Warm-Up Activity #4

Name _____ **Date** _____

Concept: Understanding Components of Scientific Notation

Directions: The following activity is designed to review writing very large or very small numbers in a more precise form known as **scientific notation**. For starters, a review of powers of 10 is necessary. Work with a partner to investigate positive and negative integer exponents. Then, relocate the decimal point in preparation for writing in scientific notation.

1. Powers of 10 Use a calculator and write each power as a rational number.

10^1	10^2	10^3	10^4	10^5	10^6
_____	_____	_____	_____	_____	_____
10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}
_____	_____	_____	_____	_____	_____

What does it mean to have a positive exponent?

How are negative exponents used?

2. Relocation of the Decimal Point Relocate the decimal point so that the new number lies between 1 and 10.

1) 34.63	2) 0.00257	3) 0.000056	4) 656,000,000,000
_____	_____	_____	_____

3. Scientific Notation Use the answers to Part 2 and write each number in scientific notation.

1) 34.63	2) 0.00257	3) 0.000056	4) 656,000,000,000
_____	_____	_____	_____

Scientific Notation in the Real World

Name _____ **Date** _____

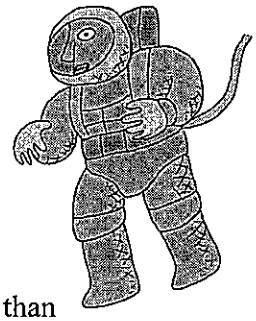
Directions: Many numbers in real life are very large or very small. Indicated below are several examples of instances where extremely large or small numbers occur. Work with a partner and write the missing equivalent forms using your knowledge of rational numbers and scientific notation.

Real-Life Examples	Word Notation	Integer	Scientific Notation
Population of the world	6 billion, 174 million, 798 thousand, 604		
Speed of light		300,000,000 m/sec	
Distance from Earth to Sun			9.3×10^{7}
Distance from Earth to Moon		240,000 miles	
Raindrops in a thundercloud	6 trillions		
Cells in the human body			1.0×10^{14}
Density of oxygen	1332 millionths g per cc		
Miles in a light-year*		5,880,000,000,000	
Stars in Milky Way from Earth*	80 thousand light-years		
Water on Earth's surface			1.40×10^{8} sq mi
Mass of a dust particle	753 trillionths of a kg		
Diameter of a grain of sand		.0024 in	

*Extension: How many miles from the Earth are the stars in the Milky Way?

Who would ever need such big numbers in the workplace?

All for a WALK on the MOON



"When Are We Ever Going To *USE* This MATH?"

Name _____ Date _____

Directions: What better place is there to explore the use of scientific notation than to take a look at the events around a walk on the moon! The Apollo program became the backbone of the American space program. Read each problem carefully and be sure to answer in the form that the question asks! Use the Scientific Notation in the Real World activity sheet as needed.

1. At its peak, more than 4.0×10^5 people worked on Apollo exploration programs. The effort was the largest enterprise ever undertaken. How many people worked on Apollo at its peak? Express this number as an integer.

2. When Apollo began, neither the United States nor the Soviet Union possessed a rocket powerful enough to send humans to the Moon and back. The United States developed the super-booster Moon Rocket. The thrust at lift off is reported to be 1.6×10^6 pounds. Express this number as an integer.

3. Each Apollo spacecraft left the ground on a Saturn V rocket. All stages of each mission combined were carrying 5,625,000 pounds of fuel. How many pounds of fuel did the eleven Apollo missions carry? Express the weight as pounds in scientific notation.

4. The Apollo spacecraft set a new speed record en route from the Earth to the Moon. The Voyager spacecraft are the fastest vehicles in existence. The Apollo's speed reached 20,000 mph. The Voyager's speed reached 39,000 mph. This represented an increase of 1.9×10^4 mph. Express the increase in speed as an integer.

5. You have already determined the Moon is 240,000 miles from the Earth. However, when Apollo 11 landed on the Moon in 1969 that only represented the trip to the Moon. Let's don't forget the trip back home. Express the round trip to and from the Moon in words, integer notation, and scientific notation.

6. There were a total of eleven manned Apollo missions. Only eight successfully orbited or landed on the moon. What is the total round trip mileage (not including orbits) of the eight missions to the Moon and safely back to Earth? Express the mileage in words, integer notation, and scientific notation.

7. The *Lunar Rover* was first used with Apollo 15. The astronauts traveled over 17 miles of the moon's surface. How many miles could have been covered if all eleven Apollo missions had the *Lunar Rover*? (Consider all eleven missions successfully landed on the moon.) Show set-up for calculation and express the answer in scientific notation.

8. Astronauts collected moon dust samples. A lunar dust particle has a mass of .000000000753 kg. A sample of lunar dust contains 100 dust particles. Find its mass. Express the mass in scientific notation.

9. The distance around Earth is about 24,887 miles. An orbit around Earth takes place several thousand miles in space. Therefore, an orbit would be much greater than the distance around Earth. Apollo 7 and Apollo 9 together made 314 orbits of Earth. Their total miles orbited around Earth is 7.814518×10^6 miles. Express this number as an integer and in words.

10. The cost of each new Apollo spacecraft was $170 million. Find the cost of eleven missions if each mission required a new spacecraft. Express the amount in integer notation, words, and scientific notation.