Pre-calculus Unit 2 Lesson 1

Name: Class notes

Date: 10/4

Objectives:
- apply the properties of exponents
- solve equations containing rational exponents and radicals
- write and solve exponential functions using a gc

Do Now: Use the exponential properties to simplify and rewrite the following expressions:

1. The expression $(-3x^2y^3)^3$ is equivalent to:

(a) $-9x^6y^9$ (b) $-27x^5y^6$ (c) $-27x^6y^9$ (d) $-3x^5y^6$

(1) C

2. Simplify: $(3^a)^2(3^{a+4})$ $= 3^{2a} \cdot 3^{a+4}$

(a) 3^{a^2+a+4} (b) 3^{3a+4} (c) 3^{2a+6} (d) 3^{a^3+4a}

(2) b

3. $5y(x^3)^0 =$ 5y

4. $\frac{xy^9}{3y^{-2}} \cdot \frac{-7y}{21x^5} = \frac{-y^{12}}{9x^4}$

$\frac{-7 \times y^{10}}{63 \quad x^5 \quad y^{-2}} = \frac{-1y^{12}}{9x^4}$

5. $4(x^{-2}y^5)^{-2} = 4(x^4y^{-10}) = \frac{4x^4}{y^{10}}$

Using Exponential Function Properties to Solve for x:

Process 1: Create Like Bases

1. $4^{4x+1} = 4^{2x-2}$

$4x+1 = 2x-2$

$2x = -3$ $x = -3/2$

2. $4^{5x+1} = 16^{2x-1}$

$4^{5x+1} = 4^{4x-2}$

$5x+1 = 4x-2$

$x = -3$

3. $3^{x^2} = 9^{x+4}$

$3^{x^2} = 3^{2(x+4)}$

$x^2 - 2x - 8 = 0$

$(x-4)(x+2) = 0$

$x = 4 \quad x = -2$

Process 2: Use $\sqrt{\ }$s

4. $x^4 = 81$

$x = \pm\sqrt[4]{81}$ if index is pos $\Rightarrow$ must use $\pm$

$x = \pm 3$

5. $(2x-1)^5 = -32$

$2x-1 = \sqrt[5]{-32}$

$2x-1 = -2$

$2x = -1$

$x = -1/2$

Process 3: Undo $\sqrt{\ }$s using exponents.

6. $\sqrt{x-1} = 4$

$x - 1 = 16$

$x = 17$

Process 4: Undo rat. exponent by raising both sides by reciprocal exponent ↑ root is even $\Rightarrow \pm$

7. $\frac{1}{2}(x+4)^{\frac{2}{3}} - 7 = 11$

$(x+4)^{2/3} = 36$

$x+4 = 36^{3/2}$

$x+4 = (\pm 6)^3$

$x = -220 \quad x+4 = \pm 216$

$x = 212$

Remember to CHECK SOLUTIONS when using process 3 or 4!

Solving Radical Equations Name_____

Steps for Solving Radical Equations

1. Isolate the radical. Examine it. _____
2. Raise **BOTH** sides of the equation to the power needed to free the radical.
4. Check your answer – it is possible that your answer will not work. If so, the solution is _____

Example #1.

$\sqrt{x} = -3$

ϕ

$\sqrt{}$ can't be negative

Example #2

$2\sqrt{x-4}+3=15$

$2\sqrt{x-4} = 12$

$\sqrt{x-4} = 6$

$x-4 = 36$

$x = 40$

Example 3

$7+\sqrt[3]{2x-1}=10$

$\sqrt[3]{2x-1} = 3$

$2x-1 = 27$

$2x = 28$

$x = 14$ ✓

Example 4

$\sqrt{3x-1}=\sqrt{2x+4}$

$3x-1 = 2x+4$

$x = 5$ ✓

EX 5. Ok, now. What should we do with this one? $\left(\sqrt{2x+3}\right)^2 = \left(3-\sqrt{2x}\right)^2$

works.

$2x+3 = 9 - 6\sqrt{2x} + 2x$

$2x+3 = 2x+9-6\sqrt{2x}$

$-6 = -6\sqrt{2x}$

$\sqrt{2x} = 1$

$2x = 1$

$x = 1/2$ ✓

check it.

Solving Equations using Rational Exponents: To undo a rational exponent, raise each side of the equation to the _____ after you have _____!

4. $x^{\frac{5}{6}} = 32$ 6/5 6/5

$x = \left(\sqrt[5]{32}\right)^6$

$x = 2^6$

$x = 64$

5. $(2x+5)^{\frac{2}{3}} = 16$ 3/2 3/2

$2x+5 = \pm\sqrt{16}^3$

$2x+5 = \pm 64$

$x = \frac{59}{2}$ or $x = \frac{-69}{2}$

$2x+5 = -64$

$2x = -69$

6. $\left[(x-4)^{\frac{3}{2}}\right]^{2/3} = (-8)^{2/3}$

$x-4 = 4$

$x = 8$

~~NO SO~~ extraneous

7. $(4x+8)^{\frac{1}{2}} = 2x$

$4x+8 = 4x^2$

$0 = 4x^2 - 4x + 8$

$0 = 4(x^2 - x + 2)$

$0 = 4(x-2)(x+1)$

$x = 2$ $x = -1$

When all else fails, what could you do. . . ?