Yesterday's question 11d solved:

$$\frac{(xy^n)^{2n}}{((xy)^{2n})^{2n}} = \frac{x^{2n}y^{2n^2}}{(x^{2n}y^{2n})^{2n}}$$

$$\frac{(xy^n)^{2n}}{((xy)^{2n})^{2n}} = \frac{x^{2n}y^{2n^2}}{x^{4n^2}y^{4n^2}}$$

$$\frac{(xy^n)^{2n}}{((xy)^{2n})^{2n}} = \frac{x^{2n}}{x^{4n^2}y^{2n^2}}$$

Now let's apply x = - 2, y = 3 and n = -1.

$$\frac{(xy^n)^{2n}}{((xy)^{2n})^{2n}} = \frac{(-2)^{2(-1)}}{(-2)^{4(-1)^2}(3)^{2(-1)^2}}$$

$$\frac{(xy^n)^{2n}}{((xy)^{2n})^{2n}} = \frac{(-2)^{-2}}{(-2)^4(3)^2}$$

$$\frac{(xy^n)^{2n}}{((xy)^{2n})^{2n}} = \frac{1}{(-2)^2(-2)^4(9)}$$

$$\frac{(xy^n)^{2n}}{((xy)^{2n})^{2n}} = \frac{1}{(-2)^6(9)}$$

$$\frac{(xy^n)^{2n}}{((xy)^{2n})^{2n}} = \frac{1}{(64)(9)}$$

$$\frac{(xy^n)^{2n}}{((xy)^{2n})^{2n}} = \frac{1}{576}$$

§ 4.4 Simplifying Algebraic Expressions Involving Exponents

Example: Let's simplify the expression:

$$\frac{SA(r)}{V(r)}$$

where SA(r) = $4\pi r^2$ and V(r) = $\frac{4}{3}\pi r^3$.

Solution:

$$\frac{SA(r)}{V(r)} = \frac{4\pi r^2}{\frac{4}{3}\pi r^3}$$

$$\frac{SA(r)}{V(r)} = \frac{3}{r}$$

Homework:§4.4#1-3,4ef,5ad,6cd,7c,8abc,11,14

Simplify:

$$\frac{(2x^{-3}y^2)^3}{(x^3y^{-4})^2}$$

Solution:

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

$$\frac{(2x^{-3}y^2)^3}{(x^3y^{-4})^2} = \frac{8x^{-9}y^6}{x^6y^{-8}}$$

$$\frac{(2x^{-3}y^2)^3}{(x^3y^{-4})^2} = \frac{8y^8y^6}{x^6x^9}$$

$$\frac{(2x^{-3}y^2)^3}{(x^3y^{-4})^2} = \frac{8y^{14}}{x^{15}}$$

Simplify:

$$\frac{(x^{2n+1})(x^{3n-1})}{x^{2n-5}}$$

Solution:

$$\frac{(x^{2n+1})(x^{3n-1})}{x^{2n-5}} = \frac{(x^{2n+1+3n-1})}{x^{2n-5}}$$

$$\frac{(x^{2n+1})(x^{3n-1})}{x^{2n-5}} = \frac{x^{5n}}{x^{2n-5}}$$

$$\frac{(x^{2n+1})(x^{3n-1})}{x^{2n-5}} = x^{5n-2n+5}$$

$$\frac{(x^{2n+1})(x^{3n-1})}{x^{2n-5}} = x^{3n+5}$$

now we reveal that x = -3 and n =2.

$$\frac{(x^{2n+1})(x^{3n-1})}{x^{2n-5}} = (-3)^{3(2)+5}$$

$$\frac{(x^{2n+1})(x^{3n-1})}{x^{2n-5}} = (-3)^{11}$$

$$\frac{(x^{2n+1})(x^{3n-1})}{x^{2n-5}} = -177{,}147$$

Simplify:

$$\frac{(27a^{-3}b^{12})^{\frac{1}{3}}}{(16a^{-8}b^{12})^{\frac{1}{2}}}$$

Solution:

$$\frac{(27a^{-3}b^{12})^{\frac{1}{3}}}{(16a^{-8}b^{12})^{\frac{1}{2}}} = \frac{\sqrt[3]{27}a^{-1}b^{4}}{\sqrt{16}a^{-4}b^{6}}$$

$$\frac{(27a^{-3}b^{12})^{\frac{1}{3}}}{(16a^{-8}b^{12})^{\frac{1}{2}}} = \frac{3a^{4}}{4ab^{2}}$$

$$\frac{(27a^{-3}b^{12})^{\frac{1}{3}}}{(16a^{-8}b^{12})^{\frac{1}{2}}} = \frac{3a^{3}}{4b^{2}}$$

Simplify:

$$\left(\frac{\sqrt[5]{x^8}}{\sqrt{x^3}}\right)^3$$

Solution:

$$\left(\frac{\sqrt[5]{x^8}}{\sqrt{x^3}}\right)^3 = \left(\frac{x^{\frac{8}{5}}}{x^{\frac{3}{2}}}\right)^3$$

$$\left(\frac{\sqrt[5]{x^8}}{\sqrt{x^3}}\right)^3 = \left(x^{\frac{8}{5}-\frac{3}{2}}\right)^3$$

$$\left(\frac{\sqrt[5]{x^8}}{\sqrt{x^3}}\right)^3 = \left(x^{\frac{16}{10}-\frac{15}{10}}\right)^3$$

$$\left(\frac{\sqrt[5]{x^8}}{\sqrt{x^3}}\right)^3 = \left(x^{\frac{1}{10}}\right)^3$$

$$\left(\frac{\sqrt[5]{x^8}}{\sqrt{x^3}}\right)^3 = \left(\sqrt[10]{x}\right)^3$$