

$\sqrt{\left(\frac{2}{3}\right)^{-2}}$ $\frac{1}{\left(\frac{2}{3}\right)^2} = \frac{1}{\frac{4}{9}} = \frac{9}{4} = \boxed{\frac{9}{4}}$	$\sqrt{\left(\frac{1}{25}\right)^{\frac{1}{2}}}$ $\sqrt[2]{\frac{1}{25}} = \frac{1}{5} = \boxed{\frac{1}{5}}$	$\sqrt{\left(\frac{1}{25}\right)^{\frac{1}{2}}}$ $\sqrt[2]{\frac{1}{25}} = \frac{1}{5} = \boxed{\frac{1}{5}}$
$\sqrt{\left(\frac{1}{3}\right)^{-2}}$ $\frac{1}{\left(\frac{1}{3}\right)^2} = \frac{1}{\frac{1}{9}} = 9 = \boxed{9}$	$\sqrt{(27)^{-2}}$ $\sqrt[3]{27^{-2}} = 3^{-2} = \frac{1}{9} = \boxed{\frac{1}{9}}$	$\sqrt{(27)^{\frac{2}{3}}}$ $\sqrt[3]{27^2} = 3^2 = \boxed{9}$
$\sqrt{(-8)^{\frac{1}{3}}}$ $\sqrt[3]{-8} = \boxed{-2}$	$\sqrt{(-8)^{-\frac{1}{3}}}$ $\sqrt[3]{-8^{-1}} = \frac{1}{-2} = \boxed{-\frac{1}{2}}$	$\sqrt{(-2)^3}$ $-2 \cdot -2 \cdot -2 = \boxed{-8}$
$\sqrt[10]{\left(\frac{-1}{2}\right)^{-3}}$ $\frac{1}{\left(\frac{-1}{2}\right)^3} = \frac{1}{-\frac{1}{8}} = -8 = \boxed{-8}$	$\sqrt[11]{\left(\frac{2}{3}\right)^0}$ $\boxed{1}$	$\sqrt[17]{\left(\frac{49}{100}\right)^{-\frac{1}{2}}}$ $\sqrt[2]{\frac{49}{100}} = \frac{7}{10} = \frac{1}{\frac{10}{7}} = \boxed{\frac{7}{10}}$
$\sqrt[13]{\left(\frac{2^3 \cdot 4}{3}\right)^{-2}}$ $\frac{1}{\left(\frac{2^3 \cdot 2^2}{3}\right)^2} = \frac{1}{\frac{2^5}{3}} = \frac{3}{2^5} = \frac{3}{32} = \boxed{\frac{3}{32}}$	$\sqrt[14]{\left(\frac{2^3 \cdot 4^{-1}}{3^{-1}}\right)^{-2}}$ $\frac{1}{\left(\frac{2^3 \cdot 2^{-1}}{2^2}\right)^2} = \frac{1}{\frac{2^2}{2^2}} = \frac{1}{1} = \boxed{1}$	$\sqrt[15]{\left(\frac{9^3}{3}\right)^{-2}}$ $\frac{1}{\frac{(3^2)^3}{3^1}} = \frac{3^1}{3^6} = \frac{1}{3^5} = \frac{1}{243} = \boxed{\frac{1}{243}}$
$\sqrt[16]{(2^3 \cdot 4)^{\frac{1}{5}}}$ $\sqrt[5]{32} = \boxed{2}$	$\sqrt[17]{\left(\frac{9^2}{3^2}\right)^{-2}}$ $\left(\frac{81}{9}\right)^{-2} = \frac{81^2}{9^2} = \frac{6561}{81} = \boxed{81}$	$\sqrt[18]{\left(\frac{2^3}{4}\right)^{-2}}$ $\frac{2^3}{2^2} = 2 = \boxed{2}$

