

Use number examples to show why the following exponent laws are true.
 $a, b \in N$.

①

(a) $y^a \times y^b = y^{a+b}$

(b) $\frac{y^a}{y^b} = y^{a-b}, a > b$

(c) $(y^a)^b = y^{ab}$

(d) $(xy)^a = x^a y^a$

(e) $\left(\frac{x}{y}\right)^a = \frac{x^a}{y^a}, y \neq 0$

②

Write each of the following as a single power of 10.

(a) $10^6 \times 10^5$

(b) $10^8 \times 10^3 \times 10$

(c) $\frac{10^8 \times 10^2}{10^4}$

(d) $\frac{(-10)^2 \times 10^4}{10^3}$

(e) $\frac{(-10)^3(-10)^5}{10^4}$

(f) $\left(-\frac{1}{10}\right)^3 \times 10^5$

(g) $-10^3(10^5)\left(-\frac{1}{10}\right)^4$

(h) $\left(\frac{10^3 \times 10^2}{-10}\right)^3$

③

Simplify each of the following.

(a) $\frac{x^8}{x^5}$

(b) $(k^4)(k^5)$

(c) $(ab)^5$

(d) $\left(\frac{k}{m}\right)^3$

(e) $(m^2)^5$

(f) $\frac{a^8}{a^2}$

(g) $(m^5)(m^6)$

(h) $\left(\frac{5}{x}\right)^3$

(i) $(3a)^4$

(j) $(x^3)^4$

(k) $(2xy)^3$

(l) $(y^7)(y^3)$

(m) $x^5 \times x^4 \times x^3$

(n) $\left(\frac{3}{2}\right)^3$

(o) $2^3 \times 2^4$

(p) $m^2 \times m^3 \times m^4$

(q) $(x^2y)(xy^2)(xy)$

(r) $(x^3y)(xy^3)(0)$

(s) $(xy)(xy)(xy)$

④

Simplify each of the following.

(a) $\frac{(xy)^3}{xy}$

(b) $\frac{2(ab)^5}{(-a^2)^2}$

(c) $(a^2b)^3\left(\frac{a}{-b}\right)^2$

(d) $(-y^2)^3\left(\frac{x}{y}\right)^2$

(e) $\left(-\frac{1}{x}\right)^3(x^2y)^4$

(f) $\frac{(a^3b^2)^4}{(-ab^2)^2}\left(\frac{-a}{b}\right)^2$

(g) $\left(\frac{xy}{y}\right)^3(x^2y)^2$

(h) $\left(\frac{x}{-y}\right)^5(-xy)^3$

Before you evaluate an expression, be sure to simplify the expression.

⑤

Evaluate each of the following if $a = -1$, $b = 1$, and $c = 2$.

(a) $\frac{(ab)^3}{b^2}$

(b) $\frac{(a^2bc)^2}{abc}$

(c) $(a^4b)^2 \div (ab^2)$

(d) $\left(\frac{a^3b^2}{ab}\right)^3$

(e) $\left(\frac{a}{b}\right)^2\left(\frac{b}{c}\right)^4\left(\frac{c}{a}\right)^2$

(f) $\left(\frac{a}{b}\right)^2\left(\frac{b}{c}\right)^2(abc)^2$