CHEQ 1094 MATH REVIEW

Fractions

$\frac{a}{b}$ means $a \div b$ a is the same as $\frac{a}{1}$

Equality of Fractions

If $\frac{a}{b} = \frac{c}{d}$, then $a \times d = b \times c$

(cross multiplication; equivalent to multiplying both sides by bd)

Multiplying Fractions

$$\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$$

Dividing Fractions

$$\frac{a}{b} \div \frac{c}{d} \equiv \frac{a}{b} \times \frac{d}{c} = \frac{a \times d}{b \times c} \quad \left(\text{same as } \frac{\frac{a}{b}}{\frac{c}{d}} = \frac{a \times d}{b \times c}\right)$$

Scientific Notation

The basis of all science is measurement. Using very large or very small numbers becomes cumbersome. In these cases, we rewrite the numbers in scientific notation ($a.bcd \times 10^e$). For example, 342587 becomes 3.42587×10^5 and 0.000864 can be written as 8.64×10^{-4}.

Multiplying Numbers in Scientific Notation

multiply numbers and add exponents

$$(a \times 10^x) \times (b \times 10^y) = ab \times 10^{x+y}$$

Dividing Numbers in Scientific Notation

divide numbers and subtract exponents

$$(a \times 10^x) \div (b \times 10^y) = \frac{a}{b} \times 10^{x-y}$$

Percent (%) = (parts) per hundred

In a basket of 40 apples, 10 are rotten; % rotten apples = $\frac{10}{40} \times 100 = 25\%$

ppm = parts per million; **ppb** = parts per billion

A 555,000 g sample of water contains 35 g of a toxic substance; express the amount of the toxic substance in ppm.

$$\text{ppm} = \frac{35 \text{ g toxic substance}}{555{,}000 \text{ g water}} \times 1{,}000{,}000 = 63 \text{ ppm}$$

Find the error in the story below.
Vancouver Sun, Aug. 24, 1987, B1
Brodeur (Canuck's No.1 goaltender for the last 7 years) was offered a new one-year (plus option) contract that includes both a pay cut at the major league level and a minor league clause. The latter would, according to Watters (Brodeur's agent), mean a 200 per cent pay cut if Brodeur was sent to the minors. Brodeur is reportedly paid $300,000 per season.

Direct Proportionality
For any material, the mass and volume are directly proportional; if the volume is doubled, the mass doubles, etc.

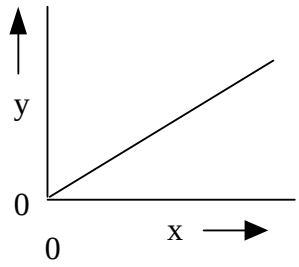
$M \propto V$ or $M = kV$ (k is a onstant)

$\frac{M}{V} = k$ (if two variables are directly proportional, the ***ratio*** is constant)

y	28	15	0.96
x	12	5	0.28

are y and x directly proportional?
(*Ans.* No)

usual form is $y = kx$ which is the equation for a straight line graph through the origin (0,0)



Inverse Proportionality
For a sample of a gas at constant temperature, the volume is inversely proportional to the pressure; if the pressure is doubled, the volume is halved, etc.

$V \propto \frac{1}{P}$ or $V = k \times \frac{1}{P}$

or $PV = k$ (if two variables are inversely proportional, the ***product*** is constant)

y	3	6	4.5
x	18	9	12

are y and x inversely proportional?
(*Ans*. Yes)

If xy = k, a graph of y vs x is a curve, but a graph of y vs 1/x is a straight line