$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$
 $\vee \quad \vee$
 $4 \cdot 4 \cdot 2$
 \vee
 $16 \cdot 2 = 32$

$$(2^1)^{-2} = 2^{-2} = \frac{1}{4} = \boxed{\frac{1}{4}}$$

$$13) 2^{-2n} \cdot 2^{n+1} = 2^{-2n}$$

$$\begin{aligned} -2n + n + 1 &= -2n \\ -n + 1 &= -2n \\ +n &\quad \downarrow \quad +n \\ 1 &= -n \end{aligned}$$

$$\boxed{n = -1}$$

$$15) 3^{2n} = 9$$

$$3^{2n} = 3^2$$

$$\frac{2n}{2} = \frac{2}{2}$$

$$\boxed{n = 1}$$

$$17) \frac{216^{2a}}{36^{-a}} = 216$$

$$\frac{6^{6a}}{6^{-2a}} = 6^3$$

$$6a - (-2a) = 3$$

$$6a + 2a = 3$$

$$\frac{8a}{8} = \frac{3}{8}$$

$$\boxed{a = 3/8}$$

$$18) 36^{3n-2} \cdot \frac{1}{216} = 36^{3n-2}$$

$$(6^2)^{3n-2} \cdot 6^{-3} = (6^2)^{3n-2}$$

$$6n - 4 - 3 = 6n - 4$$

NO SOLUTION

$$16) \frac{16}{\left(\frac{1}{16}\right)^x} = \left(\frac{1}{4}\right)^{2-2x}$$

$$\frac{4^2}{4^{-2x}} = (4^{-1})^{2-2x}$$

$$\begin{aligned} 2 - (-2x) &= -2 + 2x \\ 2 + 2x &= -2 + 2x \\ -2x &= -2x \end{aligned}$$

NO SOLUTION

$$20) 25 \cdot 125^{-v} = 625$$

$$5^2 \cdot 5^{-3v} = 5^4$$

$$2 - 3v = 4$$

$$\frac{-3v}{-3} = \frac{2}{-3}$$

$$\boxed{v = -2/3}$$

$$21) 27^{3x} \cdot \left(\frac{1}{9}\right)^{-x} = 243^{-x-3}$$

$$(3^3)^{3x} \cdot (3^{-2})^{-x} = (3^5)^{-x-3}$$

$$9x + 2x = -5x + 15$$

$$11x = -5x + 15$$

$$\frac{16x}{16} = \frac{-15}{16}$$

$$\boxed{x = -15/16}$$

$$22) \left(\frac{1}{6}\right)^{3a} \cdot 36^{-3a} = \frac{1}{36}$$

$$(6^{-1})^{3a} \cdot (6^2)^{-3a} = 6^{-2}$$

$$\begin{aligned} -3a - 6a &= -2 \\ -9a &= -2 \\ \frac{-9a}{-9} &= \frac{-2}{-9} \end{aligned}$$

$$\boxed{a = 2/9}$$

$$23) 125^{3n} \cdot 625^{-n} = 625^{-2n-1}$$

$$(5^3)^{3n} \cdot (5^4)^{-n} = (5^4)^{-2n-1}$$

$$9n - 4n = -8n - 4$$

$$5n = -8n - 4$$

$$\boxed{n = -4/13}$$

$$24) \frac{125}{25^{-3m}} = 25^{-2m-2}$$

$$\frac{5^3}{(5^2)^{-3m}} = (5^2)^{-2m-2}$$

$$3 - (-6m) = -4m - 4$$

$$3 + 6m = -4m - 4$$

$$1 + 6m = -4m - 4$$

$$\frac{1}{10} = \frac{-10m}{10}$$

$$\boxed{m = -1/10}$$

(4)

EQNS

$$14) \left(\frac{1}{16}\right)^{2a} \cdot 16^{-2a-3} = 64^{2a}$$

$$(4^{-2})^{2a} \cdot (4^2)^{-2a-3} = (4^3)^{2a}$$

$$4-4a \cdot 4-4a-6 = 46a$$

$$-4a - 4a - 6 = 6a$$

$$\begin{aligned} -8a - 6 &= 6a \\ +8a &\quad \downarrow \quad +8a \end{aligned}$$

$$\frac{-6}{14} = \frac{14a}{14}$$

$$\boxed{a = -3/7}$$

$$16) \left(\frac{1}{6}\right)^n = 36$$

$$6^{-n} = 6^2$$

$$-n = 2$$

$$\boxed{n = -2}$$

13) 2