FMPC 10
1.3, page 26
#2e,g,i

FMPC 10 1.3, page 26

2 e) $\sqrt[3]{3375} = \sqrt[3]{3^3 \times 5^3} = \sqrt[3]{3^3} \times \sqrt[3]{5^3}$

$= 3 \times 5 = \boxed{15}$

$$\begin{array}{r|l} 3 & 3375 \\ 3 & 1125 \\ 3 & 375 \\ 5 & 125 \\ 5 & 25 \\ & 5 \end{array}$$

g) $\sqrt[3]{125\,000\,000} = \sqrt[3]{125} \times \sqrt[3]{1\,000\,000}$

$= \sqrt[3]{5^3} \times \sqrt[3]{100^3}$

$= 5 \times 100$

$= \boxed{500}$

i) $-\sqrt[3]{64\,000\,000\,000} = -\sqrt[3]{64} \times \sqrt[3]{1\,000\,000\,000}$

$= -\sqrt[3]{4^3} \times \sqrt[3]{1000^3}$

$= -4 \times 1000$

$= \boxed{-4000}$

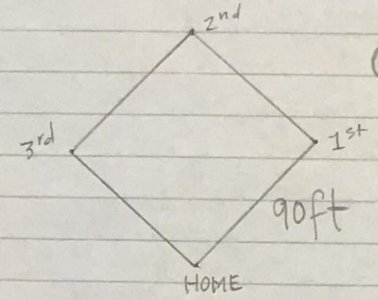
FMPC 10

1.3, page 28

#5

FMPC 10 1.3 p.28

#5 A baseball diamond is really square shaped.



a

if the area of the diamond is $8100ft^2$

the length of 1 side is $\sqrt{8100ft^2}$

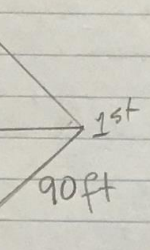
$= \sqrt{81 \times 100 ft^2}$

$= \sqrt{81} \times \sqrt{100} \times \sqrt{ft^2}$

$= 9 \times 10 ft$

$= 90ft$ from 1st to home

2



Use the Pythagorean Theorem to find the distance between 1st and 3rd base.

$(90ft)^2 + (90ft)^2 = d^2$

$8100ft^2 + 8100ft^2 = d^2$

$16200 ft^2 = d^2$

$\sqrt{16200ft^2} = d$

$d = 127.3ft$

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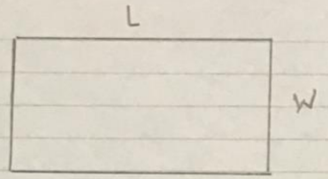
1.3, page 28

#7, 9

FMPC 10 1.3 p.28

#7



$\text{Area} = L \times W$

but $L = 2W$ and $\text{Area} = 1250m^2$

$\therefore\ 1250m^2 = 2W \times W$

$1250m^2 = 2W^2$

$\frac{1250m^2}{2} = W^2$

$625m^2 = W^2$

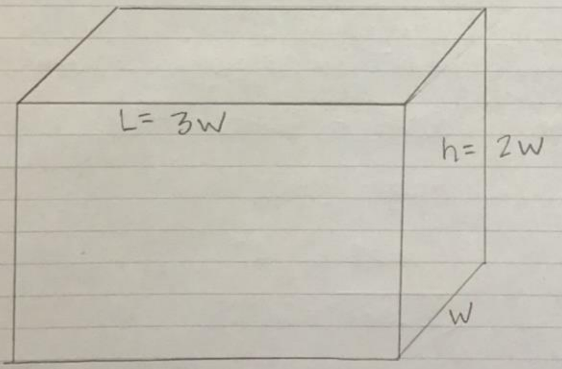
$\sqrt{625m^2} = W$

$\underline{W = 25m}$ $\quad L = 2W$

$= 2 \times 25m$

$\underline{= 50m}$

#9



$\text{Volume} = L \times W \times H$

$384in^3 = 3W \times W \times 2W$

$384in^3 = 6W^3$

$\frac{384in^3}{6} = W^3$

$64in^3 = W^3$

$\sqrt[3]{64in^3} = W$

$W = \underline{4in.}$

$H = 2W = \underline{8in.}$

$L = 3W = \underline{12in.}$

FMPC 10

1.4, page 31

#1g

g) $\sqrt{0.004} = \sqrt{\frac{4}{1000}} = \frac{\sqrt{4}}{\sqrt{1000}}$

rational

irrational

$\therefore$ this is irrational

FMPC 10
1.4, page 32
#4a,g

FMPC 10 1.4 p.32

4a) $\sqrt{2.1} = \sqrt{\dfrac{21}{10}}$ because $2.1 = 2\frac{1}{10} = \frac{21}{10} = \frac{210}{100}$

