$5^2 \cdot 5^5 = 5^{2+5} = \boxed{5^7}$

$(4x)^2 = \boxed{16x^2}$

$\frac{5^{10}}{5^3} = 5^{10-3=7} = \boxed{5^7}$

$(7^3)^3 = 7^{3 \cdot 3 = 9} = \boxed{7^9}$

$\left(\frac{5^2}{4}\right)^4 = \frac{5^{2 \cdot 4}}{4^4} = \boxed{\frac{5^8}{4^4}}$

$(y^4)^2 = y^{4 \cdot 2 = 8} = \boxed{y^8}$

$\frac{3^6}{3^4} = \boxed{3^2}$

$(7^2 \cdot 5^6)^4 = 7^{2 \cdot 4} \cdot 5^{6 \cdot 4} = \boxed{7^8 \cdot 5^{24}}$

$\left(\frac{b^7}{4^5}\right)^{-3} = \frac{b^{-21}}{4^{-15}} = \boxed{\frac{4^{15}}{b^{21}}}$

$5^{12} \cdot 5^8 = 5^{20}$

$(5^3 \cdot 5^2)^4$

$(5^5)^4 = 5^{20}$

$(5^5)^4 = 5^{20}$

$\frac{1}{3} = \boxed{3^{-1}}$

$$(a^{-2} \cdot 8^{7})^{2} = (a^{-2 \cdot 2} \cdot 8^{7 \cdot 2}) = \boxed{a^{-4} \cdot 8^{14}}$$

$$a^{-1} = \boxed{\frac{1}{a}}$$

$$\frac{9.45 \cdot 10^{15}}{3.15 \cdot 10^{7}}$$

$$3 \cdot 10^{15-7}$$

$$\boxed{3 \cdot 10^{8}}$$

$$(1.15 \cdot 10^{5})(3.65 \cdot 10^{2})$$

$$4.1975 \cdot 10^{5+2} = 4.1975 \cdot 10^{7}$$

$$= \boxed{4.2 \cdot 10^{7}}$$

$$(1.2 \cdot 10^{-1}) + (6.0 \cdot 10^{-2})$$

$$(1.2 \cdot 10^{-1}) + (0.6 \cdot 10^{-1})$$

$$\boxed{1.8 \cdot 10^{-1}}$$

$$(4 \cdot 10^{4}) \cdot (1 \cdot 10^{-4})$$

$$4 \cdot 10^{4-4} = \boxed{4 \cdot 10^{0}}$$

$9.0 \cdot 10^{-5} - 3.0 \cdot 10^{-6}$

$9.0 \cdot 10^{-5} - 0.3 \cdot 10^{-5}$

$8.7 \cdot 10^{-5}$

$5.1 \cdot 10^{-4} + 8.0 \cdot 10^{-3}$

$5.1 \cdot 10^{-4} + 80.0 \cdot 10^{-4}$

$85.1 \cdot 10^{-4}$

$\boxed{8.51 \cdot 10^{-3}}$

$(4.0 \cdot 10^{0})(2.2 \cdot 10^{6})$

$8.8 \cdot 10^{0+6} = \boxed{8.8 \cdot 10^{6}}$

$$\frac{(1.1 \cdot 10^{9})}{9.1 \cdot 10^{1}} = 0.1208 \cdot 10^{8} = 1.208 \cdot 10^{7}$$

$$= \boxed{1.21 \cdot 10^{7}}$$

Unit Test

$$\left(\frac{2^{-10}}{4^2}\right)^7 = \frac{2^{-10\cdot 7}}{4^{2\cdot 7}} = \frac{2^{-70}}{4^{14}} = 2^{-70}\cdot 4^{-14}$$

or

$$\frac{1}{2^{70}\cdot 4^{14}}$$

$$3^{-5} = \frac{1}{3^5}$$

$$\left(\frac{7}{2}\right)^8 = \frac{7^8}{2^8}$$

$$\frac{7^7}{7^3} = 7^x$$

$$x = 7-3 = 4$$

$$\left(2^4\right)^2 = 2^n$$

$$2^{4+2} = 2^8 \quad n = 8$$

$$\left(\frac{a}{b^3}\right)^4 = \frac{a^4}{b^{3\cdot 4}} = \frac{a^4}{b^{12}}$$

$$\frac{4^{-3}}{4^{-1}} = \frac{4^1}{4^3} = 4^{-2} = \frac{1}{4^2}$$

$1.8 \cdot 10^{11} - 7.2 \cdot 10^{10}$

$18 \cdot 10^{10} - 7.2 \cdot 10^{10}$

$10.8 \cdot 10^{10}$

$1.08 \cdot 10^{11}$

$(4^2)^4 = 4^{2 \cdot 4} = \boxed{4^8}$