IB MYP Math Extended Level Name [redacted]

Quiz 5.1 – ***SHOW ALL STEPS IN YOUR SOLVING AND SIMPLIFICATION!***

1. Simplify. Your answers should have only positive exponents and no fractional exponents in the denominator.

a) $(2b)^3$ $2^3 b^{1\cdot 3} = 2^3 b^3 = 8b^3$

b) $3(x^4)^{-3}$ $3x^{4\cdot -3} = 3x^{-12} = \frac{3}{x^{12}}$

(d & e) Rewrite using rational exponents and simplify.

$\sqrt[n]{a^m} = a^{\frac{m}{n}}$

d) $\sqrt[4]{x^1} = x^{\frac{1}{4}}$

e) $\sqrt[4]{(16x)^2}$ $\sqrt[4]{16^2 x^2} = \sqrt[4]{256x^2}$

$4x^{\frac{2}{4}} = 4x^{\frac{1}{2}}$

(f & g) Simplify the expressions using properties of exponents. Your answer will contain only positive exponents without fractional exponents in the denominator.

Great use of properties!

f) $\frac{x^{-\frac{1}{2}}}{x^3}$ $x^{-\frac{1}{2}-3} = x^{-\frac{1}{2}-\frac{6}{2}} = x^{-\frac{7}{2}}$

$\frac{1}{x^{\frac{7}{2}}}\left(\frac{x^{\frac{1}{2}}}{x^{\frac{1}{2}}}\right) = \frac{x^{\frac{1}{2}}}{x^{\frac{8}{2}}} = \frac{x^{\frac{1}{2}}}{x^4}$

g) $\frac{10^3}{5^2}$ $\frac{(5\cdot 2)^3}{5^2} = \frac{5^3\cdot 2^3}{5^2} = 5^{3-2}\cdot 2^3$

$5^1 \cdot 2^3 = 5 \cdot 8 = 40$

h) $\left(\dfrac{x^{-\frac{1}{3}}y^{2}}{x^{\frac{3}{4}}\cdot y^{-\frac{1}{2}}}\right)^{2}$

$\dfrac{x^{-\frac{1}{3}\cdot\frac{2}{1}}y^{2\cdot 2}}{x^{\frac{3}{4}\cdot\frac{2}{1}}y^{-\frac{1}{2}\cdot\frac{2}{1}}} = \dfrac{x^{-\frac{2}{3}}y^{4}}{x^{\frac{6}{4}}y^{-\frac{2}{2}}} = \dfrac{x^{-\frac{2}{3}}y^{4}}{x^{\frac{3}{2}}y^{-1}} = x^{-\frac{2}{3}-\frac{3}{2}}\cdot y^{4-(-1)}$

$x^{-\frac{2}{3}-\frac{3}{2}}y^{5} = x^{-\frac{13}{6}}y^{5} = \dfrac{y^{5}}{x^{\frac{13}{6}}}\left(\dfrac{x^{\frac{5}{6}}}{x^{\frac{5}{6}}}\right) = \dfrac{y^{5}x^{\frac{5}{6}}}{x^{\frac{18}{6}}} = \dfrac{y^{5}x^{\frac{5}{6}}}{x^{3}}$

$-\frac{2}{3}-\frac{3}{2} = -\frac{4}{6}-\frac{9}{6} = -\frac{13}{6}$

$\dfrac{4^{\frac{3}{4}}\cdot 4^{\frac{5}{4}}}{4^{-\frac{1}{2}}}$

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4. Write one expression using <u>both</u> negative and fractional exponents that simplifies to **64**.

$\dfrac{4^{\frac{6}{6}}\cdot 4^{\frac{7}{4}}}{4^{-\frac{1}{2}}} = \dfrac{4^{\frac{6}{6}+\frac{7}{4}}}{4^{-\frac{1}{2}}} = \dfrac{4^{\frac{6}{6}+\frac{14}{6}}}{4^{-\frac{1}{2}}} = \dfrac{4^{\frac{20}{4}}}{4^{-\frac{1}{2}}} = \dfrac{4^{\frac{5}{2}}}{4^{-\frac{1}{2}}} = 4^{\frac{5}{2}-(-\frac{1}{2})} = 4^{\frac{6}{2}} = 4^{3}$

$4\cdot 4\cdot 4 = 64$

I knew that 4^3 was 64 so I used the properties to make sure I would end up with 4^3.

