ALBERT

Name _____ Date _____

Rewriting Exponential Expressions Worksheet

Algebra 1 · Common Core HSA-SSE.B.3c

> Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. c. Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.

Practice

Builds the skill step by step.

1. $2^3 \cdot 2^4 = 2^k$. What is k?

2. $(3^2)^3 = 3^k$. What is k?

3. For 1.05^t, what is the yearly growth rate as a percent?

4. For 0.8^t, what is the yearly decay rate as a percent?

5. Which equals $1.21^{t/2}$?

   A. 1.21^t

   B. 1.1^t

   C. 1.1^{2t}

   D. 0.605^t

6. $4^t = 2^{kt}$. What is k?

7. $9^t = 3^{kt}$. What is k?

8. What is $100(1.5)^t$ when t = 2?

9. Which equals 2^{t+1}?

   A. $2^t + 1$

   B. $t \cdot 2^t$

   C. $2 \cdot 2^t$

   D. $2^t + 2$

10. What does the factor 0.5^t do each time t increases by 1?

    A. It adds 0.5.

    B. It doubles the amount.

    C. It subtracts 5%.

    D. It cuts the amount in half.

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On Level

Grade-level practice.

1. $1.44^t = b^{2t}$. What is b?

2. An amount grows 21% per year, so it is multiplied by $1.21^t = 1.1^{2t}$. By what percent does it grow every half-year?

3. An account grows by 1.15^t per year. Use $1.15^{1/12} \approx 1.0117$. What is the approximate monthly growth rate, as a percent to the nearest tenth?

4. $8^t = 2^{kt}$. What is k?

5. What does $25(0.5)^{t/3}$ tell you about the amount, if t is in years?

   A. It halves every 3 years.

   B. It halves every year.

   C. It triples every year.

   D. It loses 3% a year.

6. $2^{t+3} = a \cdot 2^t$. What is a?

7. An account grows by $1000(1.02)^{4t}$, with 2% added each quarter. Use $1.02^4 \approx 1.0824$. What is the approximate yearly growth rate, as a percent to the nearest tenth?

8. $3^{2t} = b^t$. What is b?

9. Explain why 1.21^t and 1.1^{2t} are the same.

10. What is $500(1.04)^t$ when $t = 0$?

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Challenge

Multi-step and word problems that stretch it.

1. A population grows 5% per week. Use $1.05^4 \approx 1.2155$. What is the growth over 4 weeks, as a percent to the nearest tenth?

2. An amount is multiplied by $2^{t/5}$ after t years. By what factor has it grown after 15 years?

3. A substance decays by $0.81^t = 0.9^{2t}$. By what percent does it decay every half-period?

4. Which grows faster: 1.08^t or 1.04^{2t}?

   A. 1.04^{2t}, since $1.04^2 = 1.0816$

   B. 1.08^t, since $8 > 4$

   C. They are equal.

   D. You can't tell.

5. What is $1000 \cdot 2^{t/10}$ when $t = 30$?

6. $4^{t/2} = 2^{kt}$. What is k?

7. An account grows 1% per month. Use $1.01^{12} \approx 1.1268$. What is the yearly growth rate, as a percent to the nearest tenth?

8. Which equals $3 \cdot 9^{t}$?

   A. 3^{2t}

   B. 27^{t}

   C. $9^{t + 1}$

   D. $3^{2t + 1}$

9. $27^{t/3} = 3^{kt}$. What is k?

10. Explain what rewriting 1.15^{t} as about 1.0117^{12t} reveals.