but, $\sqrt{2.1} = \sqrt{\dfrac{210}{100}}$ ← use this because $\sqrt{210} \doteq 14.49$

and $\sqrt{100} = 10$

WE DON'T USE $\sqrt{\dfrac{21}{10}} = \dfrac{\sqrt{21}}{\sqrt{10}}$ because $\sqrt{10}$ is IRRATIONAL

$$\therefore \sqrt{2.1} = \sqrt{\frac{210}{100}} = \frac{\sqrt{210}}{\sqrt{100}} = \frac{14.49}{10} = \boxed{1.449}$$

4g) $\sqrt{210000} = \sqrt{21 \times 10000}$

$= \sqrt{21} \times \sqrt{10000}$

$= 4.58 \times 100$

$= \boxed{458}$

FMPC 10

1.5, page 43

#3a,c,e,g,i

#4a,c,e,g,i

FMPC 10 1.5 p.43

3a) $(2^4)^2 = 2^{4\times2} = \boxed{2^8}$ POWER RULE #3

c) $(3^{-4})^{-2} = 3^{-4\times-2} = \boxed{3^8}$ POWER RULE #3

e) $(2x) = 2^3\cdot x^3 = \boxed{8x^3}$ #4 rule

g) $(2a^{-4})^3 = 2^3 a^{-4\times3} = 8a^{-12} = \boxed{\frac{8}{a^{12}}}$ #4, #3 and #6 rules

i) $(-4a^{-3}b^{-2})^2 = (-4)^2 a^{-6} b^{-4}$ #4, #3 and #6 rules

$= \boxed{\frac{16}{a^6b^4}}$

4a) $\frac{3^4\times3^7}{3^5} = \frac{3^{4+7}}{3^5} = \frac{3^{11}}{3^5} = 3^{11-5} = \boxed{3^6}$

c) $\frac{4^{-3}\times4}{4^{-1}} = \frac{4^1\times4}{4^3} = \frac{4^2}{4^3} = 4^{2-3} = 4^{-1} = \boxed{\frac{1}{4}}$

rule #6

e) $\frac{7^0\times7^{-3}}{7\times7^{-2}} = \frac{1\times7^2}{7\times7^3} = \frac{7^2}{7^4} = \frac{1}{7^2} = \boxed{\frac{1}{49}}$

g) $\frac{3(x^3)^2}{x^{-2}} = \frac{3x^6}{x^{-2}} = 3x^6\cdot x^2 = \boxed{3x^8}$

i) $(2a^2b^{-4}c^{-5})^3 = 2^3a^6b^{-12}c^{-15} = \boxed{\frac{8a^6}{b^{12}c^{15}}}$

FMPC 10

1.5, page 43

#3b

FMPC 10 1.5 p.43

3b) $(5^3)^{-2} = 5^{-6}$ POWER of a POWER rule #3 from the HANDOUT

$= \dfrac{1}{5^6}$ rule #6

FMPC 10

1.5, page 44-45

#5g,i and #6a

FMPC 10 1.5 page 44 - 45

5\. g) $-\left(\frac{-1}{3}\right)^2 = -\left(\frac{1}{3^2}\right) = \boxed{-\frac{1}{9}}$

i) $\left(-\frac{1}{3}\right)^{-2} = -\frac{1}{3^{-2}} = -\frac{3^2}{1} = \boxed{-9}$

6\. a) $\frac{(2a^2b^3)^{-2}\times(4ab^{-1})^3}{(a^3b)^{-4}} = \frac{(a^3b)^4\times(4ab^{-1})^3}{(2a^2b^3)^2}$

