Worksheet 2-8: More Exponent Law Challenge

Instructions: **(1) Write your answers for the following questions as a single power with positive exponents.**
(2) Provide an answer statement for each question.
**Use of a dictionary is recommended.

PART 1: Application

1. **It is estimated that there are about 10^{11} galaxies in the universe, and each galaxy contains about 10^{11} stars. About how many stars in total are in the universe?**

2. **A rectangular field is 10^5 m long and 10^2 m wide. What is its area?**

3. **The area of a rectangular parking lot is 5^5 m². If its width is 5^2 m, what is its length?**

4. **The mass of the Earth is 10^{25} kg, and the mass of the sun is 10^{30} kg. About how many times the mass of the Earth is the mass of the sun?**

Assigned Work: WS 2-8; WS 2-9

PART 2: Thinking/Communication

5. On a test, a student wrote that $2^3 \times 3^2 = 6^5$.
   (a) What mistake(s) did the student make?

   (b) What is the value of $2^3 \times 3^2$?

6. On a test, a student wrote that $(5^3)^4 = 5^7$
   a) What mistake(s) did the student make?

   (b) What is the value of $(5^3)^4$?

7. On a test, a student wrote that $3^{-2} = -9$
   a) What mistake(s) did the student make?

   (b) What is the value of 3^{-2}?

8. On a test, a student wrote that $-4^4 = 256$
   a) What mistake(s) did the student make?

   (b) What is the value of -4^4?

9. Find each value of n.

   (a) $(n^2)^2 = 16$ **(b)** $n^5 \div n^3 = 25$ **(c)** $(3^2)^n = 81$ **(d)** $(2^n)^3 = \dfrac{1}{8}$

Answers: 1. 10^{22} ; **2.** 10^7 ; **3.** 5^3 ; **4.** 10^5 ; **5. (b)** 72; **6. (b)** 5^{12} ; **7. (b)** $\dfrac{1}{9}$; **8. (b)** -256 ; **9.** (a) 2, (b) 5, (c) 2, (d) -1.

Worksheet 2-9: Applications of Powers and Exponents

1. The current population of the Earth is about 7 billion people. The population grows by about 1.2% per year. It is estimated that the Earth can support a maximum population of about 20 billion people. Determine how many years it will take the current population of the Earth to pass 16 billion at the given growth rate.

2. Mr. Vandyke receives $10,000. He keeps half his money and gives the rest to Mrs. Bartley. Mrs. Bartley keeps half her money and gives the rest to Ms. Rogowski. Ms. Rogowski keeps half her money and gives the rest to Ms. Chor. Applying the concepts of powers and exponents, write a mathematical expression to represent the dollar amount of money that Ms. Chor receives from Ms. Rogowski.

3. A ball is dropped from a height of 10 m above the ground. It bounces to 90% of its previous height on each bounce. What is the approximate height that the ball bounces to on the fifth bounce, to the nearest tenth of a metre?

Name: _____
Date: _____

4. **Find each value of *n*.**

   (a) $(n^2)^2 = 81$

   (b) $n^5 \div n^3 = 36$

   (c) $3^n = \dfrac{1}{27}$

   (d) $4^n = 4096$

   (e) $(5^n)^3 = 15625$

   (f) $(2^n)^5 = \dfrac{1}{32}$

   (g) $\dfrac{n^4 \times n^3}{n^5} = 2401$

   (h) $\dfrac{(n^2)^4}{n^7 \times n^3} = \dfrac{1}{25}$

Answers: 1. 70 years**; 2.** $10000 \times \left(\dfrac{1}{2}\right)^3$, $1250 **; 3.** 5.9 m**; 4. (a)** 3**, (b)** 6**, (c)** -3**, (d)** 6**, (e)** 2**, (f)** -1**, (g)** 49**, (h)** 5.