Rules of Indices

1. Simplify the following expressions without using a calculator. Leave your answers in index form:

a. $5^2 \times 5^4 =$ b. $3^5 \times 3^3 =$ c. $10^8 \times 10^7 =$

d. $2^{12} \times 2^3 =$ e. $a^6 \times a^{-3} =$ f. $f^{21} \times f^{13} =$

g. $6^9 \div 6^4 =$ h. $12^{15} \div 12^2 =$ i. $4^5 \div 4^3 =$

j. $20^8 \div 20^5 =$ k. $m^{15} \div m^8 =$ l. $n^4 \div n^2 =$

m. $(4^2)^5 =$ n. $(8^4)^3 =$ o. $(p^{12})^4 =$

p. $(30^5)^{10} =$ q. $(13^7)^{11} =$ r. $(t^9)^6 =$

2. Simplify the following expressions without using a calculator. Leave your answers in index form:

a. $9^2 \times 9^4 \times 9^3 =$ b. $3^5 \times 3^6 \div 3^2 =$ c. $(4^5)^3 \times 4^{10} =$

d. $(d^7 \times d^2)^6 =$ e. $(y^{12} \div y^4)^5 =$ f. $(k^8 \times k^{21} \div k^7)^2 =$

g. $r^{23} \div (r^3)^5 =$ h. $(s^0 \times s^4)^2 \div s^5 =$ i. $p^{18} \times (p^4 \div p^2)^3 =$

j. $\dfrac{w^9 \times w^2}{w^5 \times w^3} =$ k. $\dfrac{(g^5 \times g^2)^3}{g^4 \times g^{10}} =$ l. $\left[\dfrac{j^4 \times j^8}{j^9 \div j^2}\right]^3 =$

3. Without using a calculator, simplify these expressions to find the missing power:

a. $9^2 \times 3^6 = 3^{\square}$ b. $10\,000 \div 10^2 = 10^{\square}$ c. $25^2 \times 5^3 = 5^{\square}$

d. $64^2 \div 4^3 = 4^{\square}$ e. $144 \times 12^5 = 12^{\square}$ f. $(3^4)^2 \times 27 = 3^{\square}$

g. $4^5 \div 2 = 2^{\square}$ h. $11^5 \times 121^2 = 11^{\square}$ i. $(16^3 \times 2^4) \div 2^3 = 2^{\square}$