4C $\boxed{(ab)^m = a^m \cdot b^m}$ $(a^m)^n = a^{mn}$

1 (a) $(64a^6)^{1/2} = 64^{1/2} \cdot (a^6)^{1/2}$

$= 8 \cdot a^3$

root index

(b) $\sqrt[4]{16x^{-8}} = (16x^{-8})^{1/4}$ ← root index

$= 16^{1/4} \cdot (x^{-8})^{1/4}$

$= 2 \cdot x^{-2}$ or $\frac{2}{x^2}$

(c) $\frac{q\sqrt{q}}{q^{-1.5}} = q^1 \cdot q^{1/2} \cdot q^{1.5} = q^3$

(d) $\left(\frac{27e^3}{d^3}\right)^{-1/3} = \frac{27^{-1/3}(e^3)^{-1/3}}{(d^3)^{-1/3}} = \frac{d}{3e}$

(e) $\frac{(8p)^{2/3}}{(4p)^2} = \frac{8^{2/3}\ p^{2/3}}{4^2\ p^2} = \frac{4p^{2/3}}{16p^2} = \frac{1}{4p^{4/3}}$

4G

#1 $\log_7 49 = \boxed{2}$

$$7^{\square} = 49$$

$$\log_5 \sqrt{5} = \frac{1}{2}$$

$$5^{\square} = \sqrt{5}$$

$$\log_2 64 = 6$$

$$2^{\square} = 64$$

* d) $\log 1 = 0$

4H

(c) $\log_n n = \boxed{1}$

$n^{\boxed{\ }} = n$

Exponential Equations

variable in the exponent

$\boxed{\log a^b = b \cdot \log a}$

Ex. $2^x = 5$

$\ln 2^x = \ln 5$

log rule #3

$\dfrac{x \cdot \cancel{\ln 2}}{\cancel{\ln 2}} = \dfrac{\ln 5}{\ln 2}$

$\boxed{\ln x = \log_e x}$

The natural logarithm

$$\boxed{x = \frac{\ln 5}{\ln 2}}$$

≈ 2.32

The Euler number
$e \approx 2.718$

Ex. $2^x = 3^{x-1}$

$$\ln 2^x = \ln 3^{x-1}$$

$$x \cdot \ln 2 = (x-1)\ln 3$$

$$x \cdot \ln 2 = x \cdot \ln 3 - \ln 3$$

$$x\ln 2 - x\ln 3 = -\ln 3$$

$$\frac{x\cancel{(\ln 2 - \ln 3)}}{\cancel{\ln 2 - \ln 3}} = \frac{-\ln 3}{\ln 2 - \ln 3}$$

$$\boxed{x = \frac{-\ln 3}{\ln 2 - \ln 3}}$$

HW 4B #2

4C #2

4G #2

Solve

(1) $3^x = 5$

(2) $2^{x+1} = 3^{x-1}$