Name: _____ Date: _____

MORE EXPONENT PRACTICE
COMMON CORE ALGEBRA II

For further study in mathematics, especially Calculus, it is important to be able to manipulate expressions involving exponents, whether those exponents are positive, negative, or fractional. The basic laws of exponents, which you should have learned in Algebra 1 and have used previously in this course, are shown to the right. They apply regardless of the nature of the exponent (i.e. positive, negative, or fractional).

EXPONENT LAWS

1. $x^a \cdot x^b = x^{a+b}$
2. $\dfrac{x^a}{x^b} = x^{a-b}$
3. $\left(x^a\right)^b = x^{a \cdot b}$
4. $x^{m/n} = \sqrt[n]{x^m}$ (For integers m and n)
5. $x^{-a} = \dfrac{1}{x^a}$ and $\dfrac{1}{x^{-a}} = x^a$
6. $\left(x \cdot y\right)^a = x^a \cdot y^a$
7. $x^0 = 1$

Although these problems can be challenging, the key will be to carefully apply these exponent laws in a systematic manner.

***Exercise* #1:** Simplify each of the following expressions. Leave no negative exponents in your answers.

(a) $\dfrac{x^3 \cdot x^4}{\left(x^5\right)^2}$ (b) $\dfrac{\left(x^2 y\right)^4}{x^5 y^7}$ (c) $\dfrac{x^{-2} y^4}{x^{-6} y}$ (d) $\dfrac{\left(x^{-3} y^{-4}\right)^2}{\left(x y^3\right)^{-4}}$

In the last exercise, all of the powers were integers. In the next exercise, we introduce fractional powers. Remember, though, that they will still follow the exponent rules above. If needed, use your calculator to help add and subtract the powers.

***Exercise* #2:** Simplify each of the following expressions. Write each without the use of negative exponents.

(a) $\dfrac{x^{1/3} \cdot x^{1/2}}{x^{1/6}}$ (b) $\dfrac{\left(x^{1/2}\right)^5}{x^{3/2} \cdot x^3}$ (c) $\dfrac{\left(4x^{2/3}\right)^3}{32x^8}$

We must not forget from our last lesson that fractional exponents have an **equivalent interpretation** as roots. We should be able to move from one representation to another.

***Exercise* #3:** Rewrite each expression below in both its simplest form and using radical expressions.

(a) $x^{5/3}$ (b) $\dfrac{x^{5/2}}{x^{4/3}}$ (c) $\dfrac{1}{x^{-3/2}}$

(d) $\dfrac{x^3}{\sqrt{x}}$ (e) $\left(8x^5\right)^{2/3}$ (f) $\dfrac{(27x)^{1/3}}{6\sqrt{x}}$

***Exercise* #4:** Which of the following is equivalent to $\sqrt[3]{8x^7}$?

(1) $8x^{7/3}$ (3) $2x^{3/7}$

(2) $2x^{7/3}$ (4) $8x^{3/7}$

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***Exercise* #5:** The expression $\dfrac{1}{\sqrt{4x}}$ is the same as

(1) $\dfrac{1}{2}x^{-1/2}$ (3) $4x^{1/2}$

(2) $2x^{-1/2}$ (4) $\dfrac{1}{2}x^{1/2}$ _____

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EXPONENT PRACTICE
COMMON CORE ALGEBRA II HOMEWORK

FLUENCY

1. Rewrite each of the following expressions in simplest form and without negative exponents.

(a) $\dfrac{x^3x^7}{\left(x^2\right)^3}$ (b) $\dfrac{5x^4}{25x^{10}}$ (c) $\dfrac{\left(x^3y^4\right)^2}{\left(x^3y\right)^3}$ (d) $\dfrac{\left(2x^3\right)^5}{8x^{-3}}$

2. Which of the following represents the value of $\dfrac{a^{-4}}{b^{-2}}$ when $a = 3$ and $b = 2$?

(1) $\dfrac{4}{9}$ (3) $\dfrac{1}{36}$

(2) $\dfrac{4}{81}$ (4) $\dfrac{1}{3}$

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3. Simplify each expression below so that it contains no negative exponents. Do not write the expressions using radicals.

(a) $\dfrac{x^{7/2}y^{1/2}}{x^{3/4}y^2}$ (b) $\dfrac{\left(x^{1/3}\right)^4}{x^{-2/3}}$ (c) $\left(5x^{2/3}y^{-1/2}\right)\left(2x^2y^{-3}\right)$

4. Which of the following represents the expression $\dfrac{24x^{-1/2}}{6x^{5/2}}$ written in simplest form?

(1) $\dfrac{4}{x^3}$ (3) $\dfrac{x^2}{4}$

(2) $4x^3$ (4) $4x^2$

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5. Rewrite each of the following expressions using radicals. Express your answers in simplest form.

(a) $(4x)^{3/2}$ (b) $x^{-2/3}$ (c) $\left(x^4\right)^{3/5}$

(d) $\dfrac{\sqrt[3]{x}}{\sqrt{x}}$ (e) $\dfrac{\sqrt{x}\cdot x^2}{x^{5/3}}$ (f) $\dfrac{\left(2\sqrt{x}\right)^3}{24x}$

6. Which of the following is equivalent to $\dfrac{5\sqrt{x}}{20x^3}$?

(1) $\dfrac{1}{4\sqrt{x^3}}$ (3) $\dfrac{1}{4\sqrt[5]{x^2}}$

(2) $\dfrac{4}{\sqrt{x^5}}$ (4) $\dfrac{1}{4\sqrt{x^5}}$

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7. When written in terms of a fractional exponent the expression $\dfrac{\sqrt{x}\cdot x}{x^{-2}}$ is

(1) $x^{7/2}$ (3) $x^{-1/2}$

(2) $x^{5/2}$ (4) $x^{-3/2}$

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8. Expressed as a radical expression, the fraction $\dfrac{x^{1/3}x^{1/2}}{x^{-1}}$ is

(1) $\dfrac{1}{\sqrt[6]{x}}$ (3) $\sqrt[11]{x^6}$

(2) $\dfrac{1}{\sqrt[11]{x^6}}$ (4) $\sqrt[6]{x^{11}}$

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