

# Math 9 Exponent Practice Test

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

1. Complete each Statement

a) Write 243 as a power of 3  $3^5$

b) Write  $(-8)^5$  using repeated multiplication  $(-8)(-8)(-8)(-8)(-8)$

c) Arrange the following in order from largest value to smallest value.

$16$ ,  $\frac{1}{125}$ ,  $-216$ ,  $1$   
 $(-4)^2$ ,  $5^{-3}$ ,  $(-6)^3$ ,  $(-12)^0$   $(-4)^2$ ,  $(-12)^0$ ,  $5^{-3}$ ,  $(-6)^3$

d) When  $7^{-2}$  is evaluated, the answer expressed as a fraction is  $\frac{1}{49}$

e)  $(-1)(-4)(-4)(-4)(-4)$  expressed as a power is  $-(-4)^4$

f) In the power,  $-5^3$ , the base is 5 and the exponent is 3.

The "-" represents the number -1.

g) Write the following numbers in scientific notation

a)  $0.0021 = \underline{2.1 \times 10^{-3}}$  b)  $457.34 = \underline{4.5734 \times 10^2}$

h) Put the following numbers into standard notation

a)  $8.3 \times 10^{-8} = \underline{0.000000083}$  b)  $3.732 \times 10^2 = \underline{373.2}$

2. Evaluate the following (do not leave in exponential form. Calculate the answer.): (1 mark each)

a)  $2^2 \times 3^2 = \underline{4 \cdot 9}$   
 $= \underline{36}$

b)  $2^3 + 3^3 = \underline{8 + 27}$   
 $= \underline{35}$

c)  $\left(\frac{4}{5}\right)^2 = \underline{\frac{16}{25}}$

d)  $-5^2 = \underline{-25}$

e)  $(4 \times 6[5 \times 6]^2 + 9)^0 = \underline{1}$

f)  $(-2)^0 + (-1)^{10} + (6)^3 = \underline{1 + 1 + 216}$   
 $= \underline{218}$

g)  $\left(\frac{5}{6}\right)^{-3} = \left(\frac{6}{5}\right)^3$   
 $= \underline{\frac{216}{125}}$

h)  $[(3)^{-6}]^{-2} + 3^8 = \underline{3^{(-6)(-2)} - 8}$

i)  $8^5 \times 8^{-7} = \underline{8^{5-7}}$   
 $= \underline{8^{-2}}$   
 $= \underline{\frac{1}{64}}$

$= \underline{3^{12-8}}$   
 $= \underline{3^4}$   
 $= \underline{81}$

4. Write each expression as a positive power. (1 mark each)

a)  $4^7 \times 4^9 = 4^{7+9}$   
 $= 4^{16}$

b)  $\frac{10^{26}}{10^7} = 10^{26-7}$   
 $= 10^{19}$

c)  $(1.7)^4 (1.7)^3 (1.7) = 1.7^{4+3+1}$   
 $= 1.7^8$

d)  $(26^{10})^4 = 26^{10 \times 4}$   
 $= 26^{40}$

e)  $(15^3)^4 \div (15^2)^3 = 15^{3 \times 4 - 2 \times 3}$   
 $= 15^{12-6}$   
 $= 15^6$

f)  $(8^4 \times 8^{-2})^{-3} = 8^{(4-2)(-3)}$   
 $= 8^{2(-3)}$   
 $= 8^{-6} = \frac{1}{8^6}$

5. Simplify the following using exponent laws. Express your final answer using positive exponents. (1 mark each)

a)  $x^4 \times x^5 = x^{4+5}$   
 $= x^9$

b)  $\frac{c^3 \times c^2}{c^5} = c^{3+2-5}$   
 $= c^0$   
 $= 1$

c)  $(x^2)^4 \times (x^{-1})^5 = x^{2 \times 4 + (-1)(5)}$   
 $= x^{8-5}$   
 $= x^3$

d)  $(-6x)^3 = -6^3 x^3$   
 $= -216 x^3$

e)  $(8m^2n)(2m^3n^2) = (8 \times 2) m^{2+3} n^{1+2}$   
 $= 16 m^5 n^3$

f)  $-2(3a)^3 = -2 \times 3^3 a^3$   
 $= -54 a^3$

g)  $(2a^2b^3)^2 (3a^4b^2)^3 = 2^2 \times 3^3 a^{2 \times 2 + 4 \times 3} b^{3 \times 2 + 2 \times 3}$   
 $= 4 \times 27 a^{16} b^{12}$   
 $= 108 a^{16} b^{12}$

h)  $\left( \left( \left( \left( \left( (5x^2y^{-12})^3 \right)^8 \right)^{123} \right)^0 \right) \right) = 1$   
 (note:  $x, y \neq 0$ )

i)  $(x^3)(x^{-2}) = x^{3-2}$   
 $= x^1$   
 $= x$

j)  $\frac{c^{-10}}{c^{-4}} = c^{-10 - (-4)}$   
 $= c^{-6}$   
 $= \frac{1}{c^6}$

