Curious Facts

From the beginning of astronomy we looked at the stars.

Today with the telescopes we can see thousands of thousands of stars

In April 2002 astronomers discovered an object with the same mass of the sun but with a radius of only 11km. It is about 350 light years from earth..

One spoonfull of material from this object would weigh millions of tons.

What do we mean by thousands of thousands?

1 thousand thousand $= 1000 \cdot 1000 = 1000^2 = (\mathbf{10^3})^2$.

Also 1 thousand thousand $= 1000 \cdot 1000 = 10^3 \cdot 10^3 = 10^{3+3} = \mathbf{10^{2 \cdot 3}}$

So $(\mathbf{10^3})^2 = \mathbf{10^{2 \cdot 3}}$

1. Is the equation below correct? What is the value of x?
    $$(2^5)^3 = 2^5 \cdot 2^5 \cdot 2^5 = 2^{5+5+5} = 2^{5 \cdot x}$$

2. Write in the same way: $(3^2)^4$.

3. Write these products as one single power of the base:
    $(5^3)^4$, $(2^2)^2$, $(10^5)^{10}$, $((0,5)^4)^5$, $((2^3)^4)^2$, $((-2)^3)^2$, $(11^2)^1$, $(c^{10})^2$, $((-x)^2)^3$

4. Which of these are true?
    a) $10^9 = (10^3)^3$ d) $(-5)^{12} = ((-5)^4)^3$
    b) $(3^2)^7 = 3^{2+7}$ e) $((-3)^2)^1 = (-3)^2$
    c) $(2^3)^2 = (2^2)^3$ f) $((1/2)^4)^2 = (0,5)^6$.

5. Did you a rule which is working here? Express it in <u>words</u>, try to find a <u>formula</u> and give an example with <u>numbers</u>.

The following tasks may also have a common rule. Lets have a look at them:

6. Equal or different?

    $(2 \cdot 5)^3$ and $2^3 \cdot 5^3$, $(2+3)^2$ and $2^2 + 3^2$, $(-2 \cdot 3)^3$ and $(-2)^3 \cdot 3^3$,

    $\left(\frac{1}{2} \cdot 4\right)^2$ and $\left(\frac{1}{2}\right)^2 \cdot 4^2$, $(4-3)^2$ and $4^2 - 3^2$ $((0,2) \cdot 3 \cdot 5)^2$ and $(0,2)^2 \cdot 3^2 \cdot 5^2$.

7. Find other ways to display the numbers:
    a) $(5 \cdot 20)^3$
    b) $[(-5) \cdot (-2)]^6$
    c) $4^4 \cdot (1,5)^4 \cdot (1/3)^4$
    d) $2^3 : \left(\frac{1}{5}\right)^3$

8. Did you see rules which are working here? Express them in <u>words</u>, try to find a <u>formula</u> and give an example with <u>numbers</u>.