$= \frac{a^{12}b^4\times 4^3a^3b^{-3}}{4a^4b^6} =$

$= \frac{4^3a^{12+3}b^{4+(-3)}}{4a^4b^6}$

$= \frac{4^2a^{15}b}{a^4b^6}$

$= \boxed{\frac{16a^{11}}{b^5}}$

FMPC 10

1.5, page 45

#6c,e,g

FMPC 10   1.5 p45

6c) $$\frac{(5m^{-1}n^{2})^{2}\times(2m^{-2}n^{-3})^{3}}{(2m^{3}n^{2})^{-1}} = \frac{25m^{-2}n^{4}\times 8m^{-6}n^{-9}}{2^{-1}m^{-3}n^{-2}}$$

$$= \frac{25\times 2\,m^{3}n^{4}\times 8m^{3}n^{2}}{m^{2}\times m^{6}n^{9}} = \frac{400\,m^{6}n^{6}}{m^{8}n^{9}} = \boxed{\frac{400}{m^{2}n^{3}}}$$

answer in book is incorrect

e) $$\frac{(3^{-1}x^{-2}y)^{-1}\times(5x^{2}y^{4})^{-2}}{(4x^{-2}y^{-3})^{2}} = \frac{3x^{2}y^{-1}}{16x^{-4}y^{-6}\times(5x^{2}y^{4})^{2}}$$

$$= \frac{3x^{2}\cdot x^{4}\cdot y^{6}}{16y\times 25x^{4}y^{8}} = \frac{3x^{6}y^{6}}{400x^{4}y^{9}} = \boxed{\frac{3x^{2}}{400y^{3}}}$$

FMPC 10   1.5 p.45

6g) $$\left(\frac{4^{-2}x^{2}y^{-3}}{x^{-2}y}\right)^{3}\left(\frac{8^{-1}x^{-3}y}{x^{3}y^{-1}}\right)^{-2}$$

use rule #3 and get rid of the brackets

$$= \frac{4^{-6}x^{6}y^{-9}}{x^{-6}y^{3}} \times \frac{8^{2}x^{6}y^{-2}}{x^{-6}y^{2}}$$

use the rule $x^{-n} = \frac{1}{x^{n}}$ AND $x^{n} = \frac{1}{x^{-n}}$

$$= \frac{x^{6}x^{6}}{4^{6}y^{3}y^{9}} \times \frac{8^{2}x^{6}x^{6}}{y^{2}y^{2}}$$

express $8 = 2^{3}$ and $4 = 2^{2}$

use rule number 1

$$= \frac{x^{6+6}}{(2^{2})^{6}\,y^{3+9}} \times \frac{(2^{3})^{2}x^{6+6}}{y^{2+2}} = \frac{x^{12}\cdot 2^{6}\times x^{12}}{2^{12}\,y^{12}}$$

$$= \frac{2^{6}x^{24}}{2^{12}\,y^{12}} = \frac{x^{24}}{2^{6}y^{12}} = \frac{x^{24}}{64y^{12}}$$

FMPC 10
1.5, page 46
#7a,c,e

7a) $16^{3/4} = \sqrt[4]{16^3} = (\sqrt[4]{16})^3 = (2)^3 = \boxed{8}$ rule #12

c) $8^{2/3} = \sqrt[3]{8^2} = (\sqrt[3]{8})^2 = (2)^2 = \boxed{4}$ rule #12

e) $27^{4/3} = \sqrt[3]{27^4} = (\sqrt[3]{27})^4 = 3^4 = \boxed{81}$ rule #12

* USE THE HANDOUTS : - Perfect squares, cubes, fourths and fifths
  - Exponent Laws

* ALL questions are non-calculator

FMPC 10
1.5, page 47
#8(odd)

FMPC 10   1.5   p.47

8. (a) $2^{1/4} \times 2^{5/4} = 2^{1/4+5/4} = 2^{6/4} = \boxed{2^{3/2}}$

(c) $4^{1/4} \times 4^{-3/4} = 4^{1/4+(-3/4)} = 4^{-2/4} = 4^{-1/2} = \frac{1}{4^{1/2}} = \frac{1}{\sqrt{4}} = \boxed{\frac{1}{2}}$

(e) $\frac{6^{3/4}}{6^{5/4}} = 6^{3/4} \div 6^{5/4} = 6^{3/4-5/4} = 6^{-2/4} = 6^{-1/2} = \boxed{\frac{1}{6^{1/2}}}$

(g) $\frac{8^{-2/7} \times 8^{4/7}}{8^{-3/7}} = 8^{-2/7+4/7-(-3/7)} = 8^{-2/7+4/7+3/7} = 8^{5/7}$ but, $8 = 2^3$

$= (2^3)^{5/7} = \boxed{2^{15/7}}$

(i) $a^{3/4} \times a^{5/4} = a^{3/4+5/4} = a^{8/4} = \boxed{a^2}$

(k) $\frac{c^{2/3}}{c^{5/6}} = c^{2/3-5/6} = c^{4/6-5/6} = c^{-1/6} = \boxed{\frac{1}{c^{1/6}}}$

