Aksum Math

Scientific Notation

Numbers & Patterns · Grade 8

★ Hard · 13 Questions

Name: _____

Date: _____

Score: _____ / 13

Solve each problem. Show your work in the space provided. Write your answer on the line.

1. Simplify: $(3.6 \times 10^{8}) \div (1.2 \times 10^{-3})$

Answer: _____

2. The human body has about 3.7×10^{13} cells. Each cell contains about 6×10^{-12} grams of DNA. Find the total mass of DNA.

Answer: _____

3. Simplify: $(2.0 \times 10^{3})^{3}$

Answer: _____

4. The Sun is 1.496×10^{8} km from Earth. Light travels at 3.0×10^{5} km/s. How long does sunlight take to reach Earth (in seconds)?

Answer: _____

5. Add: $(3.2 \times 10^{-4}) + (8.5 \times 10^{-5})$

Answer: _____

6. Express $\sqrt{(4 \times 10^{10})}$ in scientific notation.

Answer: _____

7. Avogadro's number: 6.022×10^{23}. One mole of water weighs 18 g. Find the mass of a single water molecule in grams.

Answer: _____

8. National debt: $\$2.8 \times 10^{13}$. Population: 3.3×10^{8}. Find the debt per person.

Answer: _____

9. Simplify: $(5.0\times10^{4} \times 4.0\times10^{-2}) \div (2.5\times10^{3})$

Answer: _____

10. A computer processes 2.5×10^{9} operations per second. How many operations in 3 hours?

Answer: _____

11. Compare: (9×10^{15}) and (8.99999×10^{15}). Which is larger and by how much?

Answer: _____

12. A star is 8.5×10^{18} m away. If 1 light-year $\approx 9.46 \times 10^{15}$ m, how many light-years away is the star?

Answer: _____

13. Find n: $(2 \times 10^{n})^{3} = 8 \times 10^{15}$

Answer: _____

Answer Key

Scientific Notation — Hard

1. **3.0×10^{11}**

$3.6 \div 1.2 = 3$. $8 - (-3) = 11$. Answer: 3.0×10^{11}.

2. **2.22×10^{2} g = 222 g**

$(3.7 \times 10^{13}) \times (6 \times 10^{-12}) = 22.2 \times 10^{1} = 2.22 \times 10^{2}$ g.

3. **8.0×10^{9}**

$2^3 = 8$. $(10^3)^3 = 10^9$. Answer: 8.0×10^9.

4. **≈ 498.67 s ≈ 8.3 minutes**

$t = d/v = (1.496 \times 10^8) \div (3.0 \times 10^5) = (1.496/3.0) \times 10^3 \approx 0.499 \times 10^3 \approx 499$ s ≈ 8.3 min.

5. **4.05×10^{-4}**

$3.2 \times 10^{-4} = 32 \times 10^{-5}$. $32 + 8.5 = 40.5 \times 10^{-5} = 4.05 \times 10^{-4}$.

6. **2×10^{5}**

$\sqrt{4} = 2$. $\sqrt{10^{10}} = 10^5$. Answer: 2×10^5.

7. **≈ 2.99×10^{-23} g**

$18 \div (6.022 \times 10^{23}) = (18/6.022) \times 10^{-23} \approx 2.99 \times 10^{-23}$ g.

8. **≈ $84,848**

$(2.8 \times 10^{13}) \div (3.3 \times 10^8) = (2.8/3.3) \times 10^5 \approx 0.848 \times 10^5 \approx \$84{,}800$.

9. **8.0×10^{-1}**

Numerator: $20 \times 10^2 = 2.0 \times 10^3$. Divide: $(2.0 \times 10^3) \div (2.5 \times 10^3) = 0.8 = 8.0 \times 10^{-1}$.

10. **2.7×10^{13}**

3 hours = 10,800 s = 1.08×10^4. Operations: $2.5 \times 10^9 \times 1.08 \times 10^4 = 2.7 \times 10^{13}$.

11. **9×10^{15} is larger by 1×10^{10}.**

Difference: $(9-8.99999)\times10^{15}=0.00001\times10^{15}=10^{-5}\times10^{15}=1\times10^{10}$.

12. **≈ 899 light-years**

$(8.5\times10^{18})\div(9.46\times10^{15})=(8.5/9.46)\times10^{3}\approx0.899\times10^{3}\approx899$ ly.

13. **n = 5**

$(2)^{3}\times(10^{n})^{3}=8\times10^{3n}=8\times10^{15}$. $3n=15$. $n=5$.