Name: Key Period:

Unit 7 Test: Exponents and Exponentials Algebra 1: 2016

Multiple Choice Each worth 1 point.

Identify the choice that best completes the statement or answers the question.

1. Simplify the expression: $7^3 \cdot 7^5$

A. 7^{15} C. 7^8

B. 49^{15} D. 49^8

2. Simplify the expression: $(3a^2)(2a^5)$

A. $6a^7$ C. $5a^7$

B. $6a^{10}$ D. $5a^{10}$

3. Simplify the expression: $\frac{b^{11}}{b^9}$.

A. b^{-2} C. b^{20}

B. $\frac{1}{b^2}$ D. b^2

4. Simplify the expression: v^{-1}.

A. $-v^1$ C. $\frac{1}{-v}$

B. $\frac{-1}{v}$ D. $\frac{1}{v}$

5. Simplify the expression: $\frac{50x^5y^2}{5x^4y}$. Assume $x \neq 0, y \neq 0$.

A. $10x^9y^3$ C. $45xy$

B. $10xy$ D. $45x^9y^3$

6. Simplify the expression: $\frac{m^2n^{10}}{m^5n}$. Assume $m \neq 0, n \neq 0$.

A. m^7n^{11} C. $\frac{m^{-3}}{n^{-9}}$

B. $\frac{n^{11}}{m^3}$ D. $\frac{n^9}{m^3}$

7. Simplify the expression: $36^{1/2}$

A. 18
C. $\sqrt{18}$
B. 6
D. 36.5

8. Simplify completely the expression: $8^{2/3}$

A. 8^2
C. 2
B. $\sqrt[3]{8}$
D. 4

9. Simplify the expression: $9^{-1/2} \cdot 9^{5/2}$

A. 9^2
C. $\sqrt{9}$
B. $\sqrt[3]{81}$
D. 9^3

10. What is the simplified form of $(4g^{-3}h^4)^{-3}$?

A. $\frac{-12g^6}{h^{12}}$
C. $\frac{12g^9}{h}$
B. $\frac{-64g^9}{h^{12}}$
D. $\frac{g^9}{64h^{12}}$

11. What is the simplified form of $\left(-3c^{\frac{1}{2}}\right)\left(2c^{\frac{15}{2}}d^{-8}\right)$?

A. $\frac{-6c^8}{d^8}$
C. $\frac{-5c^7}{d^8}$
B. $\frac{6d^8}{c^8}$
D. $-6cd$

12. What is the simplified form of $\frac{36m^{-4}n^{6}}{4mn^{-2}p^{-4}}$? Assume that $m \neq 0$, $n \neq 0$ and $p \neq 0$.

A. $\frac{9n^4p^4}{m^3}$

B. $\frac{9n^8}{m^5p^4}$

C. $\frac{9n^8p^4}{m^5}$

D. $\frac{9m^5}{n^8p^4}$

13. The value of $-\sqrt{68}$ is between which two integers?

A. -9 and -8

B. 8 and 9

C. -8 and -7

D. 7 and 8

14. The value of $\sqrt[3]{90}$ is between which two integers?

A. 4 and 5

B. 6 and 7

C. 5 and 6

D. 9 and 10

15. What is the simplified form of $\sqrt{80x^5}$?

A. $4\sqrt{5x^3}$

B. $2x\sqrt{5x}$

C. $4x^2\sqrt{5x}$

D. $2x^2\sqrt{5x}$

16. What is the simplified form of $3\sqrt{5} + 10\sqrt{5}$?

A. $13\sqrt{10}$

B. $13\sqrt{5}$

C. 65

D. $30\sqrt{5}$

17. What is the simplified form of $\frac{\sqrt{24}}{\sqrt{6}}$?

A. $\sqrt{144}$

B. 3

C. $\sqrt{12}$

D. 2

18. What is the simplified form of $\frac{\sqrt{7}}{\sqrt{3}}$?

A. $\frac{\sqrt{21}}{3}$

B. $\frac{\sqrt{49}}{\sqrt{9}}$

C. $\frac{\sqrt{73}}{9}$

D. $\frac{7}{3}$

19. What is the simplified form of $4\sqrt{5} \cdot (8\sqrt{2} - \sqrt{3})$?

A. $32\sqrt{10} - 4\sqrt{15}$

B. $32\sqrt{10} - 12\sqrt{3}$

C. $12\sqrt{7} - 4\sqrt{8}$

D. $8\sqrt{10} - 4\sqrt{3}$

20. What is the simplified form of $\sqrt{48} \cdot \sqrt{54}$?

A. $36\sqrt{2}$

B. $6\sqrt{162}$

C. $18\sqrt{32}$

D. $2\sqrt{1296}$

Free Response

List one set of values for x and y that make the equation true.