(m) $\left(\frac{9}{4}\right)^{3/2} = \frac{9^{3/2}}{4^{3/2}} = \frac{(\sqrt{9})^3}{(\sqrt{4})^3} = \frac{3^3}{2^3} = \boxed{\frac{27}{8}}$

rule #5

rule #12

(o) $\left(\frac{81}{16}\right)^{3/4} = \frac{81^{3/4}}{16^{3/4}} = \frac{(\sqrt[4]{81})^3}{(\sqrt[4]{16})^3} = \frac{3^3}{2^3} = \boxed{\frac{27}{8}}$

(q) $(a^3 b^{1/4})^{2/3} = a^{6/3} b^{2/12} = \boxed{a^2 b^{1/6}}$

(s) $(a^{2/3} b^{5/6} c^{1/2})^{6/7} = a^{12/21} b^{30/42} c^{6/14} = \boxed{a^{4/7} b^{5/7} c^{3/7}}$

FMPC 10

1.6, page 52

#2a

2. Which one of the entire roots cannot be simplified

a) $\sqrt{44}$, $\sqrt{46}$, $\sqrt{48}$, $\sqrt{50}$

$\sqrt{4 \times 11}$ $\quad \sqrt{2 \times 23}$ $\quad \sqrt{16 \times 3}$ $\quad \sqrt{25 \times 2}$

$2\sqrt{11}$ $\quad\quad 4\sqrt{3}$ $\quad 5\sqrt{2}$

FMPC 10
1.6, page 53
#4g,i

FMPC 10 1.6 p. 53

4g) $-\frac{5}{2}\sqrt{32} = -\frac{5}{2}\sqrt{2^5} = -\frac{5}{2}\cdot 2^2\sqrt{2} = -\frac{5}{2}\times 4\sqrt{2} = -10\sqrt{2}$

$32 = 2^5$ $\sqrt{2^4} = 2^2$

i) $-0.8\sqrt{125} = -\frac{8}{10}\sqrt{5^3} = -\frac{8}{10}\times 5\sqrt{5} = -\frac{8}{2}\sqrt{5} = -4\sqrt{5}$

$0.8 = \frac{8}{10}$ $125 = 5^3$ $\sqrt{5\times5\times5} = 5\sqrt{5}$

FMPC 10
1.6, page 54
#5 (odd), #6 (odd)

FMPC 10 1.6 p.54

5a) $\sqrt[3]{40} = \sqrt[3]{2^3\times5} = \sqrt[3]{2^3}\times\sqrt[3]{5} = 2^{3/3}\times\sqrt[3]{5} = \boxed{2\sqrt[3]{5}}$

rule #12

OR $\sqrt[3]{40} = \sqrt[3]{8\times5} = \sqrt[3]{8}\times\sqrt[3]{5} = 2\sqrt[3]{5}$ because $\sqrt[3]{8} = 2$

c) $\sqrt[3]{54} = \sqrt[3]{2\times3^3} = \boxed{3\sqrt[3]{2}}$

OR $\sqrt[3]{54} = \sqrt[3]{27\times2} = 3\sqrt[3]{2}$ because $\sqrt[3]{27} = 3$

e) $\sqrt[3]{128} = \sqrt[3]{2^7} = \sqrt[3]{2^6\times2} = \sqrt[3]{2^6}\cdot\sqrt[3]{2}$

$= 2^{6/3}\cdot\sqrt{2} = 2^2\sqrt[3]{2}$

$= \boxed{4\sqrt[3]{2}}$

g) $2\sqrt[3]{27} = 2\times3 = \boxed{6}$

i) $\frac{1}{2}\sqrt[3]{64} = \frac{1}{2}(4) = \boxed{2}$

6a) $\sqrt{3}\times\sqrt{6} = \sqrt{18} = \sqrt{9\times2} = \boxed{3\sqrt{2}}$ because $\sqrt{9} = 3$

c) $\sqrt{3}\times\sqrt{27} = \sqrt{81} = \boxed{9}$

e) $\sqrt{3}\times\sqrt{24} = \sqrt{72} = \sqrt{2^3\times3^2} = 2\times3\sqrt{2} = \boxed{6\sqrt{2}}$

g) $5\sqrt{6}\times2\sqrt{18} = 10\sqrt{\underbrace{2\times3}_{6}\times\underbrace{2\times3\times3}_{18}} = 10\sqrt{2^2\times3^3} = 10\times2\times3\sqrt{3}$

