

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Algebra 1

Band: \_\_\_\_\_

**Unit 6: Exponents and Exponential Functions****LT#1:** Simplify expressions involving zero and negative exponents.**Simplify each expression.**

1.  $5^0$

2.  $7^{-2}$

3.  $\frac{4x^{-2}}{y^{-8}}$

4.  $\frac{1}{p^2q^{-4}r^0}$

**Evaluate each expression for  $x = 2$ ,  $y = -3$ , and  $z = -5$ .**

5.  $x^0y^2$

6.  $(-x)^{-4}y^2$

7.  $x^0z^0$

8.  $\frac{5x^0}{y^{-2}}$

9.  $y^{-2}z^2$

10.  $\frac{2x}{y^2z^{-1}}$

11. Is it true that  $(-3b)^4 = -12b^4$ ? Explain why or why not.**LT#2:** Multiply powers with the same base.**Complete each equation by finding the “?”.**

12.  $3^2 \cdot 3^? = 3^{10}$

13.  $a^6 \cdot a^? = a^8$

14.  $x^2y^5 \cdot x^?y^? = x^5y^{11}$

15.  $a^{\frac{1}{2}} \cdot a^? = a$

16.  $x^{\frac{2}{3}} \cdot x^? = x^{\frac{11}{12}}$

17.  $m^{\frac{3}{4}}n^{\frac{1}{2}} \cdot m^?n^? = m^{\frac{5}{4}}n$

Simplify each expression.

18.  $2d^2 \cdot d^3$

19.  $(x^3)(x^4)$

20.  $(x^3y^5)(-y^7x)$

21.  $\left(s^{\frac{3}{5}}\right)\left(s^{\frac{2}{3}}\right)$

22.  $\left(p^{\frac{1}{3}}q\right)\left(q^{\frac{1}{2}}p\right)$

23.  $2m^{\frac{3}{4}}n^2 \cdot 2m^{\frac{1}{4}}n$

24. Each square inch of your body has about  $6.5 \times 10^2$  pores. Suppose the back of your hand has an area of about  $0.12 \times 10^2$  in<sup>2</sup>. About how many pores are on the back of your hand? Write your answer in scientific notation.

**LT#3:** Raise a power to a power.

**LT#4:** Raise a product to a power.

Complete each equation by finding the “?”.

25.  $(5^5)^? = 5^{15}$

26.  $(b^{-4})^? = b^{20}$

27.  $(4x^3y^5)^? = 16x^6y^{10}$

28.  $(x^{\frac{2}{3}})^? = x^2$

29.  $(a^{\frac{1}{2}})^? = a^{\frac{1}{4}}$

30.  $(2x^2y^{\frac{1}{4}})^? = 4x^4y^{\frac{1}{2}}$

**Simplify each expression.**

31.  $(q^3r)^4$

32.  $(1.34)^2(1.34)^{-8}$

33.  $(12x^2y^{-2})^5(4xy^{-3})^{-7}$

34.  $(-2r^{-4})^2(-3r^2z^8)^{-1}$

35.  $(x^{\frac{4}{7}})^7$

36.  $(a^{\frac{3}{4}}b^{\frac{7}{8}})^4$

**LT#5: Divide powers with the same base.**

**Simplify each expression.**

37.  $\frac{w^2}{w^5}$

38.  $\frac{21x^3}{3x^{-1}}$

39.  $\left(\frac{n^5}{v^3}\right)^7$

40.  $\left(\frac{3c^3}{e^5}\right)^{-4}$

**Simplify each quotient. Write your answer in scientific notation.**

41.  $\frac{4.2 \times 10^8}{2.1 \times 10^{11}}$

42.  $\frac{3.1 \times 10^4}{1.24 \times 10^2}$

43.  $\frac{4.5 \times 10^3}{9 \times 10^7}$

44.  $\frac{5.1 \times 10^5}{1.7 \times 10^2}$

45. List the steps that you would use to simplify  $\left(\frac{5a^8}{10a^6}\right)^{-3}$ .

**LT#6: Rewrite expressions involving radicals and rational exponents.****Write each expression in radical form.**

46.  $m^{\frac{1}{2}}$

47.  $p^{\frac{2}{3}}r^{\frac{4}{5}}$

48.  $(36x^4)^{\frac{1}{2}}$

49.  $(125x)^{\frac{1}{3}}$

50.  $(64)^{\frac{1}{2}}x^{\frac{3}{4}}$

51.  $25^{\frac{1}{3}}(x^2y)^{\frac{1}{2}}$

**Write each expression as a power with a rational exponent.**

52.  $\sqrt{xy}$

53.  $\sqrt[4]{a}$

54.  $\sqrt[3]{b^2}$

55.  $\sqrt[3]{x^6y^9}$

56.  $\sqrt[4]{81x^2}$

57.  $\sqrt[5]{x^2y^3}$

**LT#7:** Evaluate and graph exponential functions.

Evaluate each function for the domain  $\{1, 2, 3\}$ .

