**Exponent Practice**

**Simplify each expression; express all remaining exponents as positives.**

**a)** $5^{-2}$ **b)** $\left(\frac{x}{2}\right)^{-3}$ **c)** $(-2x)^{4}$ **d)** $4.683^{0}$

**e)** $\frac{x^{2}q^{3}y^{-1}}{z^{-4}w^{5}}$ **f)** $\frac{x^{5}}{x}$ **g)** $-2^{4}$ **h)** $(-2)^{4}$

**Rational Exponents**

**What does it mean to have a fraction as an exponent?**

**For example, what is meant by the expression** $4^{\frac{5}{2}}$**?**

**Intuitively, it would make sense that this quantity** $(4^{2.5})$ **would be somewhere between** $4^{2}$ **and** $4^{3}$**; that is,** $4^{2.5}$ **must be between the**

**values \_\_\_ and \_\_\_\_. When we enter** $4^{2.5}$ **into the calculator, we get a value of \_\_\_\_ which is indeed between** $4^{2}$ **and** $4^{3}$ **(but not in the middle).**

**To evaluate** $4^{\frac{5}{2}}$ **without using a calculator, we need to make use of two important mathematical rules:**

1. **The expression** $x^{\frac{1}{n}}$ **means** $\sqrt[n]{x}$ **or the nth root of x.**

 **eg;** $8^{\frac{1}{3}}=\sqrt[3]{8}=2$ **or** $81^{\frac{1}{4}}=\sqrt[4]{81}=3$

1. **All powers can be written as a power of a power;**

 **eg;** $3^{6}$ **can equivalently be written as** $(3^{2})^{3}$

**Using the above two rules we can evaluate** $4^{\frac{5}{2}}$ **as follows:**

$4^{\frac{5}{2}}$ **or** $4^{\frac{5}{2}}$

**= =**

**= =**

**= =**

**Examples**

**Evaluate each expression.**

**a)** $8^{\frac{2}{3}}$ **b)** $81^{\frac{3}{4}}$ **c)** $25^{\frac{3}{2}}$

**d)** $36^{1.5}$ **e)** $27^{-\frac{2}{3}}$ **f)** $16^{-1.25}$

**Homework: pg 229 # 1-3, 4bc, 5acf, 8, 10, 13-15**