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**Exercise 1**

Let  $M = 993,456,789,098,765$ . Find the smallest power of 10 that will exceed  $M$ .

$10^4$   $10^{11}$   $10^0$

$10^{15}$

**Exercise 2**

Let  $M = 78,491 \frac{899}{987}$ . Find the smallest power of 10 that will exceed  $M$ .

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### Exercise 2

Let  $M = 78,491 \frac{899}{987}$ . Find the smallest power of 10 that will exceed  $M$ .

$\frac{8}{10} 10^1$   $\frac{89}{100} 10^2$

$10^4$   $10^0$

$10^5$

$10^4 = 10,000$   
 $10^5 = 100,000$

78,492

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### Exercise 3

Let  $M$  be a positive integer. Explain how to find the smallest power of 10 that exceeds it.

To find the smallest power of 10 you need to count the number of digits in the whole number. (no decimal or fraction digits)

### Exercise 4

The chance of you having the same DNA as another person (other than an identical twin) is approximately  $\frac{1}{10,000,000,000,000}$  (one trillion is a 1 followed by 12 zeros). Given the fraction, express this very small number using a power of 10.

$$\frac{1}{10,000,000,000,000}$$

8.50 x 11.00 in

**Exercise 4**

The chance of you having the same DNA as another person (other than an identical twin) is approximately  $\frac{1}{10,000,000,000,000}$  (one trillion is a 1 followed by 12 zeros). Given the fraction, express this very small number using a power of 10.

Fraction - neg. mag.

$$\frac{1}{10,000,000,000,000} = \frac{1}{10^{13}} = 10^{-13}$$

$10^2 = 100$   
 $10^3 = 1,000$   
 $10^4 = 10,000$

**Exercise 5**

The chance of winning a big lottery prize is about  $10^{-8}$ , and the chance of being struck by lightning given year is about 0.000001. Which do you have a greater chance of experiencing? Explain.

**Exercise 5**

The chance of winning a big lottery prize is about  $10^{-8}$ , and the chance of being struck by lightning in a given year is about 0.000001. Which do you have a greater chance of experiencing? Explain.

↳ write as a power of 10

$$\frac{1}{1,000,000} = \frac{1}{10^6} = 10^{-6}$$

$$10^{-6} > 10^{-8}$$

$$-6 > -8$$

Better chance  
of getting  
struck by  
lightning.

**Exercise 6**

There are about 100 million smartphones in the U.S. Your teacher has one smartphone. What share of smartphones does your teacher have? Express your answer using a negative power of 10.

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### Exercise 6

There are about 100 million smartphones in the U.S. Your teacher has one smartphone. What share of smartphones does your teacher have? Express your answer using a negative power of 10.

$$\frac{1}{100,000,000} = \frac{1}{10^8} = 10^{-8}$$

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**Problem Set**

1. What is the smallest power of 10 that would exceed 987,654,321,098,765,432?  $10^{18}$
2. What is the smallest power of 10 that would exceed 999,999,999,991?  $10^{12}$
3. Which number is equivalent to 0.0000001:  $10^7$  or  $10^{-7}$ ? How do you know?  
*It is a decimal smaller than 1.*
4. Sarah said that 0.00001 is bigger than 0.001 because the first number has more digits to the right 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:  
 $10^5$     $10^{-99}$     $10^{-17}$     $10^{14}$     $10^{-5}$     $10^{30}$

8.50 x 11.00 in

4. Sarah said that 0.00001 is bigger than 0.001 because the first number has more digits to the right 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:

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



4)  $0.00001$

$$\frac{1}{100,000} = \frac{1}{10^5} = 10^{-5}$$

$0.001$

$$\frac{1}{1,000} = \frac{1}{10^3} = 10^{-3}$$