58.  $f(x) = 4^x$

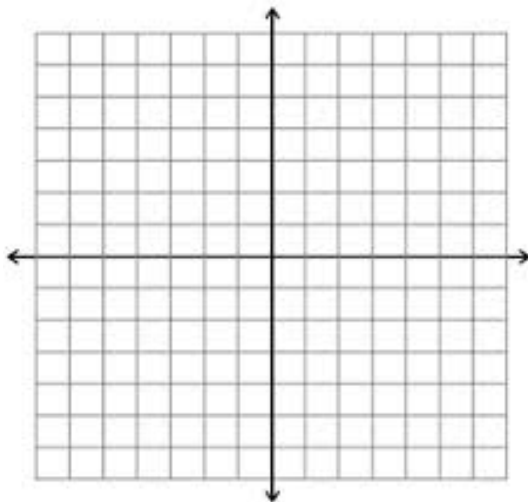
59.  $y = 0.01^x$

60.  $y = 40\left(\frac{1}{2}\right)^x$

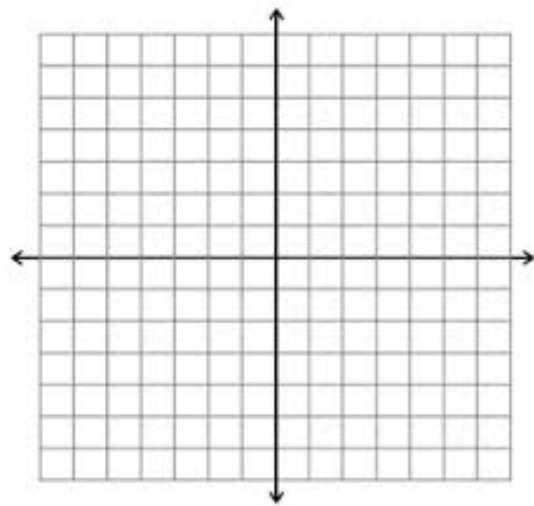
61.  $f(x) = 3 \cdot 2^x$

Graph each function.

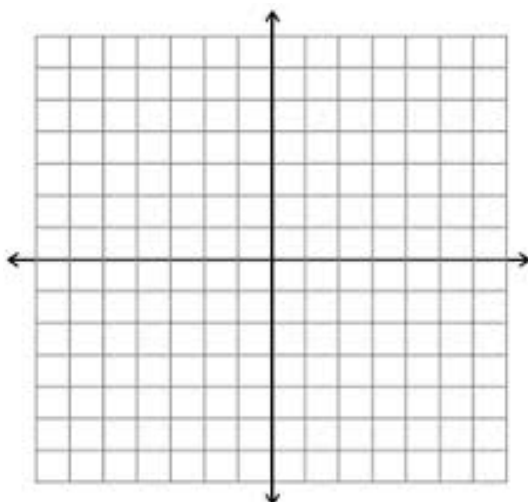
62.  $f(x) = 2.5^x$



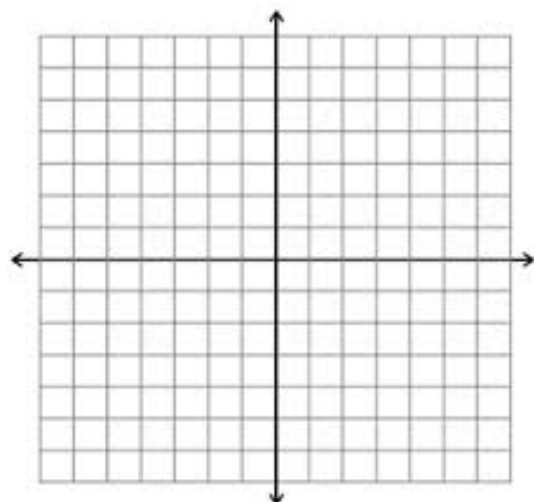
63.  $y = 0.5(0.5)^x$



64.  $f(x) = \frac{1}{2} \cdot 3^x$



65.  $y = 0.1^x$



- 66.** A population of 50 bacteria in a laboratory culture doubles every 30 min. The function  $p(x) = 50 \cdot 2^x$  models the population, where  $x$  is the number of 30-min periods.
- A.** How many bacterial will there be after 2 h?

**B.** How many bacteria will there be after 1 day?

**LT#8:** Model exponential growth and decay.

Tell whether the function represents *exponential growth* or *exponential decay*. Identify the growth or decay factor.

**67.**  $y = 5.2 \cdot 3^x$

**68.**  $y = 7 \cdot 0.32^x$

**69.**  $y = 0.15 \left(\frac{3}{2}\right)^x$

**70.**  $g(x) = 1/3 \left(\frac{1}{4}\right)^x$

**71.** Suppose \$2000 is deposited in an account paying 2.5% interest compounded quarterly. What will the account balance be after 12 yr?

**72.** A band performs a free concert in a local park. There are 200 people in the crowd at the start of the concert. The number of people in the crowd grows 15% every half hour. How many people are in the crowd after 3 h? Round to the nearest person.