

SOL 2.2

September 16, 2020 9:01 AM

Name: _____

Date: _____

Math 9 Section 2.2 Powers of Tens and Zeros

1. Evaluate the following without a calculator:

a) 10^5 $100,000$	b) -7^0 -1	c) 10^{-3} $0.001, \frac{1}{1000}$	d) 10^2 100
e) 100^2 10000	f) $(1+99)^0 - 4$ -3	g) $-4 - (22 \times 4)^0$ -5	h) $(10^{10} - 5)^0$ 1
i) $10^2 - 5^0 \times (-2)$ $100 - 1 \times (-2)$ $100 - (-2) = 102$	j) $10^{-4} \times 10^3$ $\frac{1}{10000} \times \frac{1000}{1} = \frac{1}{10}$	k) $12 \times 3^2 + 1999^0$ $12 \times 9 + 1$ 109	l) $3 \times 10^3 + 2 \times 10^2$ $3000 + 200$ 3200

2. Write each of the following as a power of 10:

a) 945 $= 9 \times 10^2 + 4 \times 10^1 + 5 \times 10^0$	b) 12,391 $= 1 \times 10^4 + 2 \times 10^3 + 3 \times 10^2 + 9 \times 10^1 + 1$	c) 9385 $= 9 \times 10^3 + 3 \times 10^2 + 8 \times 10^1 + 5$
d) 12,035 $= 1 \times 10^4 + 2 \times 10^3 + 3 \times 10^2 + 5$	e) 1,003,840 $= 1 \times 10^6 + 3 \times 10^5 + 8 \times 10^4 + 4 \times 10^3$	f) 30,003,152 $= 3 \times 10^7 + 3 \times 10^6 + 1 \times 10^5 + 5 \times 10^4 + 2$

3. Write each of the following in standard form:

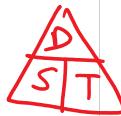
a) $9 \times 10^3 + 8 \times 10^2 + 7 \times 10 + 3$ 98073	b) $8 \times 10^5 + 2 \times 10^3 + 8 \times 10^2 + 1$ 802801	c) $7 \times 10^7 + 6 \times 10^5 + 3 \times 10^2 + 1$ 70600301
d) $5 \times 10^5 + 6 \times 10^4 + 9 \times 10^3 + 2 \times 10$ 569020	e) $1 \times 10^7 + 2 \times 10^5 + 9 \times 10^3 + 5$ 209105	f) $5 \times 10^8 + 1 \times 10^9 + 9 \times 100 + 1$ 1500000901

4. Solve for "x" in each of the following:

a) $10^x = 1,000,000$ $10^1 = 10$ $10^2 = 100$ $10^3 = 1,000$ $10^4 = 10,000$ $10^5 = 100,000$ $10^6 = 1,000,000$ $x = 6$	b) $10^x = 0.00001$ $10^{-1} = 0.1$ $10^{-2} = 0.01$ $10^{-3} = 0.001$ $10^{-4} = 0.0001$ $x = -4$	c) $10^x = 10000$ $x = 4$
d) $10^x = (1000)^3$ $10^x = 1000 \times 1000 \times 1000$ $10^x = 1,000,000,000$ $x = 9$	e) $100^x = 10^{22}$ $100^x = (10^2)^x$ $100^x = 10^2$ $x = 11$	f) $(10) \times (10^x) = 10^x$ $10^{1+4} = 10^4$ $1000 \times 10000 = 10^4$ $= 10^3 \times 10^1$ $10^3 \times 10^1 = 10^4$ $x = 4$

5. Given that a,b,c, and d are all single digit integers, what is the value of $a+b+c+d$?

$$9 \times 10^0 + 8 \times 10^1 + c \times 10^2 + d = 8791$$



6. The distance from the sun to the earth is 15×10^{11} km. If a space ship can travel at 10000km/s, how long will it take to travel from the earth to the sun?

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$= \frac{15 \times 10^{11}}{10^4} = 15 \times 10^7$$

7. The mass of an electron is 9.1×10^{-31} and the mass of a proton is 1.7×10^{-27} . How many electrons is equal to the mass of one proton?

Electron (smallest)
 $0.0000000000000000000000000000000001$

$$\frac{\text{Proton}}{1.7 \times 10^{-27}} \text{ (smallest)} = ?$$

$$\# = \frac{\text{mass of proton}}{\text{mass of electron}}$$

$$\# = \frac{1.7 \times 10^{-27}}{9.1 \times 10^{-31}} = 0.186813 \times 10^4$$

$$= 1868.13$$

8. Solve for "x" in each of the following equation:

$$\begin{aligned} 16^x &= 128 \\ 128 &= 2^7 \\ 16^x &= 2^7 \\ 16^x &= 2^{3x} \\ 2^4 &= 2^7 \\ 2^x &= 2^7 \\ x &= 7 \end{aligned}$$

$$(4^{x+1})(2^5) = 65536$$

$$\begin{aligned} \frac{17}{9.1} &= 0.186813 \\ \frac{10^{22}}{10^{-31}} &= 10 \\ &= 10^4 \end{aligned}$$

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$$\left\{ \begin{array}{l} (4^{x+1})(2^5) = 65536 \\ (4^{x+1})(2^5) = 2^{16} \\ (2^4)(2^5) = 2^{16} \end{array} \right.$$

$$\begin{array}{l} ① 2^{15} = 32 = 64 \\ 2^{16} = 65536 \end{array}$$

$$\left\{ \begin{array}{l} (2^4)(2^5) = 2^{16} \\ \uparrow \quad \uparrow \quad \uparrow \end{array} \right.$$

$$\begin{aligned} 4^{x+1} &= 2^{11} \\ 4^{x+1} &= (2^2)^{5.5} \\ 4^{x+1} &= 4^{5.5} \end{aligned}$$

$$\begin{aligned} x+1 &= 5.5 \\ x &= 4.5 \end{aligned}$$

$$11 = 2 \times 5.5$$

$$\left\{ \begin{array}{l} 4^{x+1} \\ = (2^2)^{x+1} \\ = 2^{2x+2} \end{array} \right.$$

$$\left\{ \begin{array}{l} 2(x+1) \\ 2x+2 \end{array} \right.$$

$$4^{x+1} = 2^{11}$$

$$\left\{ \begin{array}{l} 2^{2x+2} = 2^{11} \\ 2 = 2 \end{array} \right.$$

$$2x+2 = 11$$

$$2x = 9$$

$$x = 4.5$$