Name: _____ Per.: _____

Notation, Radicals, Exponents, and Functions

Set-Builder and Interval Notation

Rules: *For set-builder,

1. Start with {x |
2. Write in the inequality ***as it is***
3. Close with }

*For interval,

1. Start with **(** if the lowest/starting number is ***not equal (or is –∞)***, or **[** if the number ***is equal***
2. Write in the lowest/starting number
3. If x is simply less than a single number, the starting number is –∞
4. Write a comma
5. Write in the greatest/ending number
6. If x is simply greater than a single number, the ending number is ∞
7. End with **)** if the greatest/ending number is ***not equal (or is ∞)***, or **]** if the number ***is equal***

Write each in the requested notation.

Inequality	Set-Builder	Interval	Inequality	Set-Builder	Interval
EXAMPLE: **$-2 < x \leq 7$**	*Just write it into {x| }* **{x| -2 < x ≤ 7 }**	*-2 is not equal, but 7 is* **(-2, 7]**	**EXAMPLE:** **$x \geq 5$**	*Just write it into {x| }* **{x| x ≥ 5 }**	*Equal to 5, and bigger* **[5, ∞)**
1. $6 \leq x < 9$			4. $x \leq 13$		
2. $x < -3$			5. $0 < x < 1$		
3. $-4 \leq x \leq 10$			6. $x > 6$		

Radicals

Rules:

1. Simplify, if you can, by separating out perfect square factors and rooting them. Ex: $\sqrt{56} = \sqrt{4}\sqrt{14} = 2\sqrt{14}$
2. Roots can be combined when multiplied or divided with each other, but a root cannot combine with a normal number. Ex: $\sqrt{3}\sqrt{12} = \sqrt{36} = 6$ *but…* $4\sqrt{7}$ ***is not*** $\sqrt{28}$ *or* 28 ***it's just*** $4\sqrt{7}$!
   Ex: $\frac{\sqrt{150}}{\sqrt{6}} = \sqrt{25} = 5$ *but…* $\frac{\sqrt{15}}{3}$ ***is not*** $\sqrt{5}$ *or* 5 ***it's just*** $\frac{\sqrt{15}}{3}$!
3. To get a radical out of the bottom, rationalize the denominator. This means, multiply the top and bottom by the denominator's radical. *Shortcut hint: the result will always move the radical to the top and leave a copy of its radicand (the number inside) on the bottom.* Ex: $\frac{1}{\sqrt{17}} \rightarrow \frac{1\sqrt{17}}{17} \rightarrow \frac{\sqrt{17}}{17}$

Simplify each.

1. $\sqrt{24}$	4. $\frac{\sqrt{56}}{\sqrt{14}}$	7. $\sqrt{50}\sqrt{20}$	10. $\frac{5\sqrt{2}}{4\sqrt{20}}$
2. $\frac{\sqrt{80}}{\sqrt{5}}$	5. $\sqrt{15}\sqrt{10}$	8. $\frac{6}{5\sqrt{15}}$	11. $\sqrt{72}$
3. $\sqrt{8}\sqrt{14}$	6. $\frac{8}{\sqrt{12}}$	9. $\sqrt{125}$	12. $\sqrt{\frac{121}{25}}$

Exponents

Rules:

1. Anything to the power of ^{0} = 1.
2. Anything to the power of ^{1} = itself.
3. Anything to a negative power moves from the top of the fraction to the bottom, or from the bottom to the top. After it moves, the power becomes positive.
4. A power touching parentheses multiplies to every exponent inside them—including the invisible ^{1}.
5. Multiplying two base numbers that are the same means you add the exponents—including the invisible ^{1}.
6. Dividing two base numbers that are the same means you subtract the exponents—including the invisible ^{1}. *Trick: always subtract bigger exponent – smaller exponent, and put what remains wherever the bigger exponent used to be.* Ex: $\frac{a^3}{a^5} = \frac{1}{a^2}$ *but* $\frac{a^5}{a^3} = \frac{a^2}{1} = a^2$
7. The most important part of this process is organization. Organize the problem first, then keep it that way!

Simplify each.

Example:

$$\frac{g^3h^5k^{-3}m^0ng^2}{h^3g^9mn^{-6}k^{-2}}$$

One way to organize is to use a table to line up the matching bases. Simplify each section. Keep simplifying, until it's done.

g^3g^2	h^5	k^{-3}	m^0	n
g^9	h^3	k^{-2}	m	n^{-6}

g^5	h^2	k^{+2}	1	n^1n^{+6}
g^9	1	k^{+3}	m	1

1	h^2	1	1	n^7
g^4	1	k^1	m	1

$$\frac{h^2n^7}{g^4km}$$

Example:

$$\frac{(p^{-2}q^8r^0)^5p^3rs^{-4}}{q^3r^{-4}pq^{-4}s^5} = \frac{p^{-10}q^{40}r^0p^3rs^{-4}}{q^3r^{-4}pq^{-4}s^5}$$

*Organize **after** multiplying out the)^5. PARENTHESES 1st!*

Then, simplify until you're done.

$p^{-10}p^3$	q^{40}	r^0r	s^{-4}
p	q^3q^{-4}	r^{-4}	s^5

p^3	$q^{40}q^{+4}$	$1r^1r^{+4}$	1
$p^{+10}p^1$	q^3	1	$s^{+4}s^5$

p^3	q^{44}	r^5	1
p^{11}	q^3	1	s^9

1	q^{41}	r^5	1
p^8	1	1	s^9

$$\frac{q^{41}r^5}{p^8s^9}$$

1. $$\frac{a^8bc^{-4}b^7}{a^{-6}b^{10}ca^0c^{-5}}$$

2. $$\frac{(m^5n^0p^2q^{-4})^{-3}mpq^3}{m^{-6}np^5}$$

3. $$\frac{y^{-2}xy^5z^8}{x^7(x^{-1}y^5z^2)^4y^{-8}}$$

4. $$\frac{g^2hk^{-3}h^3gk^0}{g^{-4}kh^5}$$

Functions:

Rules:

1. Every girl gets one guy, every x gets one y. If any x has more than one y, it is not a function!
2. Domain is x, and Range is y.

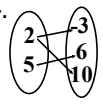
Determine if each relation is a function.

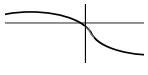
1. {(3, 1), (-4, 5), (6, 1), (0, 2)}

2.

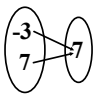
D	-1	-1	4
R	0	5	7

3. 

4. 

5. 

6. {(7, -2), (5, 4), (7, 0)}

7. 

8.

D	R
2	5
3	5
2	5