

Unit 2 Exponents Study Guide

Student

Key

1. What is the value of the expression  $8^{-2} \times 8^3$ ?

- A. 64
- B. 8**
- C.  $\frac{1}{8}$
- D.  $\frac{1}{48}$

$$8^{-2+3} = 8^1$$

2. Which is equivalent to  $\frac{1}{81}$ ?

- A.  $9^{-2} \times 9^{-1} = \frac{1}{9^2 \cdot 9} = \frac{1}{729}$
- B.  $3^{-3} \times 3^{-1} = \frac{1}{3^3 \cdot 3} = \frac{1}{81}$**
- C.  $3^3 \times 3 = 34 = 81$
- D.  $9 \times 3^{-2} = \frac{9}{3^2} = \frac{9}{9} = 1$

3. Which number is equivalent to  $\frac{3^3 \times 3^{-3}}{3^2}$ ?

- A.  $\frac{1}{3^{11}}$
- B.  $\frac{1}{9}$**
- C. 0
- D. 9

$$\frac{3^3 \cdot 3^{-3}}{3^2} = \frac{3^{3+(-3)}}{3^2} = \frac{3^0}{3^2} = \frac{1}{9}$$

4. Which expression is equivalent to  $\frac{7^{15}}{7^5}$ ?

- A.  $7^3$
- B.  $7^{10}$**
- C.  $7^{20}$
- D.  $7^{75}$

$$7^{15-5} = 7^{10}$$

5. What is the value of  $5^3 \div 5$ ?

- A. 3
- B. 10
- C. 25**

$$5^{3-1} = 5^2 = 25$$

6. Which choice is equivalent to  $4^3 \times 4^{-4}$ ?

- A. -4
- B.  $-\frac{1}{4}$
- C.  $\frac{1}{4}$**
- D. 4

$$4^{3+(-4)} = 4^{3-4} = 4^{-1} = \frac{1}{4}$$

7. Which of these is equivalent to  $\frac{(2^{-4})^2 \cdot 2^{-5}}{2^{-6}}$ ?

- A.  $2^{-19}$
- B.  $\frac{1}{2^7}$**
- C.  $\frac{1}{2}$
- D.  $2^3$

$$\frac{(2^{-4})^2 \cdot 2^{-5}}{2^{-6}} = \frac{2^{-8} \cdot 2^{-5}}{2^{-6}} = \frac{2^{-13}}{2^{-6}} = 2^{-13-(-6)} = 2^{-7} = \frac{1}{2^7}$$

8. Which expression is equivalent to  $6^{30}$ ?

- A.  $(6^{15})^2 = 6^{15 \cdot 2} = 6^{30}$
- B.  $6^{-10} \cdot 6^{-20} = 6^{-10+(-20)} = 6^{-30} = \frac{1}{2^7}$
- C.  $6^5 \cdot 6^6 = 6^{5+6} = 6^{11}$
- D.  $6^{12} \cdot 6^{18} = 6^{12+18} = 6^{30}$**

9. Which expression is equivalent to  $(4^{-6} \cdot 4^4) + \left(\frac{2^6}{2^3}\right)$ ?

- A.  $\frac{1}{4^2} + 2^3$**

$$4^{-6} \cdot 4^4 + \left(\frac{2^6}{2^3}\right) = 4^{-6+4} + (2^{6-3}) = 4^{-2} + (2^3) = \frac{1}{4^2} + 2^3$$

B.  $\frac{1}{4^{24}} + 2^3$

C.  $\frac{1}{4^2} + 2^2$

D.  $\frac{1}{4^{24}} + 2^2$

10. Mrs. Jones asked her students to write an equivalent numerical expression

$$(2^{-4} \cdot 3^{-3})^3 \div (2^{-3} \cdot 3^{-2})^2$$

to Which of these responses is correct?

