Study Guide for a No-Calculator Exam: *Fractions*

HINT #1. The numerator (top) and denominator (bottom) may be multiplied or divided by the same value without changing the fraction's numeric value.

example i. $\frac{9}{12} = \frac{\frac{9}{3}}{\frac{12}{3}} = \frac{3}{4} = 0.75$

example ii. $\frac{4}{5} = \frac{8}{10} = 0.8$

example iii. $\frac{150}{500} = \frac{150\times2}{500\times2} = \frac{300}{1000} = \frac{3}{10} = 0.3$

HINT #2. Dividing by powers of 10 is easy. Use HINT #1 to get powers of 10 in denominator.

example i. $\frac{150}{100} = 1.50$ (move the decimal point)

example ii. $\frac{8}{250} = \frac{8\times4}{250\times4} = \frac{32}{1000} = 32\ m$ ("milli")

example iii. $\frac{1}{3k} = \frac{1}{3}m = 0.33\ m$

example iv. $\frac{16}{320k} = \frac{1}{20k} = \frac{1}{20}m = \frac{1}{20}e - 3 = .5e - 4$

HINT #3. "Powers" add when multiplied and subtract when divided.

example i. $\frac{150e6}{50e8} = \frac{150}{50}e(6-8) = 3e - 2 = 0.03$

example ii. $\frac{6e9}{8e{-9}} = \frac{6}{8}e18 = \frac{3}{4}e18 = .75e18$

Worksheet #1

Reduce each fraction to a non-fractional value. You can *check* your answers with a calculator.

1. $\frac{8}{4} =$
2. $\frac{80}{4} =$
3. $\frac{8}{40} =$
4. $\frac{6}{2} =$
5. $\frac{6}{20} =$
6. $\frac{60}{20} =$
7. $\frac{6}{200} =$
8. $\frac{9}{2} =$
9. $\frac{90}{2} =$
10. $\frac{9}{20} =$
11. $\frac{9}{200} =$
12. $\frac{3}{2} =$
13. $\frac{30}{2} =$
14. $\frac{3}{200} =$
15. $\frac{3}{2000} =$
16. $\frac{5}{4} =$
17. $\frac{50}{40} =$
18. $\frac{50}{4} =$
19. $\frac{5}{400} =$
20. $\frac{7}{4} =$
21. $\frac{7}{40} =$
22. $\frac{7}{400} =$

Worksheet #2

Which fraction/value is ***not*** equivalent to the first? There may be more than one!

$\frac{0.4}{100}$ a. $\frac{4}{1000}$ b. $\frac{0.04}{10}$ c. $\frac{0.04}{1000}$ d. $\frac{0.1}{25}$ e. 0.004	$\frac{5}{200}$ a. $\frac{10}{400}$ b. $\frac{1}{40}$ c. $\frac{1}{4\times10}$ d. 0.04 e. 0.025	$\frac{7}{500}$ a. $\frac{7}{1000}$ b. $\frac{14}{1000}$ c. $\frac{7/5}{100}$ d. $1.4e-2$ e. 0.014	$\frac{9}{300}$ a. $\frac{9/3}{300/3}$ b. $\frac{3}{100}$ c. $.09$ d. 0.03 e. $30\ m$
$\frac{3}{1200}$ a. $\frac{1}{400}$ b. $\frac{9}{3600}$ c. $\frac{1}{4}\times\frac{1}{100}$ d. $0.25e-2$ e. 0.00025	$\frac{6}{300}$ a. $\frac{2}{100}$ b. $\frac{20}{1000}$ c. $20\ m$ d. $20000\ \mu$ e. $2e-3$	$\frac{7}{120}$ a. $\frac{7}{12}\times\frac{1}{10}$ b. $1\frac{5}{7}e-1$ c. $\approx 1.7e-2$ d. ≈ 0.17 e. $\approx 170\ m$	$\frac{1}{20}$ a. $\frac{10}{200}$ b. $\frac{10}{2000}$ c. $\frac{50}{1000}$ d. $50\ m$ e. 0.05
$\frac{4}{50}$ a. $\frac{8}{100}$ b. $\frac{80}{1000}$ c. $80\ m$ d. 0.08 e. $8e-3$	$\frac{120}{600}$ a. $\frac{20}{300}$ b. $\frac{2}{3}\times\frac{10}{100}$ c. $\frac{2}{3}\times\frac{1}{10}$ d. 0.67 e. 0.067	$\frac{64}{800}$ a. $\frac{8}{100}$ b. $.8$ c. $.08$ d. $80\ m$ e. $800m$	$\frac{3}{270}$ a. $\frac{1}{90}$ b. $\frac{12}{1080}$ c. $\frac{1}{9}e-1$ d. 0.111 e. 0.0111
Answers (left to right, top to bottom): c; d; a; c; e; e; b,c,d,e; b; e; a,b,c,d,e; b,e; d			

Worksheet #3

Reduce each fraction to a non-fractional value. The first is done for you.

1. $\frac{.4}{100} = 0.004$	10. $\frac{8m}{50k} \times 50 =$
2. $\frac{.5}{200} =$	11. $\frac{12}{24m} \times 10 =$
3. $\frac{1.8}{200} =$	12. $\frac{6e-8}{9e-10} =$
4. $\frac{1.8}{10k} =$	13. $\frac{6e-8}{12e9} =$
5. $\frac{180}{10k} =$	14. $\frac{4e8}{8e8} =$
6. $\frac{4k}{10k} =$	15. $\frac{2e8}{12m} =$
7. $\frac{4k}{10m} =$	16. $\frac{1.6e-19}{1200} \times 300 =$
8. $\frac{.03}{10k} \times 100 =$	17. $\frac{16}{28m} \times 3k =$
9. $\frac{3}{40m} \times 200 =$	18. $\frac{16e8}{2000m} \times \frac{1}{8} =$

Answers (your format may vary):

1. 4m	10. 8e-6
2. 5m	11. 5k
3. 9m	12. 66.7
4. 0.18m	13. 0.5e-17
5. 18m	14. 0.5
6. 0.4	15. 0.167e11
7. 400,000	16. 4e-20
8. 0.3m	17. 1.71e6
9. 15	18. 100,000

Study Guide for a No-Calculator Exam: *Logarithms*

HINT #1. $\log_2 A = x \; such \; that \; 2^x = A$

example i. $\log_2 1 = 0$

example ii. $\log_2 2 = 1$

example iii. $\log_2 4 = 2$

HINT #2. $\log_2 \frac{1}{A} = -\log_2 A$

HINT #3. $\log_2 AB = \log_2 A + \log_2 B$

example i. $\log_2 6 = \log_2 2 + \log_2 3$

HINT #4. Use HINT#2 to fill in a table of logs when given logs of some of the factors in the table.

example i. Given $\log_2 3 = 1.6$, and using two examples from above, we find that $\log_2 6 = 1 + 1.6 = 2.6$.

example ii. $\log_2 12 = \log_2 2 + \log_2 2 + \log_2 3 = 1 + 1 + 1.6 = 3.6$

example iii. $\log_2 \frac{3}{7} = \log_2 3 - \log_2 7 = 1.6 - 2.8 = -1.2, where \; \log_2 7 = 2.8 \; was \; known.$