1. $(4^{x+6})(4^{y-2}) = 4^{10}$

x and y can be any of these pairs

2 points

X=-1	Y=7
X=0	Y=6
X=1	Y=5
X=2	Y=4
X=3	Y=3
X=4	Y=2
X=5	Y=1
X=6	Y=0

2. Simplify. Show all your work. (Assume that $x \neq 0, p \neq 0$)

3 points
1 point each
4, x^8, p^9

$$\frac{(x^2p^3)^2(x^4)}{4p^{-3}}$$

$$\frac{x^8p^9}{4}$$

3. Rewrite each equation so that x is a POSITIVE power AND "b" is a fraction of two whole numbers. Then, label the equations as exponential growth or decay.

	Equation 1	**Equation 2**	**Equation 3**	**Equation 4**
Original Equation	$y = (2) \cdot (1.5)^{-x}$	$y = (0.2) \cdot (0.8)^{x}$	$y = (-3) \cdot (0.5)^{-x}$	$y = \left(\frac{1}{2}\right) \cdot (2.7)^{x}$
Rewritten Equation	$y = 2 \cdot \left(\frac{3}{2}\right)^{-x}$ → $y = 2 \cdot \left(\frac{2}{3}\right)^{x}$ +1	$y = 0.2 \cdot \frac{8}{10}^{x}$ → $y = 0.2\left(\frac{4}{5}\right)^{x}$ +1	$y = -3 \cdot \left(\frac{1}{2}\right)^{-x}$ → $y = -3 \cdot 2^{x}$ +1	$y = \frac{1}{2} \cdot \frac{27}{10}^{x}$ +1
Circle One:	Growth/Decay +1	Growth/Decay +1	Growth/Decay +1	Growth/Decay +1

$y = a \cdot b^{x-h} + k$

4. Given the equation, $y = 3 \cdot \left(\frac{1}{2}\right)^{(x-2)} + 3$, identify the following:

a.) Identify "a" as a vertical stretch or a vertical compression factor. Include your reasoning.

+1 point a is equal to 3. it is a vertical stretch because $3 > 1$.

b.) Using h & k, explain how the graph is shifted from the parent function

$y = 3 \cdot \left(\frac{1}{2}\right)^{(x-0)} + 0.$

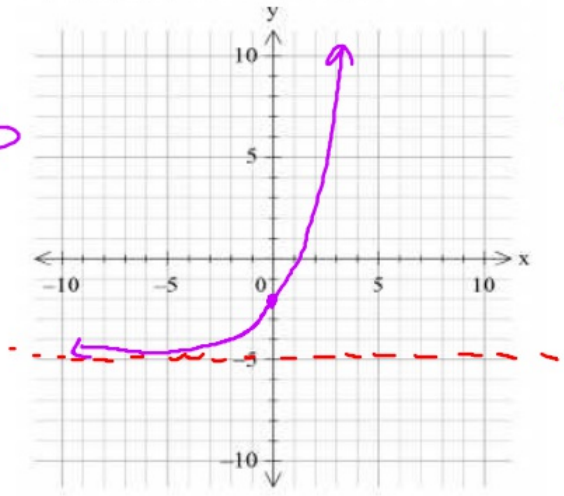
How far left/right/up/down?

+2 points right two units
up 3 units.

c.) Is this equation an example of exponential growth or exponential decay? WHY?

+2 points It is exponential decay because $b = \frac{1}{2} < 1$

5. Sketch a graph of the following function $f(x) = 3 \cdot 2^x - 5$. Identify the asymptote and initial value.



3 points

initial value is 3

asymptote $y = -5$

6. Identify whether the sequence is arithmetic or geometric and explain why.
6, 12, 24, 48, ...

+2 points

it is geometric because the values are being multiplied by 2 at each step.

7. Write the explicit formula for this geometric sequence: 5, 15, 45, 135, ...

+3 points

$r = 3$

$a_1 = 5$

$a_n = 5 \cdot 3^{n-1}$

8. Write the explicit formula for the geometric sequence where $a_3 = 1$ and $a_5 = 0.25$. Assume the common ratio is positive.

+4 points

$a_1 = 4$ $a_2 = 2$ $a_3 = 1$ $a_4 = 0.5$ $a_5 = 0.25$

$r = \frac{1}{2}$

$a_n = 4 \cdot \frac{1}{2}^{n-1}$