

Adv Alg 2 Week 13 Block Day Notes

EXPONENT RULES:

Notes

1. $a^m \cdot a^n = a^{m+n}$ Example: $w^8 \cdot w^2 = w^{8+2} = w^{10}$

2. $(a^m)^n = a^{mn}$ Example: $(k^2)^3 = k^{2 \cdot 3} = k^6$

3. $\frac{a^m}{a^n} = a^{m-n}$ Example: $\frac{x^9}{x^4} = x^{9-4} = x^5$

4. $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$ Example: $\left(\frac{j}{k}\right)^7 = \frac{j^7}{k^7}$

5. $a^{-n} = \frac{1}{a^n}$ or $\frac{1}{a^{-n}} = a^n$
Example: $g^{-6} = \frac{1}{g^6}$ or $\frac{1}{q^{-3}} = q^3$

Simplify each expression. Use only positive exponents.

1. $(-3x^3)(-5x^{-3}) = (-3 \cdot -5)(x^3 \cdot x^{-3})$
 $= 15x^{3+(-3)}$
 $= 15x^0$
 $= 15(1) = \boxed{15}$

2. $\frac{(-4x^2)^0}{5x^2y} = \frac{1}{5x^2y}$

3. $\frac{x^5 \cdot x^{-9}}{(x^2)^8} = \frac{x^{5+(-9)}}{x^{2 \cdot 8}}$
 $= \frac{x^{-4}}{x^{16}} = x^{-4-16} = x^{-20}$
 $= \boxed{\frac{1}{x^{20}}}$

$$\begin{aligned}
 4. \quad (4x^8y^{-7})^{-3} &= 4^{-3} (x^8)^{-3} (y^{-7})^{-3} \\
 &= \frac{1}{4^3} \cdot x^{8 \cdot -3} \cdot y^{-7 \cdot -3} \\
 &= \frac{1}{64} \cdot x^{-24} \cdot y^{21} = \frac{1}{64} \cdot \frac{1}{x^{24}} \cdot y^{21} = \frac{y^{21}}{64x^{24}}
 \end{aligned}$$

$$\begin{aligned}
 5. \quad \left(\frac{(2x)^3 \cdot x}{(4x^{-3})^2} \right)^2 &= \left(\frac{2^3 \cdot x^3 \cdot x^1}{4^2 \cdot (x^{-3})^2} \right)^2 = \left(\frac{8 \cdot x^{3+1}}{16 \cdot x^{-3 \cdot 2}} \right)^2 = \left(\frac{1 \cdot x^4}{2 \cdot x^{-6}} \right)^2 \\
 &= \left(\frac{x^{4-(-6)}}{2} \right)^2 = \left(\frac{x^{10}}{2} \right)^2 = \frac{x^{20}}{4}
 \end{aligned}$$

$$\begin{aligned}
 6. \quad \left(\frac{r^2 s^{-1} t^3}{r^{-3} s^4 t^0} \right)^{-1} &= \left(r^{2-(-3)} s^{-1-4} t^{3-0} \right)^{-1} \\
 &= \left(r^5 s^{-5} t^3 \right)^{-1} \\
 &= r^{5 \cdot -1} s^{-5 \cdot -1} t^{3 \cdot -1} \\
 &= r^{-5} s^5 t^{-3} = \frac{1}{r^5} \cdot s^5 \cdot \frac{1}{t^3} \\
 &= \frac{s^5}{r^5 t^3}
 \end{aligned}$$