$= \boxed{60\sqrt{3}}$

i) $2\sqrt{10}\times3\sqrt{50} = 6\sqrt{500} = 6\sqrt{100\times5} = 6\times10\sqrt{5}$

$= \boxed{60\sqrt{5}}$

FMPC 10

1.6, page 55

#7 (odd)

FMPC 10 1.6 p.55

7\. a) $\sqrt[3]{4} \times \sqrt[3]{6} = \sqrt[3]{24} = \sqrt[3]{2^3 \times 3} = \boxed{2\sqrt[3]{3}}$

because $\sqrt[3]{2^3} = 2^{3/3} = 2^1 = 2$
rule #12

c) $\sqrt[3]{5} \times \sqrt[3]{5} = \boxed{\sqrt[3]{25}}$

(note: 25 is NOT a perfect cube)

e) $2\sqrt[3]{12} \times \sqrt[3]{30} = 2\sqrt[3]{\underbrace{2^2 \times 3}_{12} \times \underbrace{2 \times 3 \times 5}_{30}} = 2\sqrt[3]{2^3 \times 3^2 \times 5}$

$= 2 \times 2\sqrt[3]{3^2 \times 5}$

$= \boxed{4\sqrt[3]{45}}$

g) $2\sqrt[3]{10} \times 3\sqrt[3]{50} = 6\sqrt[3]{\underbrace{2 \times 5}_{10} \times \underbrace{2 \times 5 \times 5}_{50}} = 6\sqrt[3]{2^2 \times 5^3}$

$= 6 \times 5\sqrt[3]{2^2}$

$= \boxed{30\sqrt[3]{4}}$

i) $(-3\sqrt[3]{4})(-2\sqrt[3]{32}) = 6\sqrt[3]{\underbrace{2 \times 2}_{4} \times \underbrace{2^5}_{32}}$

$= 6\sqrt[3]{2^7} = 6\sqrt[3]{2^6 \cdot 2} = 6\sqrt[3]{2^6} \cdot \sqrt[3]{2}$

$= 6 \cdot 2^{6/3}\sqrt[3]{2}$

$= 6 \times 2^2\sqrt[3]{2}$

once you gain confidence, you may go directly here.

$= 6 \times 4\sqrt[3]{2}$

$= 24\sqrt[3]{2}$

FMPC 10
1.6, page 55
#8a,c

FMPC 10 1.6 p.55

8. a) $4\sqrt{14}$, ____ , 15

express each of these numbers as entire radicals

that is, $4\sqrt{14} = \sqrt{4^2 \times 14} = \sqrt{16 \times 14}$

$= \sqrt{224}$

$$\begin{array}{r} 16 \\ \times\ 14 \\ \hline 64 \\ 16 \\ \hline 224 \end{array}$$

and $15 = \sqrt{15^2} = \sqrt{225}$

$\therefore$ $\boxed{4\sqrt{14} < 15}$ because $\sqrt{224} < \sqrt{225}$

c) $3\sqrt{11}$ ____ $7\sqrt{2}$

$\sqrt{3^2 \times 11}$ ____ $\sqrt{7^2 \times 2}$

$\sqrt{9 \times 11}$ ____ $\sqrt{49 \times 2}$

$\sqrt{99}$ $\underline{\ >\ }$ $\sqrt{98}$

$\therefore$ $3\sqrt{11} > 7\sqrt{2}$

e) $4\sqrt[3]{2}$ ____ 5

$\sqrt[3]{4^3 \times 2}$ ____ $\sqrt[3]{5^3}$

$\sqrt[3]{64 \times 2}$ ____ $\sqrt[3]{125}$

$\sqrt[3]{128}$ $\underline{\ >\ }$ $\sqrt[3]{125}$

$\therefore$ $4\sqrt[3]{2} > 5$

FMPC 10

1.6, page 56

#9a

FMPC 10 1.6 p.56

9a) $4\sqrt{3} = \sqrt{4^2 \times 3} = \sqrt{16 \times 3} = \sqrt{48}$

the index of a square root is 2

when the 4 is brought "inside" the radical ($\sqrt{}$) it is raised to the power represented by the index - in this case it is 2.

so, $4\sqrt{3} = \sqrt{4^2 \times 3}$ and so on...