**1.** If $a = 2^{-13}3^9$, $b = 2^{11}3^{-7}$, what is the value of $ab$? of $a/b$?

**2.** In how many zeroes does the number $4^{15}5^{26}$ end?

**3.** Simplify:

(a) $(4c^2 \cdot c^3)^3$

(b) $\left( \dfrac{8dg^2}{3d^3g^4} \right)^3$

(c) $((x^2y)^3)^4$

(d) $\dfrac{26(a^2b)^4}{65a^3b^2c^3}$

(e) $\left( \dfrac{9a^7b^6}{45a^3b} \right)^4$

(f) $\left( \dfrac{3a^5b^2}{21ab} \right)^4 \cdot \dfrac{7^4}{a^{16}b^2}$

**4.** Let $x = a^3 \cdot b^2$, $y = \dfrac{b^5}{a^2c^4}$, and $z = \dfrac{c^3}{ab}$. Express in terms of $a, b, c$:

(a) $(xy)^2z$

(b) $\dfrac{x}{y}$

(c) $\dfrac{x^3y^2}{xy^2z^3}$

**5.** Suppose \$100 is deposited into an account and the amount doubles every 8 years. How much will be in the account after 40 years? Express your answer using powers.

**6.** At the beginning of an epidemic, 50 people are sick. If the number of sick people triples every other day, how many people will be sick at the end of 2 weeks? Express your answer using powers.

**7.** About how many hydrogen atoms are there in one gram of hydrogen?

**8.** Write the following numbers using scientific notation.
   (a) the distance from Earth to Pluto is $\approx$ 7,527,000,000 km;
   (b) the distance from Earth to the star Sirius is $\approx$ 81,900,000,000,000 km;
   (c) the distance from Earth to Vega is $\approx$ 249,500,000,000,000 km;
   (d) the distance from Earth to the Andromeda Nebula is $\approx$ 2,000,000,000,000,000,000,000 km.
   (e) the area of the Pacific Ocean is $\approx$ 178,684,000,000 km$^2$

**9.** Write the following numbers in regular form:

   (a) $9.21 \times 10^6 =$   (b) $1.527 \times 10^4 =$
   (c) $5.3459 \times 10^3 =$   (d) $7.527 \times 10^2 =$