$$k) \frac{25a^5}{5a^3} = \boxed{5a^2}$$

$$l) \frac{-\frac{1}{2}m^5}{m^3} \times \frac{8m^2m^4}{14m^6} = -4m^{5+4-6} = \boxed{-4m^3}$$

$$m) \frac{(3a^2)^2}{3(a^2)^2} = \frac{3^{\cancel{2}} a^{\cancel{2} \cdot 2}}{3^{\cancel{2}} a^{\cancel{2} \cdot 2}} = \boxed{3}$$

$$n) (4xy)(-3xy)^2 = (4 \times 9) x^{1+2} y^{1+2} = \boxed{36x^3y^3}$$

$$o) \left(\frac{5c^2}{2d^3}\right)^2 = \frac{5^2 c^4}{2^2 d^6} = \boxed{\frac{25c^4}{4d^6}}$$

$$p) -(-6x^{-2})^{-2} = \boxed{-\frac{x^4}{36}}$$

6. Each of the following equations has an error. Briefly explain what the error is and provide steps to find the correct answer. (1 mark each)

a)  $(9ab^2)^3 = 9a^3b^6$  The "9" must also be to the power of 3

b)  $7c^{-5} = \frac{1}{7c^5}$  The "7" does not have a negative exponent.

c)  $(s^4)^2 = s^6$  When we have power to a power we multiply the exponents, not add.

d)  $\left(\frac{2}{5}\right)^3 = \frac{8}{5}$  "5" must also be raised to the power 3

7. Evaluate by showing steps and applying order of operations if appropriate! (6 marks)

$$\begin{aligned} \text{a) } 7^2 + (-7)^2 &= 49 + 49 \\ &= \boxed{98} \end{aligned}$$

$$\begin{aligned} \text{b) } (-2)^3 - (-4)^2 + (-7)^0 &= -8 - 16 + 1 \\ &= -8 - 16 \\ &= \boxed{-24} \end{aligned}$$

$$\begin{aligned} \text{c) } (12^3 + 7^2) + (4^3 - 2^6) &= (1728 + 49) + (64 - 64) \\ &= \boxed{1777} \end{aligned}$$

$$\begin{aligned} \text{d) } \left[\left(\frac{3}{2}\right)^{-2}\right]^4 &= \left[\left(\frac{2}{3}\right)^2\right]^4 = \frac{2^8}{3^8} \\ &= \frac{2^8}{3^8} \end{aligned}$$

$$\begin{aligned} \text{e) } \frac{2^2 \times 5 - (2 - 3^2)}{2^2 \times 3 - (5 + 4)} &= \frac{2^2 \times 5 - (2 - 9)}{2^2 \times 3 - 9} = \frac{2^2 \times 5 - -7}{2^2 \times 3 - 9} = \frac{4 \times 5 + 7}{4 \times 3 - 9} \\ &= \frac{20 + 7}{12 - 9} = \frac{27}{3} = \boxed{9} \end{aligned}$$

Word Problems: Show all Steps and give exponent expression used to solve problem where appropriate.

8. A formula that approximates the distance an object falls through air in relation to time is  $d = 4.9t^2$ . The distance,  $d$ , is measured in metres, and time,  $t$ , in seconds. A pebble breaks loose from a cliff. What distance would it fall if it fell for 18 seconds?

$$\begin{aligned} d &= ? \\ t &= 18 \text{ s} \\ d &= 4.9t^2 \\ &= 4.9(18)^2 \\ &= 1587.6 \end{aligned}$$

It would fall  
1587.6m in 18s

9. A population of bacteria doubles every 3 hours. If there are 100 bacteria now, how many will there be after each amount of time? (2 marks)

a. 15 hours  
 $15 \div 3 = 5$

$$\begin{aligned} 100 \times 2^5 &= 100 \times 32 \\ &= 3200 \end{aligned}$$

There would be  
3200 bacteria

b. 24 hours  
 $24 \div 3 = 8$

$$\begin{aligned} 100 \times 2^8 &= 100 \times 256 \\ &= 25600 \end{aligned}$$

There would be  
25600  
bacteria

10. A cube has a side length of 3 cm. Write an exponent expression for each and then solve. (2 marks)

a. Determine the volume of the cube.

$$\begin{aligned}V &= s^3 \\ &= (3\text{cm})^3\end{aligned}$$

$$V = \boxed{27\text{cm}^3}$$

The volume  
is  $27\text{cm}^3$

b. Determine the surface area of the cube.

$$\begin{aligned}\text{SA} &= 6s^2 \\ &= 6(3\text{cm})^2\end{aligned}$$

$$= 6(9\text{cm}^2)$$

$$= \boxed{54\text{cm}^2}$$

The surface area  
is  $54\text{cm}^2$

