

1. Express each of the following as product of powers of their prime factors:

- (a) 1296                      (b) 810                      (c) 1080                      (d) 7200                      (e) 2025

2. Simplify:

- (a)  $2 \times 16^2$                       (b)  $2^6 \times 5^2$                       (c)  $3^2 \times 2^2 \times 5^2$                       (d)  $0 \times 10^8$

3. Simplify and express each of the following in exponential form (use laws of exponents).

(a)  $\frac{2^8 \times 3^6 \times 4}{3^2 \times 3^3}$                       (b)  $\frac{3^8 \times 10^3}{3^{12} \times 3^{19}}$                       (c)  $\frac{2^0 + 3^0 + 4^0}{1^0 \times 2^0 \times 3^0}$                       (d)  $[9^2 \times 2^6] \div 18^2$

(e)  $\frac{17^8 \times a^{10} b^8 c^{14}}{17^6 \times a^8 b^4 c^{12}}$                       (f)  $\frac{250 \times 5^4 \times a^8}{10^4 \times a^6}$                       (g)  $\frac{6^4 \times 9^2 \times 25^3}{3^2 \times 4^2 \times 15^6}$                       (h)  $\frac{15^4 \times 18^3}{3^3 \times 5^2 \times 12^2}$

(i)  $\frac{3^5 \times 10^5 \times 2^5}{5^7 \times 6^5}$                       (j)  $\frac{25^2 \times 7^2}{8^2 \times 7}$

4. Find the value of

(a)  $m$ , so that  $\left(\frac{2}{9}\right)^3 = \left(\frac{2}{9}\right)^{2m-1}$                       (b)  $\frac{p}{q}$  if  $\left(\frac{p}{q}\right) = \left(\frac{3}{2}\right)^2$

5. Simplify and express each of the following in exponential form (by using laws of exponents).

(a)  $\left[\left(\frac{4}{7}\right)^4 \times \left[\left(\frac{4}{7}\right)^5\right]\right] \div \left(\frac{4}{7}\right)^7$

(d)  $\left(\frac{a^8}{a^5}\right) \times a^7 \times a^0$

(b)  $(4^7 \div 4^5)^4$

(e)  $(6^{15} \div 6^{10}) \times 6^6$

(c)  $\left[\left(\frac{7}{13}\right)^5 \div \left[\left(\frac{7}{13}\right)^3 \times \left(\frac{7}{13}\right)^2\right]\right]$

(f)  $\left[\left(\frac{3}{5}\right)^4 \times \left(\frac{3}{5}\right)^4\right] \div \left[\left(\frac{3}{5}\right)^2 \times \left(\frac{3}{5}\right)^3\right]$

6. Express the following numbers in standard form:

- (a) 5000000000                      (b) 30897.6                      (c) 418560000                      (d) 8290404000

7. Write the following numbers in the expanded form (in exponential notation)

- (a) 297064                      (b) 20719                      (c) 60028                      (d) 20068

8. Find the value of  $k$  in each of the following:

(i)  $\left(\frac{2}{3}\right)^3 \times \left(\frac{2}{3}\right)^6 = \left(\frac{4}{9}\right)^{2k-3}$

(ii)  $\left(-\frac{4}{5}\right)^2 \times \left(\frac{4}{5}\right)^5 = \left(\frac{4}{5}\right)^{6k+1}$