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Date ____________
Algebra II

Fractional Exponents Regents Practice

For Multiple Choice, Use Multiple Choice Strategy!!!!!! 10→x 15→y

1. The expression $\sqrt[4]{81x^8y^6}$ is equivalent to 17428.42506

4maths for $\sqrt[4]{}$

17428.4286 1) $3x^2y^{\frac{3}{2}}$

3) $9x^2y^{\frac{3}{2}}$ 52285.27517

6750000 2) $3x^4y^2$

4) $9x^4y^2$ 26250000

2. When $b > 0$ and d is a positive integer, the expression $(3b)^{\frac{2}{d}}$ 1.57... is equivalent to $(3x)^{\frac{2}{y}}$

1) $\frac{1}{\left(\sqrt[d]{3b}\right)^2}$ 2) $\left(\sqrt{3b}\right)^d$ 3) $\frac{1}{\sqrt{3b^d}}$ 4) $\left(\sqrt[d]{3b}\right)^2$

.635... 1.1...E11 1.8...E8 1.57...

3. Given $y > 0$, the expression $\sqrt{3x^2y} \bullet \sqrt[3]{27x^3y^2}$ is equivalent to 12240...

1) $81x^5y^3$ 2.7... E10

3) $3^{\frac{5}{2}}x^2y^{\frac{5}{3}}$ 142218....

2) $3^{1.5}x^2y$ 7794...

4) $3^{\frac{3}{2}}x^2y^{\frac{7}{6}}$ 12240...

$\left(\frac{x^2}{x^{\frac{1}{3}}}\right)^{-\frac{1}{2}}$

4. The expression $\left(\frac{m^2}{m^{\frac{1}{3}}}\right)^{-\frac{1}{2}}$ is equivalent to .146...

1) $-\left(\sqrt[6]{m^5}\right)$ -6.81...

3) $-m\left(\sqrt[5]{m}\right)$ -15.84...

2) $\frac{1}{\sqrt[6]{m^5}}$ .146...

4) $\frac{1}{m\left(\sqrt[5]{m}\right)}$ .063...

5. What does $\left(\frac{-54x^9}{y^4}\right)^{\frac{2}{3}}$ equal? 10439...

1) $\cancel{\frac{9ix^6\sqrt[3]{4}}{y\sqrt[3]{y^2}}}$

2) $\cancel{\frac{9ix^6\sqrt[3]{4}}{y^2\sqrt[3]{y^2}}}$

3) $\frac{x^6\left(\sqrt[3]{4}\right)}{y\left(\sqrt[3]{y}\right)}$ 42910...

4) $\frac{9x^6\sqrt[3]{4}}{y^2\sqrt[3]{y^2}}$ 10439...

Since my answer doesn't have an i, it can't have an i

6. For $x > 0$, which expression is equivalent to $\frac{\sqrt[3]{x^2} \bullet \sqrt{x^5}}{\sqrt[6]{x}}$? 1000

1) x 10
2) $x^{\frac{3}{2}}$ 31...
3) x^3 1000
4) x^{10} 1E10

7. For positive values of x, which expression is equivalent to $\sqrt{16x^2} \bullet x^{\frac{2}{3}} + \sqrt[3]{8x^5}$ 278...

1) $6(\sqrt[3]{x^5})$ 278...
2) $6(\sqrt[5]{x^3})$ 23...
3) $4(\sqrt[3]{x^2}) + 2(\sqrt[3]{x^5})$ 111...
4) $4\sqrt{x^3} + 2(\sqrt[6]{x^3})$ 134...

8. For $x \geq 0$, which equation is *false*?

1) $(x^{\frac{3}{2}})^2 = \sqrt[4]{x^3}$ 1000 = 5.6.. X
2) $(x^3)^{\frac{1}{4}} = \sqrt[4]{x^3}$ 5.6.. = 5.6.. ✓
3) $(x^{\frac{3}{2}})^{\frac{1}{2}} = \sqrt[4]{x^3}$ 5.6.. = 5.6.. ✓
4) $(x^{\frac{2}{3}})^2 = \sqrt[3]{x^4}$ 21... = 21.. ✓

9. For $x \neq 0$, which expressions are equivalent to one divided by the sixth root of x? $\frac{1}{\sqrt[6]{x}}$ = .68...

I. $\frac{\sqrt[6]{x}}{\sqrt[3]{x}}$ .68... II. $\frac{x^{\frac{1}{6}}}{x^{\frac{1}{3}}}$ .68... III. $x^{\frac{-1}{6}}$ .68...

1) I and II, only
2) I and III, only
3) II and III, only
4) I, II, and III

10. Explain what a rational exponent, such as $\frac{5}{2}$ means. Use this explanation to evaluate $9^{\frac{5}{2}}$.

Radicals are fractional/rational exponents. The fraction is the $\frac{\text{power}}{\text{root}}$.

$9^{\frac{5}{2}\frac{P}{r}} = (\sqrt[2]{9})^5$

$3^5 = 81$

11. Explain how $125^{\frac{4}{3}}$ can be evaluated using properties of rational exponents to result in an integer answer.

