1. The platelet count of a healthy adult is about 2.5×10^{-5} parts per 1 million parts blood. In a patient with thrombocytopenia, a disorder in which the body produces fewer platelets, the platelet level is 100 times lower than this average. What is the approximate patient's platelet count in parts per million?

    A. 2.5×10^{-7}

    B. 2.5×10^{-3}

    C. 2.5×10^{-105}

    D. -9.9×10

    E. 2.5×10^{7}

2. The average diameter of a monocyte, a type of white blood cell, is 2.00×10^{-5} meters. A monocyte's diameter is about how many times the diameter of a red blood cell, whose average diameter is 6.50×10^{-6}?

    A. 3.25×10

    B. 3.08×10

    C. 3.08

    D. 3.25

    E. 3.08×10^{-11}

3. A hummingbird beats its wings approximately 14 times per second. After 5 hours and 20 minutes, how many times has the bird beat its wings?

    A. 7.47×10^{1}

    B. 2.62×10^{5}

    C. 4.36×10^{3}

    D. 2.69×10^{5}

    E. 4.48×10^{2}

4. At sea level, the speed of sound is $3.40 * 10^{2}$ meters per second. After 3 hours and 30 minutes, about how many kilometers could a sound wave travel?

    A. 4.28×10^{3} km

    B. 7.14×10^{3} km

    C. 7.14×10^{4} km

    D. 6.73×10^{4} km

    E. 4.28×10^{5} km

5. According to the EPA, water is no longer safe to drink once the level of lead in the water reaches 15,000,000 parts per billion. What is this level of lead water contamination written in scientific notation?

    A. 1.5×10^{-1}

    B. 1.5×10^{-2}

    C. 1.5×10^{-3}

    D. 1.5×10

    E. 1.5×10^{2}

6. Which is the closest to 6.5×10^{-4}?

    A. 0.065

    B. 0.0065

    C. 0.00065

    D. 0.000065

    E. 0.0000065

7. Whenever x and y are both integers, what is $\dfrac{3.5 \times 10^{y}}{6.2 \times 10^{x}}$ expressed in scientific notation?

    A. $5.6 \times 10^{y-x-1}$

    B. $5.6 \times 10^{y-x}$

    C. $5.6 \times 10^{\frac{y}{x}-1}$

    D. $5.6 \times 10^{y+x}$

    E. $5.6 \times 10^{x-y-1}$

ANSWER KEY

1. A   2. C   3. D   4. A   5. B   6. C   7. A

ANSWER EXPLANATIONS

1. **A.** If the platelet count is 100 times lower than the healthy amount of $2.5*10^{-5}$ parts, then it has a count of $\dfrac{2.5*10^{-5}}{100} = \dfrac{2.5*10^{-5}}{10^2} \to 2.5*10^{-7}$ parts per million.

2. **C.** 2.00×10^{-5} is x times $6.50*10^{-6}$. Solving for x, we get:
$$2.00\times10^{-5} = x\left(6.50\times10^{-6}\right) \to x = \frac{2.00\times10^{-5}}{6.50\times10^{-6}} = \frac{2}{6.50}\times10^{-5-(-6)} = 0.308\times10^1 = 3.08.$$

3. **D.** A hummingbird's wing beats $\dfrac{14\,beats}{sec}\times\dfrac{60\sec}{1\,min} = 840$ beats per minute. We calculate 5 hours and 20 minutes is equal to $5(60)+20 = 320$ min. So, a hummingbird beats its wings approximately $\dfrac{840\,beats}{min}\times320\,min = 268800$ beats in 5 hours and 20 minutes. Writing this in scientific notation, we have 2.69×10^5.

4. **A.** At sea level, the speed of sound is $\dfrac{3.4\times10^2\,meters}{sec}\times\dfrac{60\sec}{1\,min} = 60(3.4)\times10^2 = 204\times10^2 = 2.04\times10^4$ meters per minute. We calculate 3 hours and 30 minutes is equal to $3(60)+30 = 210$ min. So, the speed of sound is approximately $\dfrac{2.04\times10^4\,meters}{min}\times\dfrac{1\,kilometer}{1000\,meters}\times210\,min = 428.4\times10 = 4.28\times10^3$ kilometers in 3 hours and 30 minutes.

5. **B.** $15,000,000$ parts per billion is equal to $\dfrac{15,000,000}{1,000,000,000}$. Canceling out the zeros on the numerator and denominator, we get $\dfrac{15}{1000} = 0.015 = 1.5\times10^{-2}$.

6. **C.** $6.5\times10^{-4} = 0.00065$. So, the value closest to that, with the same number of zeros preceding the first non-zero integer, is 0.00065.

7. **A.** $\dfrac{3.5\times10^y}{6.2\times10^x}$ is $\dfrac{3.5}{6.2}\times10^{y-x} = 0.56\times10^{y-x} = 5.6\times10^{-1}\times10^{y-x} = 5.6\times10^{y-x-1}$.