Investigation • Moving Ahead

Name ______ Period ______ Date ______

Step 1 Rewrite each product in expanded form, and then rewrite it in exponential form with a single base. Use your calculator to check your answers.

a. $3^4 \cdot 3^2$ $= 3^{4+2} = 3^6$ ← Power Form
$= 729$ Exponent Form

b. $x^3 \cdot x^5$ $= x^8$ We don't know the value of "x"

c. $(1 + 0.05)^2 \cdot (1 + 0.05)^4$ $(1+0.05)^6$
$x^2 \cdot x^4 = x^6$

d. $10^3 \cdot 10^6$ $= 10^{3+6} = 10^9 = 1{,}000{,}000{,}000$

Step 2 Compare the exponents in each final expression you got in Step 1 to the exponents in the original product. Describe a way to find the exponents in the final expression without writing the expanded form.

When you multiply two powers w/the same base. You add exponents.

Step 3 Generalize your observations in Step 2 by filling in the blank.

$b^m \cdot b^n = b^{\square}$ b^{m+n}

Step 4 Apply what you have discovered about multiplying expressions with exponents.

a. The number of ants in a colony after 5 weeks is $16(1 + 0.5)^5$. What does the expression $16(1 + 0.5)^5 \cdot (1 + 0.5)^3$ mean in this situation? Rewrite the expression with a single exponent.

# of ants after 8 weeks

b. The depreciating value of a truck after 7 years is $11{,}500(1 - 0.2)^7$. What does the expression $11{,}500(1 - 0.2)^7 \cdot (1 - 0.2)^2$ mean in this situation? Rewrite the expression with a single exponent.

Value of the truck after 9 years.

c. The expression $A(1 + r)^n$ can model n time periods of exponential growth. What does the expression $A(1 + r)^{n+m}$ model?

Step 5 How does looking ahead in time with an exponential model relate to multiplying expressions with exponents?