

Key notes:

$$\nabla a^m \times a^n = a^{m+n} \quad \nabla a^m \div a^n = a^{m-n} \quad \nabla (a^m)^n = a^{mn}$$

$$\nabla (ab)^m = a^m b^m \quad \nabla a^0 = 1 \quad \nabla a^{-p} = \frac{1}{a^p}$$

1. Calculation

- (1) $2^3 \times 2^5$ (2) $3^7 \times 9^2$ (3) $(5^3)^4$ (4) $4^7 \div 2^{10}$ (5) $(12345 \times 54321)^0$
 (6) $5^2 \times 5^{-2}$ (7) $2^{100} \times (-\frac{1}{2})^{99}$ (8) 36×6^{-3} (9) $(2^3)^5 \div 2^6$ (10) $27^{\frac{2}{3}}$
 (11) $25^{-\frac{1}{2}}$ (12) $16^{-\frac{3}{4}}$ (13) $256^{\frac{5}{8}}$

Answers:

2. Simplify the following

- (1) $a^3 \times a^2 b$ (2) $\frac{a^4 b^9}{ab^3}$ (3) $\frac{4u^3 y^6}{8u^2 v^3}$ (4) $\frac{(6x^2 y^4)^2 \times (2xy)^3}{12x^6 y^8}$ (5) $(ab)^d \times (ab)^e$
 (6) $(p^3)^0 (q^2)^{-1}$ (7) $\frac{m^0 \div m^{-6}}{(m^{-1})^3}$ (8) $(m^3)^3 (m^{-2})^5$ (9) $a^{\frac{1}{2}} \times a^{\frac{1}{4}}$ (10) $\frac{1}{3} x^{\frac{1}{2}} \div 4x^{-2}$

Answers:3. Express each of the following in the form $a^{\frac{m}{n}}$

- (1) $\sqrt[3]{a}$
 (2) $\sqrt[3]{a^2}$
 (3) $(\sqrt[4]{a})^2$
 (4) $(\sqrt[7]{a})^3$
 (5) $a^{\frac{2}{3}} \times a^{-\frac{1}{4}}$
 (6) $\frac{\sqrt{a}}{a^{-2}}$
 (7) $\frac{\sqrt[3]{3}}{\sqrt{a}}$

4. Express each of the following in the form $(\sqrt[n]{b})^m$

- (1) $b^{\frac{2}{7}}$
 (2) $b^{\frac{8}{3}}$
 (3) $b^{-\frac{2}{3}}$
 (4) $\frac{\sqrt{b} \times b^{\frac{1}{4}}}{b^{-\frac{1}{5}}}$

$$(5) \frac{b^{-\frac{1}{3}} \times \sqrt[3]{b}}{b^{\frac{2}{5}} \times b}$$

$$(6) \frac{b^3 \times b^{-\frac{1}{3}}}{b^{-2}}$$

$$(7) \frac{b^{-2} \times \sqrt[3]{b}}{\sqrt{b} \times (\sqrt[3]{b})^{-1}}$$

5. Solve the exponential equations.

$$(1) 5^x = 625$$

$$(2) 2^{x-1} = 1024$$

$$(3) 4^{2z} = 64$$

$$(4) 3^x = 9^{x-1}$$

$$(5) 5^{3z+1} = 1$$

$$(6) \left(\frac{1}{2}\right)^n = 32$$

$$(7) 3^{x-1} = \sqrt{27}$$

$$(8) 5^z = 125^z$$

$$(9) 2^{x-1} + 1 = \frac{9}{8}$$

$$(10) 4^x = \sqrt{32}$$