

**Exponential -Exponent Rules & Equivalent Equations
 Classwork**

Product Rule:	Power of Power Rule:
$x^2 \cdot x^5 =$	$(x^2)^3 =$
$(1.05)^x \cdot (1.05)^{12} =$	$(2^3)^x =$
$(2)^t(2)^5 =$	$(1.08\overline{12})^x =$

Mixed Exponent Practice:

$(2x^3y^2)^3$	$2m^3 \cdot 4m^7$	$(4x^6y^3z)^2$
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Regents Example:

1. Which expression is equivalent to $(-4x^2)^3$?

(1) $-12x^6$

(3) $-64x^6$

(2) $-12x^5$

(4) $-64x^5$

Exponential Problems- Equivalent Expressions –

Example 1- Which of the following is equivalent to $(1.02)^{t+6}$?

- (1) $(1.02)^t + (1.02)^6$
- (2) $((1.02)^t)^6$
- (3) $(1.02)^t \cdot (1.02)^6$
- (4) $(1.02)^{\frac{t}{6}}$

Example 2- Ava inherited a savings account that was started by her great-grandma 10 years ago. This scenario is modeled by the function $A(t) = 4000(1.02)^{t+10}$, where $A(t)$ represents the value of the account, in dollars, t years after the inheritance. Which function below is equivalent to $A(t)$?

- (1) $A(t) = (4000)^t(1.02)^{10}$
- (2) $A(t) = 4000(1.02)^t(1.02)^{10}$
- (3) $A(t) = 4000[(1.02)^t]^{10}$
- (4) $A(t) = 4000[(1.02)^t + (1.02)^{10}]$

Example 3- A sequence can be modeled by $g(n) = 150 \cdot 8^n$. Which function below will generate the same note sequence as $g(n)$? Justify your answer with work.

A	B	C
$300 \cdot 2^{4n}$	$150^n \cdot 2^3$	$150 \cdot 2^{3n}$

You Try:

- 1. Which of the following is equivalent to 3^{2n} ?
 - (1) 6^{2n}
 - (2) 9^n
 - (3) 3^{2+n}
 - (4) 6^n

- 2. In an organism, the number of cells, $C(d)$, after d days can be represented by the function $C(d) = 120 \cdot 2^{3d}$. This function can also be expressed as:
 - (1) $C(d) = 240^{3d}$
 - (2) $C(d) = 960 \cdot 2^d$
 - (3) $C(d) = 120 \cdot 6^d$
 - (4) $C(d) = 120 \cdot 8^d$

3. Which expression is *not* equivalent to $(5^{2x})^3$?

(1) $(5^x)^6$

(3) $(5^5)^x$

(2) $(5^{3x})^2$

(4) $(5^2)^{3x}$

4. Which of the following is equivalent to $(.75)^{t+10}$?

(1) $(.75)^{\frac{t}{10}}$

(3) $((.75)^t)^{10}$

(2) $(.75)^t \cdot (.75)^{10}$

(4) $(.75)^t + (.75)^{10}$

5. Michelle inherited a savings account that was started by her grandparent 15 years ago. This scenario is modeled by the function $A(t) = 2000(1.03)^{t+15}$, where $A(t)$ represents the value of the account, in dollars, t years after the inheritance. Which function below is equivalent to $A(t)$?

(1) $A(t) = (2000)^t(1.03)^{15}$

(3) $A(t) = 2000[(1.03)^t]^{15}$

(2) $A(t) = 2000(1.03)^t(1.03)^{15}$

(4) $A(t) = 2000[(1.03)^t + (1.03)^{15}]$

Mixed Problems:

6. If a population of 20 rabbits triples every month, which function represents $p(t)$, the population after t months?

(1) $p(t) = 20t + 3$

(2) $p(t) = 3t + 20$

(3) $p(t) = 20(3)^t$

(4) $p(t) = 3(20)^t$

7. The number of bacteria grown in a lab can be modeled by $P(t) = 300 \cdot 2^{4t}$, where t is the number of hours. Which expression is equivalent to $P(t)$?

A	B	C
$300^t \cdot 2^4$	$300 \cdot 8^t$	$300 \cdot 16^t$

8. A laboratory technician used the function $t(m) = 2(3)^{2m+1}$ to model her research. Consider the following expressions:

I. $6(3)^{2m}$ II. $6(6)^{2m}$ III. $6(9)^m$

The function $t(m)$ is equivalent to

(1) I, only

(3) I and III

(2) II, only

(4) II and III