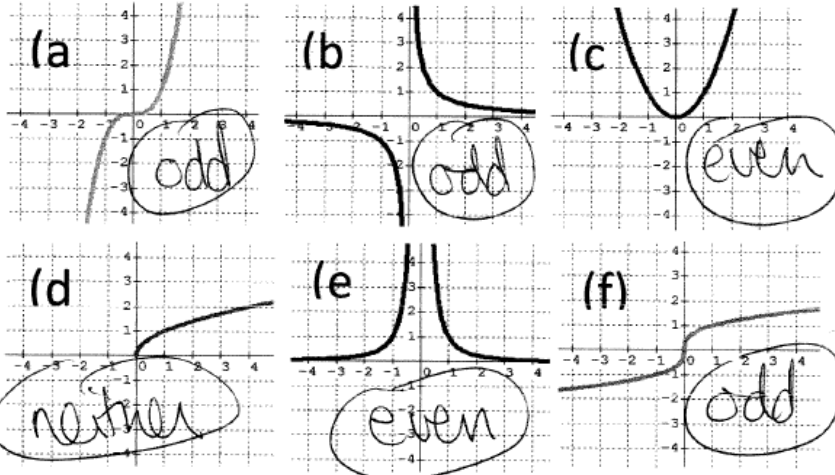
(2) $(12, -5)$

(3) $(-5, 12)$

(3) $(-12, 5)$



8) Look at the power functions below and determine if they are odd, even, or neither. Then state the end behavior of each.



Function a: As $x \rightarrow \infty, y \rightarrow \infty$. As $x \rightarrow -\infty, y \rightarrow -\infty$ Odd, Even, or Neither?

Function b: As $x \rightarrow \infty, y \rightarrow 0$. As $x \rightarrow -\infty, y \rightarrow 0$ Odd, Even, or Neither?

Function c: As $x \rightarrow \infty, y \rightarrow \infty$. As $x \rightarrow -\infty, y \rightarrow \infty$ Odd, Even, or Neither?

Function d: As $x \rightarrow \infty, y \rightarrow \infty$. As $x \rightarrow -\infty, y \rightarrow \text{N/A}$ Odd, Even, or Neither?

Function e: As $x \rightarrow \infty, y \rightarrow 0$. As $x \rightarrow -\infty, y \rightarrow 0$ Odd, Even, or Neither?

Function f: As $x \rightarrow \infty, y \rightarrow \infty$. As $x \rightarrow -\infty, y \rightarrow -\infty$ Odd, Even, or Neither?