ADDL RULES FOR $\sqrt{\ }$ and FRACTIONAL EXPONENTS

$4^{1/2} = \sqrt{4} = 2$ $\qquad$ $8^{1/3} = \sqrt[3]{8} = 2$

$9^{1/2} = \sqrt{9} = 3$ $\qquad$ $27^{1/3} = \sqrt[3]{27} = 3$

$16^{1/2} = \sqrt{16} = 4$ $\qquad$ $64^{1/3} = \sqrt[3]{64} = 4$

multiplication rule

$\sqrt{36} = \sqrt{4x9} = \sqrt{4}\ \sqrt{9} = 2\text{x}3 = 6$

division rule

$$\sqrt{\frac{36}{4}} = \frac{\sqrt{36}}{\sqrt{4}} = \frac{6}{2} = 3$$

ADDITIONAL PROBLEMS

21. $8^{-\frac{2}{3}}$

a) 64 b) 24 c) $1/4$ d) 4 e) $1/2$

22. Sue can read a book in 6 hours. Jane can read the same book in 4 hours. Jane can read the 5 pages/hour faster than Sue. How many pages/hour can Sue read?

a) 5 b) 10 c) 15 d) 20 e) 25

23. How many gallons of ethanol must be added to 100 gallons of gasoline to make a 90 % gasohol blend?

a) 5 b) 9 c) 11.111 d) 12.5 e) 15

24. Pump A can drain a swimming pool in 3 hours. Pump B takes 6 hours. How many hours will it take you if both pumps are used at the time?

a) 1 b) 2 c) 3 d) 4 e) 5

25. $\sqrt{18} + \sqrt{200}$

a) $\sqrt{218}$ b) $13\sqrt{2}$ c) 3 d) 12 e) 225

26. $\sqrt[3]{\dfrac{64}{27}}$ a) 1/2 b) 3/4 c) 4/3 d) 8/9 e) 9/8

<u>SOLUTIONS FOR ADDL PROBLEMS</u>

21. $8^{-\frac{2}{3}} = \dfrac{1}{8^{\frac{2}{3}}} = \dfrac{1}{(8^{\frac{1}{3}})^2} = \dfrac{1}{(\sqrt[3]{8})^2} = \dfrac{1}{2^2} = \dfrac{1}{4}$

22. use : distance = (rate)(time)
for Sue : book = (x)(6 hours) for Jane : book = (x + 5)(4 hours)
set : book = book
6x = 4(x + 5)
6x = 4x + 20
2x = 20
x = 10 pages/hour

23. $\dfrac{100}{100+x}$ = 90 % 100 = 0.9(100 + X)
100 = 90 + 0.9 X
10 = 0.9 X
10 / 0.9 = X
11.111 gallons = X

24. use : distance = (rate)(time)
for A : pool = (r_A)(3 hours) for B : pool = (r_B)(6 hours)
thus :
r_A = pool / 3 r_B = pool / 6

together :
pool = ($r_A + r_B$)(t_{both}) = (pool / 3 + pool / 6)(t_{both})

pool = pool ($\dfrac{1}{3} + \dfrac{1}{6}$)(t_{both}) = pool ($\dfrac{2}{6} + \dfrac{1}{6}$)(t_{both})

pool = pool ($\dfrac{1}{2}$)(t_{both})

2 hours = t_{both}

shortcut : $\dfrac{1}{t_A} + \dfrac{1}{t_B} = \dfrac{1}{t_{both}}$ $\dfrac{1}{3} + \dfrac{1}{6} = \dfrac{2}{6} + \dfrac{1}{6} = \dfrac{3}{6} = \dfrac{1}{2} = \dfrac{1}{t_{both}}$

thus : t_{both} **= 2 hours**

25. $\sqrt{18} + \sqrt{200} = \sqrt{9x2} + \sqrt{100x2} = \sqrt{9}\,\sqrt{2} + \sqrt{100}\,\sqrt{2}$

$= 3\sqrt{2} + 10\sqrt{2}$

$= 13\sqrt{2}$

26 $\sqrt[3]{\frac{64}{27}} = \frac{\sqrt[3]{64}}{\sqrt[3]{27}} = \frac{4}{3}$