A.  $2^0$

B.  $\frac{1}{2} \cdot \frac{1}{3^5}$

**C.  $2^{-6} \cdot 3^{-5}$**

D.  $2^{-18} \cdot 3^{-13}$

$$(2^{-4} \cdot 3^{-3})^3 \div (2^{-3} \cdot 3^{-2})^2$$

$$2^{-4 \cdot 3} 3^{-3 \cdot 3} \div 2^{-3 \cdot 2} 3^{-2 \cdot 2}$$

$$2^{-12} 3^{-9} \div 2^{-6} 3^{-4}$$

$$\frac{2^{-12} 3^{-9}}{2^{-6} 3^{-4}} = \frac{2^{-12+6} 3^{-9+4}}{1} = 2^{-6} 3^{-5}$$

11. Which numerical expression is equivalent

$$(4^4)^3 \times 4 \times 3^0?$$

to

A.  $4^{12}$

**B.  $4^{13}$**

C.  $4^{12} \times 3$

D.  $4^{13} \times 3$

$$(4^4)^3 \times 4 \times 3^0$$

$$4^{4 \cdot 3} \times 4^1 \times 3^0$$

$$4^{12} \times 4^1 \times 3^0$$

$$4^{12+1} \times 3^0$$

$$4^{13} \times 3^0$$

$$4^{13} \times 1 = 4^{13}$$

12. What is the value of the expression  $(2^3)(4^3)(2^{-4})$ ?

**A. 32**

B. 48

C. 64

D. 128

$$\frac{2^3 4^3 (2^{-4})}{1} = \frac{2^3 4^3}{2^4}$$

$$= 2^{3-4} 4^3$$

$$= 2^{-1} 4^3$$

$$= \frac{4^3}{2} = \frac{64}{2} = 32$$

13.

Which expression is equivalent to  $\frac{2^{-5}}{2^4}$ ?

A.  $2^9$

B. 2

C.  $\frac{1}{2}$

**D.  $\frac{1}{2^9}$**

$$\frac{2^{-5}}{2^4} = 2^{-5-4}$$

$$= 2^{-9}$$

$$= \frac{2^{-9}}{1} = \frac{1}{2^9}$$

14. Which expression is equivalent to  $(-3)^4 \times (-3)^2$ ?

**A.  $(-3)^6$**

B.  $(-3)^8$

C.  $(9)^8$

$$(-3)^4 \times (-3)^2 = (-3)^{4+2}$$

$$= (-3)^6$$

15. Which exponential form is equivalent to  $8 \times 8 \times 8 \times m \times m \times m \times m$ ?

A.  $3^8 \times m^4$

B.  $3^8 \times 4m$

**C.  $8^3 \times m^4$**

D.  $8^3 \times 4m$

$$8^3 m^4$$

16.

Which expression is equivalent to  $\frac{10^{-2}}{10^{-14}}$ ?

A.  $10^7$

**B.  $10^{12}$**

C.  $10^{16}$

D.  $10^{28}$

$$\frac{10^{-2}}{10^{-14}} = \frac{10^{14}}{10^2} = 10^{14-2}$$

$$= 10^{12}$$

17.

What is the value of  $\frac{9^2}{(3^2 \cdot 3^2)}$ ?

A. 0

B.  $\frac{1}{81}$

C.  $\frac{1}{2}$

**D. 1**

$$\frac{9^2}{(3^2 \cdot 3^2)} = \frac{9^2}{3^{2+2}} = \frac{9^2}{3^4}$$

$$= \frac{81}{81} = 1$$

18. Ernie is planning to buy a computer and his friend advised him to get one with a RAM size of  $2^9$  megabytes. Which is equivalent to  $2^9$  megabytes?

- A. 18 megabytes  
 B. 81 megabytes  
 C. 256 megabytes  
 D. 512 megabytes

$$\begin{array}{l}
 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \\
 \checkmark \\
 4 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \\
 \checkmark \\
 8 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \\
 \checkmark \\
 16 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \\
 \checkmark \\
 32 \cdot 2 \cdot 2 \cdot 2 \\
 \checkmark \\
 64 \cdot 2 \cdot 2 \\
 \checkmark \\
 128 \cdot 2 \\
 \checkmark \\
 256 \cdot 2 \\
 \checkmark \\
 512
 \end{array}$$

**Vocabulary Matching**

1. D Multiplying with Like Bases  
 2. A Dividing with Like Bases  
 3. H Power of a Power  
 4. E Simplifying Powers  
 5. F Expanded Form  
 6. B Exponential Form  
 7. C Zero Exponents  
 8. G Negative Exponents

- ~~a)~~ keep the base and subtract the exponents  
~~b)~~ example:  $(-2)^4$   
~~c)~~ anything to this power equals 1  
~~d)~~ keep the base and add the exponents  
~~e)~~ to write the powers in reduced form  
~~f)~~ example:  $(-2)(-2)(-2)(-2)$   
~~g)~~ change the position  
 h) multiply powers