$64 = 4^{?}$

$\frac{64}{2} = 32$

$\dfrac{4^{\frac{6}{6}}\cdot 4^{\frac{2}{4}}}{4^{-\frac{1}{2}}} = 64$

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1. Simplify. Your answers should have only positive exponents and no fractional exponents in the denominator.

a) $(2b)^3 = 2^3 \cdot b^3 = 8b^3$

b) $3(x^4)^{-3} = 3(x)^{-12} = \frac{3}{x^{12}}$

(d & e) Rewrite using rational exponents and simplify.

d) $\sqrt[4]{x} = x^{\frac{1}{4}}$

e) $\sqrt[4]{(16x)^2} = (16x)^{\frac{1}{2}} = 4x^{\frac{1}{2}}$

(f & g) Simplify the expressions using properties of exponents. Your answer will contain only positive exponents without fractional exponents in the denominator.

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

$\frac{x^{\frac{1}{2}}}{x^7}$

g) $\frac{10^3}{5^2} = \frac{10 \cdot 10 \cdot 10}{5 \cdot 5} \quad 2 \cdot 2 \cdot 10 = 40$

h) $\left(\dfrac{x^{-\frac{1}{3}}y^{2}}{x^{\frac{3}{4}}\cdot y^{-\frac{1}{2}}}\right)^{2} = \dfrac{x^{-\frac{2}{3}}y^{4}}{x^{\frac{6}{4}}\cdot y^{-1}} = \dfrac{x^{-\frac{8}{12}}y^{5}}{x^{\frac{18}{12}}} = x^{-\frac{26}{12}}y^{5} = \dfrac{y^{5}}{x^{\frac{13}{6}}}\left(\dfrac{x^{\frac{5}{6}}}{x^{\frac{5}{6}}}\right) = \dfrac{y^{5}x^{\frac{5}{6}}}{x^{3}}$

4. Write one expression using <u>both</u> negative and fractional exponents that simplifies to **64**.

$\dfrac{64^{\frac{1}{2}}}{2^{-3}} = \dfrac{\sqrt{64}}{1/8} = 8\cdot 8 = 64$

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Quiz 5.1 – ***SHOW ALL STEPS IN YOUR SOLVING AND SIMPLIFICATION!***

1. Simplify. Your answers should have only positive exponents and no fractional exponents in the denominator.

a) $(3b)^2$

$3^2 b^2 = 9b^2$

b) $2(x^4)^{-2}$

$2x^{-8} = \frac{2}{x^8}$

2. Rewrite using rational exponents and simplify.

d) $\sqrt[3]{y^1}$

$\sqrt[n]{a^m}$

$m = 1$

$n = 3$

$\frac{1}{a} : y$

$y^{\frac{1}{3}}$

$y^{\frac{1}{3}}$

e) $\sqrt[6]{(27x)^2}$

$(27x)^{\frac{2}{6}} = (27x)^{\frac{1}{3}} = 3x^{\frac{1}{3}}$

3. Simplify the expressions using properties of exponents. Your answer will contain only positive exponents without fractional exponents in the denominator.

f) $\frac{x^{-\frac{1}{3}}}{x^2}$

$\frac{1}{x^{\frac{7}{3}}} \left(\frac{x^{\frac{1}{3}}}{x^{\frac{6}{3}}}\right) = \frac{x^{\frac{2}{3}}}{x^3}$

g) $\frac{14^3}{7^2}$

$\frac{14 \cdot 14 \cdot 14}{7 \cdot 7} = \frac{2744}{49} = 56$

h) $\left(\dfrac{a^{-\frac{1}{2}}b^{3}}{a^{\frac{5}{4}}\cdot b^{-\frac{1}{3}}}\right)^{3}$

$\left(\dfrac{a^{-\frac{3}{2}}\,b^{9}}{a^{\frac{15}{4}}\,b^{-1}}\right) = \dfrac{a^{-\frac{3}{2}}b^{10}}{a^{\frac{15}{4}}} = \dfrac{a^{-\frac{6}{4}}\,b^{10}}{a^{\frac{15}{4}}} = \dfrac{b^{10}}{a^{\frac{21}{4}}}$

$\dfrac{b^{10}}{a^{\frac{21}{4}}}\left(a^{\frac{3}{4}}\right) = \dfrac{b^{10}\,a^{\frac{3}{4}}}{a^{\frac{24}{4}}} = \dfrac{b^{10}\,a^{\frac{3}{4}}}{a^{6}}$

4. Write one expression using <u>both</u> negative and fractional exponents that simplifies to **81**.

$\left(9^{-\frac{3}{5}}\right)^{-\frac{10}{3}}$

$-\frac{3}{5}\cdot\frac{10}{3} = \frac{30}{15} = 2$

$9^{2} = 81$