

## *Equations in Chemistry and Algebra - Worksheet*

**Fill in the missing blanks to illustrate correspondence**

- <sup>a</sup> Excepting **x**, all variables are assumed to be constant in each algebraic equation  
<sup>b</sup> Excepting the unknown, all variables are assumed to be constant in each chemistry equation  
<sup>c</sup> List the correspondence between the algebraic constants and the chemistry-equation constants.

Algebra <sup>a</sup>		Chemistry <sup>b</sup>				Correspondence between constants <sup>c</sup>	
No.	Equation	Solve for x	Topic	Equation	Unknown		Solve for Unknown
1	$ax = b$	$x = \frac{b}{a}$	Boyle's Law	$P_1V_1 = P_2V_2$	$P_1$	$P_1 = \frac{P_2V_2}{V_1}$	$a = V_1, b = P_2V_2$
					$V_1$	$V_1 = \frac{P_2V_2}{P_1}$	$a = P_1, b = P_2V_2$
					$P_2$	$P_2 = \frac{P_1V_1}{V_2}$	$a = V_2, b = P_1V_1$
					$V_2$	$V_2 = \frac{P_1V_1}{P_2}$	$a = P_2, b = P_1V_1$
2a	$\frac{x}{a} = b$		Charles' Law	$\frac{V_1}{T_1} = \frac{V_2}{T_2}$	$V_1$		
					$V_2$		
2b	$\frac{a}{x} = b$				$T_1$		
					$T_2$		

Algebra <sup>a</sup>			Chemistry <sup>b</sup>				Correspondence between constants <sup>c</sup>
No.	Equation	Solve for x	Topic	Equation	Unknown	Solve for Unknown	
3a	$\frac{x}{a} = b$		Gay-Lussac's Law	$\frac{P_1}{T_1} = \frac{P_2}{T_2}$	$P_1$		
					$P_2$		
3b	$\frac{a}{x} = b$				$T_1$		
					$T_2$		
4a	$\frac{x}{a} = b$		Avogadro's Law	$\frac{V_1}{n_1} = \frac{V_2}{n_2}$	$V_1$		
					$V_2$		
4b	$\frac{a}{x} = b$				$n_1$		
					$n_2$		

	Algebra <sup>a</sup>		Chemistry <sup>b</sup>				Correspondence between constants <sup>c</sup>	
No.	Equation	Solve for x	Topic	Equation	Unknown	Solve for Unknown		
5a	$ax = b$		Combined Gas Law	$\frac{PV_1}{T_1} = \frac{PV_2}{T_2}$	$P_1$			
					$P_2$			
5b					$V_1$			
					$V_2$			
5c	$\frac{a}{x} = b$					$T_1$		
					$T_2$			
6	$ax = b$		Ideal Gas Law	$PV = nRT$	$P$			
					$V$			
					$n$			
					$T$			

Algebra <sup>a</sup>			Chemistry <sup>b</sup>				Correspondence between constants <sup>c</sup>
No.	Equation	Solve for x	Topic	Equation	Unknown	Solve for Unknown	
7a	$\frac{x}{a} = b$		Graham's Law	$\frac{v_2}{v_1} = \sqrt{\frac{M_1}{M_2}}$	$n_2$		
7b	$\frac{a}{x} = b$				$n_1$		
7c	$\sqrt{\frac{x}{a}} = b$				$M_1$		
7d	$\sqrt{\frac{a}{x}} = b$				$M_2$		

	Algebra <sup>a</sup>		Chemistry <sup>b</sup>				Correspondence between constants <sup>c</sup>
No.	Equation	Solve for x	Topic	Equation	Unknown	Solve for Unknown	
8a	$ax = b$		Thermo- dynamics	$Q = mC_p \Delta T,$ where $\Delta T = T_f - T_i$	$m$		
8b					$C_p$		
8c					$\Delta T$		
8d					$T_f$		
8e					$T_i$		

	Algebra <sup>a</sup>		Chemistry <sup>b</sup>				Correspondence between constants <sup>c</sup>
No.	Equation	Solve for x	Topic	Equation	Unknown	Solve for Unknown	
9a	$\frac{x}{a} = b$		Molarity	$M = \frac{n}{V}$	$n$		
9b	$\frac{a}{x} = b$				$V$		
10a	$\frac{ax}{x+b} = c$		Percent by Mass	$P = 100 \frac{s}{s+S}$ where $s = \text{mass}$ <i>solute</i> $S = \text{mass}$ <i>solvent</i>	$s$		
10b	$\frac{a}{b+x} = c$				$S$		

	Algebra <sup>a</sup>		Chemistry <sup>b</sup>				Correspondence between constants <sup>c</sup>
No.	Equation	Solve for x	Topic	Equation	Unknown	Solve for Unknown	
11a	$y = a \log(x)$		Acidity	$pH = -\log([H^+]),$ where $[H^+]$ is the molarity of $H^+$	$[H^+]$		
11b							
12a	$\frac{x^2}{a} = b$		Equilibria: Mass Action Fraction	$\frac{[C][D]}{[A][B]} = K$ where $A + B \rightarrow C + D,$ and little of C and D is formed.	$[C],$ assume $[D] = [C]$		
12b	$\frac{a}{x^2} = b$						

12c	$\frac{(x)(2x)^2}{a} = b$		Equilibria: Mass Action Fraction	$\frac{[C][D]^2}{[A][B]} = K$ <i>where</i> $A + B$ $\rightarrow C + 2D$ <i>and</i> <i>little of C</i> <i>and D is</i> <i>formed</i>	$[C],$ <i>assume</i> $[D] = 2[C]$		
12d	$\frac{(x)^2 \left(\frac{3}{2}x\right)^3}{a} = b$		Equilibria: Mass Action Fraction	$\frac{[C]^2[D]^3}{[A][B]} = K$ <i>where</i> $A + B$ $\rightarrow 2C + 3D$ <i>and</i> <i>little of C</i> <i>and D is</i> <i>formed</i>	$[C],$ <i>assume</i> $[D] = \frac{3}{2}[C]$		