Unit 7 Lesson 14: Adding and Subtracting with Scientific Notation

1 Number Talk: Non-zero Digits (Warm up)

Student Task Statement

Mentally decide how many non-zero digits each number will have.

$(3 \times 10^9)(2 \times 10^7)$

$(3 \times 10^9) \div (2 \times 10^7)$

$3 \times 10^9 + 2 \times 10^7$

$3 \times 10^9 - 2 \times 10^7$

2 Measuring the Planets

Student Task Statement

Diego, Kiran, and Clare were wondering:

"If Neptune and Saturn were side by side, would they be wider than Jupiter?"

1. They try to add the diameters, 4.7×10^4 km and 1.2×10^5 km. Here are the ways they approached the problem. Do you agree with any of them? Explain your reasoning.
   a. Diego says, "When we add the distances, we will get $4.7 + 1.2 = 5.9$. The exponent will be 9. So the two planets are 5.9×10^9 km side by side."

   b. Kiran wrote 4.7×10^4 as 47,000 and 1.2×10^5 as 120,000 and added them:
   $$\begin{array}{r} 120{,}000 \\ +47{,}000 \\ \hline 167{,}000 \end{array}$$

   c. Clare says, "I think you can't add unless they are the same power of 10." She adds 4.7×10^4 km and 12×10^4 to get 16.7×10^4.

2. Jupiter has a diameter of 1.43×10^5. Which is wider, Neptune and Saturn put side by side, or Jupiter?

3 A Celestial Dance

Student Task Statement

object	diameter (km)	distance from the Sun (km)
Sun	1.392×10^6	0×10^0
Mercury	4.878×10^3	5.79×10^7
Venus	1.21×10^4	1.08×10^8
Earth	1.28×10^4	1.47×10^8
Mars	6.785×10^3	2.28×10^8
Jupiter	1.428×10^5	7.79×10^8

1. When you add the distances of Mercury, Venus, Earth, and Mars from the Sun, would you reach as far as Jupiter?

2. Add all the diameters of all the planets except the Sun. Which is wider, all of these objects side by side, or the Sun? Draw a picture that is close to scale.

4 Old McDonald's Massive Farm (Optional)

Student Task Statement

Use the table to answer questions about different life forms on the planet.

creature	number	mass of one individual (kg)
humans	7.5×10^9	6.2×10^1
cows	1.3×10^9	4×10^2
sheep	1.75×10^9	6×10^1
chickens	2.4×10^{10}	2×10^0
ants	5×10^{16}	3×10^{-6}
blue whales	4.7×10^3	1.9×10^5
antarctic krill	7.8×10^{14}	4.86×10^{-4}
zooplankton	1×10^{20}	5×10^{-8}
bacteria	5×10^{30}	1×10^{-12}

1. On a farm there was a cow. And on the farm there were 2 sheep. There were also 3 chickens. What is the total mass of the 1 cow, the 2 sheep, the 3 chickens, and the 1 farmer on the farm?

2. Make a conjecture about how many ants might be on the farm. If you added all these ants into the previous question, how would that affect your answer for the total mass of all the animals?

3. What is the total mass of a human, a blue whale, and 6 ants all together?

4. Which is greater, the number of bacteria, or the number of all the other animals in the table put together?