Name: Ms Juengel Period: 1,4,7,8

Reading Guide for Direct and Inverse Variation

Preview read subsection "Variation" pg 188-189

1. Fill in the information below:

Name	Formula	Power	Constant of Variation	Input	Output
Circumference	$C = 2\pi r$	1	2π	r	C
Area of a circle	$A = \pi r^2$	2	π	r	A
Force of gravity	$F = \frac{k}{d^2}$	-2	k	d	F
Boyle's Law	$V = \frac{k}{P}$	-1	k	P	V
Free-fall	$d = \frac{p^2}{32}$	2	$\frac{1}{32}$	P	d

These four power function models involve output -from- input relationships that can be

expressed in the language of variation and proportion.

2. What is the difference between direct and inverse variation? *Explain in terms of powers.

Direct variations are power function formulas with positive powers.
Inverse variations are power function formulas with negative powers.

3. If a problem does not state otherwise, the variation is direct.

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4. Carefully read "Example 1" on page 189, and complete the chart with the information from the word problem.

Variable or Constant	Definition in words
T	period of time
l	pendulum's length.
k	constant of variation

General Variation Equation: $T(l) = k \cdot \sqrt{l}$

Power Function Form: $T(l) = k \cdot l^{1/2}$

5. Use "Example 1"and what you have read so far to help you complete exercises #17 and #21 page 197 read the directions in the test before starting the problems.

(#17) Variable or Constant	Definition in words
A	area of an equilateral Δ.
s	side length.
k	constant of variation

General Variation Equation: $A = k \cdot s^2$

Power Function Form: $A = k \cdot s^2$

(#21) Variable or Constant	Definition in words
E	energy produced in nuclear reaction
m	mass
c^2	constant

General Variation Equation: $E = m \cdot c^2$

Power Function Form: $E = c^2 \cdot m$

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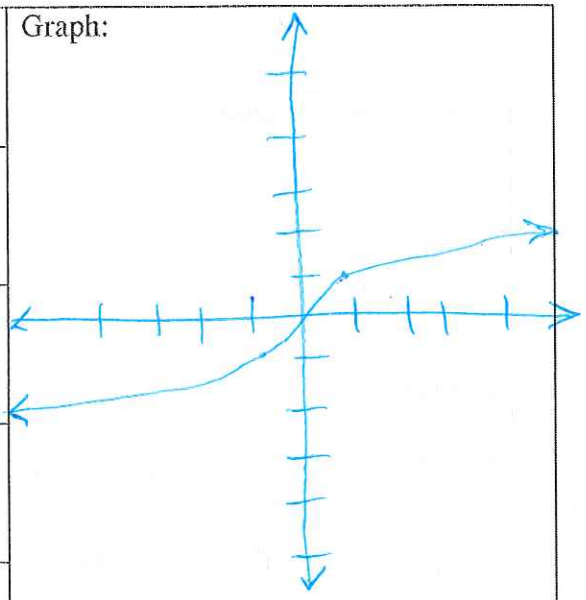
6. Which of the Twelve Basic Functions are power functions?

1. identity x 4. reciprocal $\frac{1}{x}$
2. squaring x^2 5. square root $\sqrt{x}$
3. cubing x^3 6. cube root $\sqrt[3]{x}$ inverse square $1/x^2$

7. Complete the following for the function $f(x) = \sqrt[3]{x}$
   a. Write the function in the table below
   b. Graph the function using your calculator.
   c. Fill in the missing information in the table below.

Power Function Formula: $f(x) = 1 \cdot x^{1/3}$	Graph: 
Power: $1/3$	
Constant of Variation: 1	
Symmetry: Odd	
Domain: $(-\infty, \infty)$	
Range: $(-\infty, \infty)$	
End Behavior: $\lim_{x \to -\infty} \sqrt[3]{x} = -\infty$ $\lim_{x \to \infty} \sqrt[3]{x} = \infty$	Intervals of Decrease: Does not decrease
Unbounded, Bounded, Bounded Above, Bounded Below	Intervals of Increase: $(-\infty, \infty)$

1.

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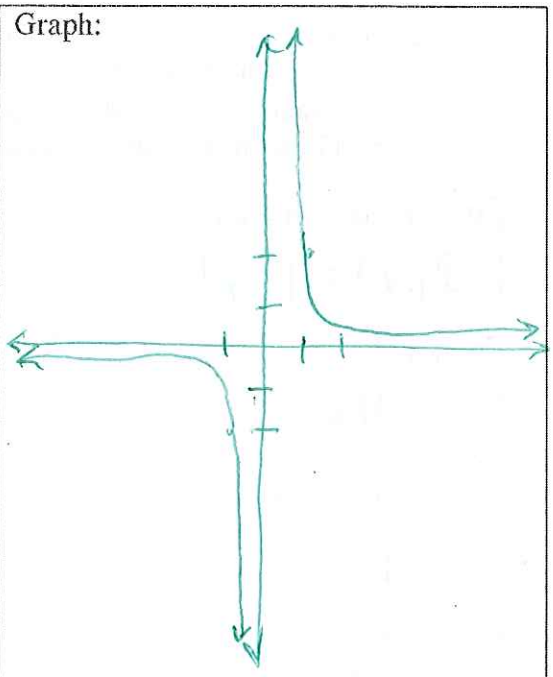
8. Complete the following for the function $f(x) = \frac{2}{x^3}$
   a. Write the function in the table below
   b. Graph the function using your calculator.
   c. Fill in the missing information in the table below.