Radicals are fractional/rational exponents. The exponent is the $\frac{\text{Power}}{\text{root}}$. $125^{\frac{4}{3}}$ $\frac{P}{r}$ $(\sqrt[3]{125})^4$

$5^4 = 625$

12. Explain how $(-8)^{\frac{4}{3}}$ can be evaluated using properties of rational exponents to result in an integer answer.

Radicals are fractional/rational exponents. The exponent is the $\frac{\text{Power}}{\text{root}}$. $(-8)^{\frac{4}{3}}$ $\frac{P}{r}$ $(\sqrt[3]{-8})^4$

$(-2)^4 = 16$

13. Explain how $\left(3^{\frac{1}{5}}\right)^2$ can be written as the equivalent radical expression $\sqrt[5]{9}$.

Radicals are fractional exponents. The exponent is the $\frac{\text{Power}}{\text{root}}$.

$(3^{\frac{1}{5}})^2 = \sqrt[5]{9}$ $\quad 3^{\frac{2}{5}} = 3^{\frac{2}{5}}$

$3^{\frac{2}{5}} = 9^{\frac{1}{5}}$

$3^{\frac{2}{5}} = (3^2)^{\frac{1}{5}}$

14. Kenzie believes that for $x \geq 0$, the expression $\left(\sqrt[7]{x^2}\right)\left(\sqrt[5]{x^3}\right)$ is equivalent to $\sqrt[35]{x^6}$. Is she correct? Justify your response algebraically.

Radicals are fractional exponents
Get rid of parenthesis
Negative exponents are fractions
Clean it up (multiply/divide/radical)

$(x^{\frac{2}{7}})(x^{\frac{3}{5}}) = x^{\frac{6}{35}}$

$x^{\frac{31}{35}} = x^{\frac{6}{35}}$

$\frac{2}{7} + \frac{3}{5} = \frac{31}{35}$
It's easiest to use the calculator

No, she is not correct

Radicals are fractional exponents
Get rid of parenthesis
Negative exponents are fractions
Clean it up (multiply/divide radical)

* Add exponents when multiplying
* Subtract exponents when dividing

15. Justify why $\frac{\sqrt[3]{x^2y^5}}{\sqrt[4]{x^3y^4}}$ is equivalent to $x^{\frac{-1}{12}}y^{\frac{2}{3}}$ using properties of rational exponents, where $x \neq 0$ and $y \neq 0$.

$\frac{2}{3}-\frac{3}{4}=\frac{-1}{12}$

$\frac{5}{3}-1=\frac{2}{3}$

use calc

$\frac{(x^2y^5)^{\frac{1}{3}}}{(x^3y^4)^{\frac{1}{4}}} = x^{-\frac{1}{12}}y^{\frac{2}{3}}$

$\frac{x^{\frac{2}{3}}y^{\frac{5}{3}}}{x^{\frac{3}{4}}y^1} = \frac{y^{\frac{2}{3}}}{x^{\frac{1}{12}}}$

$x^{-\frac{1}{12}}y^{\frac{2}{3}} = \frac{y^{\frac{2}{3}}}{x^{\frac{1}{12}}}$

$\frac{y^{\frac{2}{3}}}{x^{\frac{1}{12}}} = \frac{y^{\frac{2}{3}}}{x^{\frac{1}{12}}}$

I didn't have to drop the $x^{-\frac{1}{12}}$ power but I like to follow my procedule

16. For n and $p > 0$, is the expression $\left(p^2n^{\frac{1}{2}}\right)^8 \sqrt[2]{p^5n^4}^{\,1}$ equivalent to $p^{18}n^6\sqrt[2]{p^1}$? Justify your answer.

$16+\frac{5}{2}=\frac{37}{2}$

Use Calc

$(p^{16}n^4)(p^5n^4)^{\frac{1}{2}} = p^{18}n^6p^{\frac{1}{2}}$

$(p^{16}n^4)(p^{\frac{5}{2}}n^2) = p^{\frac{37}{2}}n^6$

$p^{\frac{37}{2}}n^6 = p^{\frac{37}{2}}n^6$

$18+\frac{1}{2}=\frac{37}{2}$

Use calc

17. Use the properties of rational exponents to determine the value of y for the equation:

$\frac{\sqrt[3]{x^8}}{\left(x^4\right)^{\frac{1}{3}}} = x^y,\ x > 1$

$\frac{x^{\frac{8}{3}}}{x^{\frac{4}{3}}} = x^y$

$x^{\frac{4}{3}} = x^y$

$y = \frac{4}{3}$

$\frac{8}{3}-\frac{4}{3}=\frac{4}{3}$

18. Express the fraction $\frac{2x^{\frac{3}{2}}}{\left(16x^4\right)^{\frac{1}{4}}}$ in simplest radical form.

put back into radical

$\frac{2x^{\frac{3}{2}}}{16^{\frac{1}{4}}x^1}$

$\frac{\cancel{2}x^{\frac{3}{2}}}{\cancel{2}x^1}$

$x^{\frac{1}{2}}$

$\sqrt{x}$

$\frac{3}{2}-1=\frac{1}{2}$