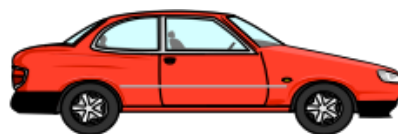


Algebra 8-5: Products and Powers of Products

Warm-Up

$$100\% - 17\% = 83\%$$

1. Joe's car is worth \$15,000. It depreciates at 17% a year. How much is the car worth in 3 years?



$$y = ab^x$$

$$y = 15,000(.83)^3 = \$8,576.81$$

2. $x \cdot x \cdot x \cdot x = x^4$

3. $x \cdot x \cdot x \cdot x (x \cdot x \cdot x) = x^7$

4. $x^0 = 1$

Property	Definition	Example
Product of Powers	$X^a \cdot X^t = X^{a+t}$	$b^3 \cdot b^5 = b^8$ $c^2 \cdot c^8 = c^{10}$
Power of a Power	$(X^a)^b = X^{a \cdot b}$	$(5^3)^2 = 5^6$ $(7^4)^3 = 7^{12}$

Remember...

- When multiplying, in order to add the powers the base must be the same.
- If you are unsure or forget the property, you can always write it out!

$$\begin{aligned}
 \text{Ex) } (5^3)^2 &= 5^3 \cdot 5^3 \\
 &= (5 \cdot 5 \cdot 5)(5 \cdot 5 \cdot 5) \\
 &= 5^6
 \end{aligned}$$

Examples

Multiply.

$$1. x^4 \cdot x^5 = x^{4+5} = x^9$$

$$2. r^2 \cdot s^5 \cdot t^0 \cdot r^8 \cdot s^4 \cdot t^8$$

$$r^2 \cdot r^8 \cdot s^5 \cdot s^4 \cdot \cancel{t^0} \cdot \cancel{t^8} = r^{10} s^9 t^8$$

$$3. x^2(x^4 + x^3)$$

$$x^2 \cdot x^4 + x^2 \cdot x^3 = x^6 + x^5$$

$$4. x^3(x^{10} + x^5 + y^2)$$

$$x^3 \cdot x^{10} + x^3 \cdot x^5 + x^3 y^2$$

$$x^{13} + x^8 + x^3 y^2$$

Simplify.

$$5. (r^4)^5 = r^{20}$$

$$6. (x^5)^{10} = x^{50}$$

$$7. (x^6)^1 = x^6$$

$$8. 3x^5(x^7)^3$$

$$3x^5(x^{21}) = 3x^5 \cdot x^{21}$$

$$3x^{26}$$

$$\textcircled{1} \quad 3^4 \cdot 3^5 = 3^9$$

$$\textcircled{2} \quad (3^4)^5 = 3^{20}$$