Bell Work:

Simplify each expression

1) $(2a^3)(5a^2) = 10a^5$

2) $\frac{12x^5y^3}{4x^{-1}} = 3x^6y^3$

3) $\left(\frac{r^{-1}s^2t^{-3}}{r^{-2}s^0t^1}\right)^{-1} = \frac{r^1s^{-2}t^3}{r^2t^{-1}} = r^{-1}s^{-2}t^4$

$\frac{t^4}{rs^2}$

Principal nth root - The principal nth root of a number is the nth root that has the same sign as the original number.

index

$\sqrt{16} = 4$ $\quad \sqrt[3]{-27} = -3$ $\quad \sqrt[3]{27} = 3$

Property

If n is even, then $\sqrt[n]{a^n} = |a|$; $\sqrt{(-3)^2} = |-3| = 3$

If n is odd, then $\sqrt[n]{a^n} = a$; $\sqrt[3]{(-2)^3} = -2$

Examples

$\frac{\text{exponent}}{\text{index}}$

1) $-\sqrt{a^6} = -a^{\frac{6}{2}} = -a^3$

2) $\sqrt[3]{x^3y^{12}} = xy^4$

3) $\sqrt[4]{b^{16}c^4} = b^4c$

4) $\sqrt[5]{-32x^{15}y^{20}} = -2x^3y^4$

Product Property of Radicals

If $\sqrt[n]{a}$ and $\sqrt[n]{b}$ are real numbers, then

$$\sqrt[n]{a \cdot b} = \sqrt[n]{a} \cdot \sqrt[n]{b}$$

$$\sqrt{36} = 6$$

$$\sqrt{36} = \sqrt{4}\sqrt{9} = 2 \cdot 3 = 6$$

Examples

5) $\sqrt{x^3y^6z^9}$ $\sqrt{x^3}\sqrt{y^6}\sqrt{z^9}$

$\sqrt{x^2}\sqrt{x}\sqrt{y^6}\sqrt{z^8}\sqrt{z} = xy^3z^4\sqrt{xz}$

6) $\sqrt{60xy^7z^{12}} = \sqrt{4}\sqrt{15}\sqrt{x}\sqrt{y^6}\sqrt{y}\sqrt{z^{12}}$

$= 2y^3z^6\sqrt{15xy}$

7) $\sqrt[3]{-216x^5y^{10}} = \sqrt[3]{-216}\sqrt[3]{x^3}\sqrt[3]{x^2}\sqrt[3]{y^9}\sqrt[3]{y}$

$= -6xy^3\sqrt[3]{x^2y}$

8) $\sqrt[4]{64x^8y^{10}z^{15}}$

$\sqrt[4]{16}\sqrt[4]{4}\sqrt[4]{x^8}\sqrt[4]{y^8}\sqrt[4]{y^2}\sqrt[4]{z^{12}}\sqrt[4]{z^3}$

$2x^2y^2z^3\sqrt[4]{4y^2z^3}$ $2x^2y^2z^3\sqrt[4]{4y^2z^3}$