

Name _____

Date _____

Magnitude

1. Let $M = 118,526.65902$. Find the smallest power of 10 that will exceed M .

2. Scott said that 0.09 was a bigger number than 0.1. Use powers of 10 to show that he is wrong.

1. What is the smallest power of 10 that would exceed 987,654,321,098,765,432?
2. What is the smallest power of 10 that would exceed 999,999,999,991?
3. Which number is equivalent to 0.0000001: 10^7 or 10^{-7} ? How do you know?
4. Sarah said that 0.00001 is bigger than 0.001 because the first number has more digits to the right of the decimal point. Is Sarah correct? Explain your thinking using negative powers of 10 and the number line.
5. Place each of the following numbers on a number line in its approximate location:

10^5 10^{-99} 10^{-17} 10^{14} 10^{-5} 10^{30}

1. Let $M = 118,526.65902$. Find the smallest power of 10 that will exceed M .

Since $M = 118,527 < 1,000,000 < 10^6$, then 10^6 will exceed M .

2. Scott said that 0.09 was a bigger number than 0.1. Use powers of 10 to show that he is wrong.

We can rewrite 0.09 as $\frac{9}{10^2} = 9 \times 10^{-2}$ and rewrite 0.1 as $\frac{1}{10^1} = 1 \times 10^{-1}$. Because 0.09 has a smaller power of 10, 0.09 is closer to zero and smaller than 0.1.

1. What is the smallest power of 10 that would exceed 987,654,321,098,765,432?

$987,654,321,098,765,432 < 999,999,999,999,999,999 < 1,000,000,000,000,000,000 = 10^{18}$

2. What is the smallest power of 10 that would exceed 999,999,999,991?

$999,999,999,991 < 999,999,999,999 < 1,000,000,000,000 = 10^{12}$

3. Which number is equivalent to 0.0000001: 10^7 or 10^{-7} ? How do you know?

$0.0000001 = 10^{-7}$ Negative powers of 10 denote numbers greater than zero but less than 1. Also, the decimal 0.0000001 is equal to the fraction $\frac{1}{10^7}$, which is equivalent to 10^{-7} .

4. Sarah said that 0.00001 is bigger than 0.001 because the first number has more digits to the right of the decimal point. Is Sarah correct? Explain your thinking using negative powers of 10 and the number line.

$0.00001 = \frac{1}{100000} = 10^{-5}$ and $0.001 = \frac{1}{1000} = 10^{-3}$. On a number line, 10^{-5} is closer to zero than 10^{-3} ; therefore, 10^{-5} is the smaller number, and Sarah is incorrect.

5. Place each of the following numbers on a number line in its approximate location:

10^5 10^{-99} 10^{-17} 10^{14} 10^{-5} 10^{30}