Power Function Formula: $f(x) = 2 \cdot x^{-3}$	Graph: 
Power: -3	
Constant of Variation: 2	
Symmetry: Odd	
Domain: $(-\infty, 0) \cup (0, \infty)$	
Range: $(-\infty, 0) \cup (0, \infty)$	
End Behavior: $\lim_{x \to -\infty} 2 \cdot x^{-3} = 0$ $\lim_{x \to \infty} 2 \cdot x^{-3} = 0$	Intervals of Decrease: $(-\infty, 0) \cup (0, \infty)$
Unbounded, Bounded, Bounded Above, Bounded Below	Intervals of Increase: Does not increase

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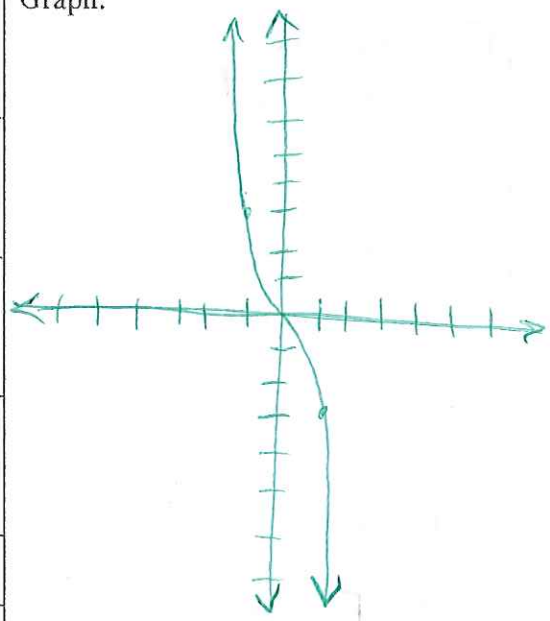
9. Page 197 #28 Complete the following for the function $f(x) = -3x^3$
   a. Write the function in the table below
   b. Graph the function using your calculator.
   c. Fill in the missing information in the table below.

Power Function Formula: $f(x) = -3x^3$	Graph: 
Power: 3	
Constant of Variation: -3	
Symmetry: odd	
Domain: $(-\infty, \infty)$	
Range: $(-\infty, \infty)$	
End Behavior: $\lim_{x \to -\infty} -3x^3 = \infty$ $\lim_{x \to \infty} -3x^3 = -\infty$	Intervals of Decrease: $(-\infty, \infty)$
(Unbounded); Bounded, Bounded Above, Bounded Below	Intervals of Increase: Does not increase

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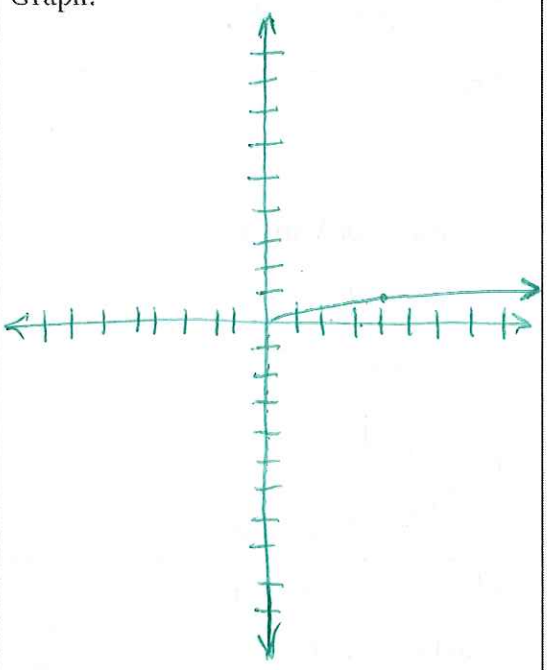
11. Page 197 #29 Complete the following for the function $f(x)=\frac{1}{2}\sqrt[4]{x}$

d. Write the function in the table below
e. Graph the function using your calculator.
f. Fill in the missing information in the table below.

Power Function Formula: $f(x)=\frac{1}{2}x^{1/4}$	Graph: 
Power: $1/4$	
Constant of Variation: $\frac{1}{2}$	
Symmetry: None	
Domain: $[0,\infty)$	
Range: $[0,\infty)$	
End Behavior: $\lim_{x\to\infty}\frac{1}{2}x^{1/4}=\infty$ no left side	Intervals of Decrease: Does not decrease
Unbounded, Bounded, Bounded Above, Bounded Below	Intervals of Increase: $[0,\infty)$

12. Preview Read "Monomial Functions and Their Graphs" page 190. What is a monomial function? How is it similar and/or different from both polynomials and power functions?

Monomial functions are any function that can be written as $f(x)=k$ or $f(x)=k\cdot x^n$ where k is a constant and n is a positive integer.

Power functions can have negative and non integer powers.

⇒ All monomial functions are power functions, but not all power functions are monomial functions.