Chapter 4 Review

1. <u>Rational</u>   <u>Irrational</u>

$\sqrt{4}, \frac{2}{3}, 8.\overline{23}, \sqrt{\frac{64}{121}}, -\sqrt{0.81}, 0.75$ $\sqrt[3]{85}, \sqrt[4]{32}, 6.2\overline{1231}...$

2. $\sqrt{36} = 6$ and $\sqrt{49} = 7$ $\sqrt[3]{64} = 4$ and $\sqrt[3]{125} = 5$

36 ——— 45 ——— 49   64 ——— 75 ———

a) $\sqrt{45} \doteq 6.7$ b) $\sqrt[3]{75} \doteq 4.2$

3. $\sqrt[3]{50}, \sqrt{\frac{1}{3}}, \sqrt[3]{\frac{4}{5}}, \sqrt[4]{12}, \sqrt{22}$

4.   Real Numbers

5a) $\sqrt{45} = 3\sqrt{5}$ b) $\sqrt[3]{256}$ c) $\sqrt[4]{1250}$

$= \sqrt[3]{8 \cdot 32}$ $= \sqrt[4]{10 \cdot 125}$

$= \sqrt[3]{8 \cdot 8 \cdot 4}$ $= \sqrt[4]{25 \cdot 5 \cdot 5 \cdot 5}$
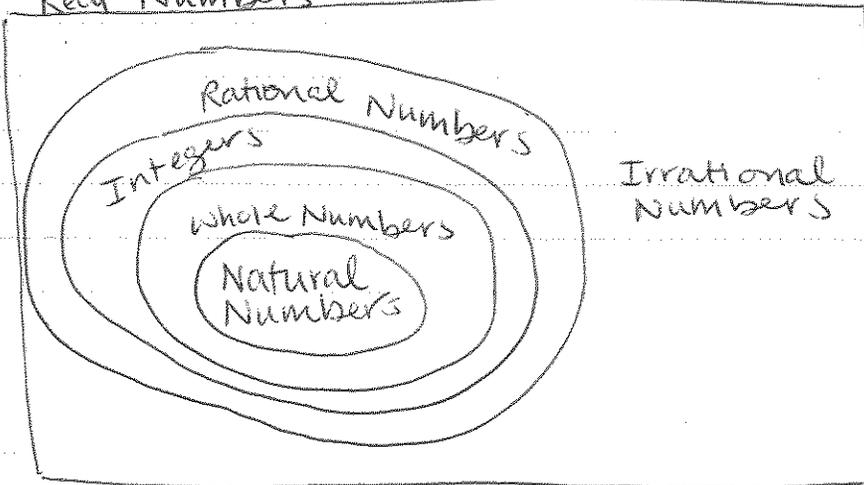
$= 4\sqrt[3]{4}$ $= 5\sqrt[4]{2}$

6a) $6\sqrt{5} = \sqrt{180}$ b) $3\sqrt[3]{2} = \sqrt[3]{54}$ c) $2\sqrt[4]{9} = \sqrt[4]{144}$

7a) [square diagram] ℓ $\ell^2 = 252$ b) $P = 4\ell$

$\ell = \sqrt{252}$ $= 24\sqrt{7}$ ft

$= \sqrt{2 \cdot 126}$

$= \sqrt{2 \cdot 2 \cdot 63}$

$= 2 \cdot 3\sqrt{7}$
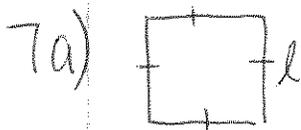
$= 6\sqrt{7}$ ft

8. $a^3 = a \cdot a \cdot a$ $\Big\} \times \frac{1}{a}$

$a^2 = a \cdot a$ $\Big\} \times \frac{1}{a}$

$a^1 = a$ $\Big\} \times \frac{1}{a}$

$a^0 = 1$ $\Big\} \times \frac{1}{a}$

$a^{-1} = \frac{1}{a}$ $\Big\} \times \frac{1}{a}$

$a^{-2} = \frac{1}{a \cdot a} = \frac{1}{a^2}$

9 a) $16^{1/2} = \sqrt{16}$
   $= 4$

b) $8^{4/3} = (\sqrt[3]{8})^4$
   $= (2)^4$
   $= 16$

c) $-\left(\frac{4}{25}\right)^{3/2}$
   $= -\left(\sqrt{\frac{4}{25}}\right)^3$
   $= -\left(\frac{2}{5}\right)^3$
   $= -\,^8/_{125}$

d) $0.36^{3/2} = \left(\sqrt{\frac{36}{100}}\right)^3$
   $= \left(\frac{6}{10}\right)^3$
   $= \left(\frac{3}{5}\right)^3$
   $= \,^{27}/_{125}$

10 a) $\sqrt{8^3} = 8^{3/2}$

b) $(\sqrt[3]{-1.5})^2 = (-1.5)^{2/3}$

c) $\left(\sqrt{\frac{1}{8}}\right)^5 = \left(\frac{1}{8}\right)^{5/2}$

11. $1.96^{3/2} = \left(\sqrt{1.96}\right)^3$
   $= (1.4)^3$
   $= 2.744$

12 a) $4^{-1/2}$
   $= \frac{1}{4^{1/2}}$
   $= \frac{1}{\sqrt{4}}$
   $= \frac{1}{2}$

b) $(-7)^{-2}$
   $= \frac{1}{(-7)^2}$
   $= \frac{1}{49}$

c) $\left(\frac{1}{5^{-3}}\right)$
   $= 5^3$
   $= 125$

d) $(-0.027)^{-2/3}$
   $= (\sqrt[3]{\frac{-27}{1000}})^{-2}$
   $= \left(\frac{-3}{10}\right)^{-2}$
   $= \left(\frac{-10}{3}\right)^2$
   $= \frac{100}{9}$

e) $\left(\frac{-64}{125}\right)^{-5/3}$
   $= \left(\frac{-125}{64}\right)^{5/3}$
   $= \left(\sqrt[3]{\frac{-125}{64}}\right)^5$
   $= \left(\frac{-5}{4}\right)^5$
   $= \,^{-3125}/_{1024}$

13 a) $(a^5 b)(a^4 b^{-9})$
   $= a^9 b^{-8}$
   $= \,^{a^9}/_{b^8}$

b) $\left(\frac{a^2}{b^3}\right)^{-4}$
   $= \left(\frac{b^3}{a^2}\right)^4$
   $= \,^{b^{12}}/_{a^8}$

c) $(3x^{-2} y^4 z)^3$
   $= 27 x^{-6} y^{12} z^3$
   $= \frac{27 y^{12} z^3}{x^6}$

d) $-\frac{9a^{-4} b^{3/4}}{3a^2 b^{1/4}}$
   $= -3 a^{-6} b^{2/4}$
   $= \frac{-3 b^{1/2}}{a^6}$

e) $\left(-\frac{3}{8}\right)^{2/3} \cdot \left(-\frac{3}{8}\right)^{-1/3}$
   $= \left(-\frac{3}{8}\right)^{1/3}$

f) $\left(\frac{-64a^6}{b^{-9}}\right)^{1/3} = \frac{\sqrt[3]{-64} a^2}{b^{-3}}$
   $= -4 a^2 b^3$

14. $\left(\frac{5a^2}{b^{1/2}}\right)^{-2} = \frac{5^{-2} a^{-4}}{b^{-1}} = \frac{b}{25a^4}$