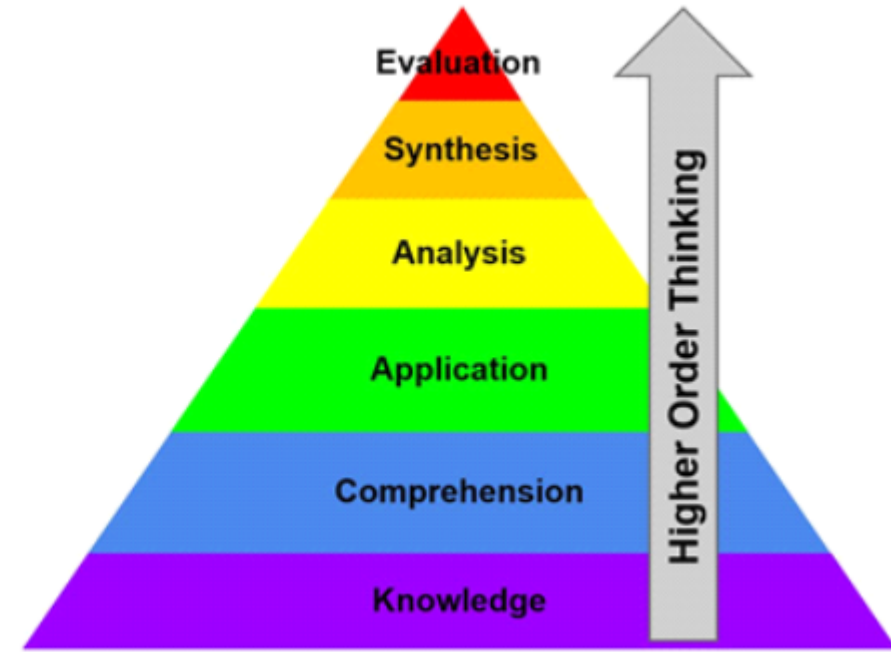


# Critical Thinking

“The careful, deliberate determination of whether one should accept, reject, or suspend judgment about a claim and the degree of confidence with which one accepts or rejects it.”

(*Critical Thinking*. B. Moore and R. Parker, 2007)



Bloom's Taxonomy  
Cognitive Domain

# Application

Critical thinking should be applied to:

- Expressing your own thoughts, beliefs, and opinions.
- Reading or listening to the thoughts, beliefs, opinions of others.



# Elements of Thought and Reasoning

- It has a purpose.
- It is trying to figure something out.
- It is based on assumptions.
- It is done from some point of view.
- It is based on information.
- It is expressed through concepts & theories.
- It contains interpretation of data, observations.
- It has implications and consequences.

Periodic Table of the Elements																	
1A 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 VIIA																	
1 IA H Hydrogen 1.008 1.00794																	18 VIIA He Helium 4.0026 4.002602
Atomic Number → 1 ← Symbol																	
Name → Hydrogen ← Atomic Weight																	
Electrons per shell → 1																	
State of matter (color of name) GAS LIQUID SOLID UNKNOWN																	
Subcategory in the metal-metalloid-nonmetal trend (color of background) Alkali metals Alkaline earth metals Transition metals Lanthanides Actinides Post-transition metals Noble gases Unknown chemical properties																	
3 IIIA Li Lithium 6.94 6.941	4 IIA Be Beryllium 9.012 9.0122															19 IIIB K Potassium 39.098 39.0983	
5 IIIA Na Sodium 22.99 22.98976928	6 IIA Mg Magnesium 24.304 24.304094															20 IIIB Ca Calcium 40.078 40.0784	
7 IIIA B Boron 10.81 10.811	8 IIIA C Carbon 12.01 12.0107	9 IIIA N Nitrogen 14.01 14.00643	10 IIIA O Oxygen 16.00 15.999	11 IIIA F Fluorine 18.99 18.99840323	12 IIIA Ne Neon 20.18 20.17976653												
13 IIIB Al Aluminum 26.98 26.9815385	14 IIIB Si Silicon 28.09 28.0855836	15 IIIB P Phosphorus 30.97 30.973761998	16 IIIB S Sulfur 32.06 32.059	17 IIIB Cl Chlorine 35.45 35.453	18 IIIB Ar Argon 39.95 39.9481634												
19 IIIB K Potassium 39.098 39.0983	20 IIIB Ca Calcium 40.078 40.0784	21 IIIB Sc Scandium 44.96 44.9559122	22 IIIB Ti Titanium 47.88 47.88	23 IIIB V Vanadium 50.94 50.9415	24 IIIB Cr Chromium 51.996 51.9961	25 IIIB Mn Manganese 54.938 54.938045	26 IIIB Fe Iron 55.845 55.845	27 IIIB Co Cobalt 58.933 58.933195	28 IIIB Ni Nickel 58.693 58.6934	29 IIIB Cu Copper 63.546 63.546	30 IIIB Zn Zinc 65.38 65.38	31 IIIB Ga Gallium 69.723 69.7231	32 IIIB Ge Germanium 72.64 72.64055	33 IIIB As Arsenic 74.922 74.921595	34 IIIB Se Selenium 78.96 78.96	35 IIIB Br Bromine 79.904 79.904	36 IIIB Kr Krypton 83.80 83.80
37 IIIB Rb Rubidium 85.468 85.4678	38 IIIB Sr Strontium 87.62 87.62	39 IIIB Y Yttrium 88.906 88.9062	40 IIIB Zr Zirconium 91.224 91.224	41 IIIB Nb Niobium 92.906 92.90638	42 IIIB Mo Molybdenum 95.94 95.94	43 IIIB Tc Technetium 98.906 98.906251	44 IIIB Ru Ruthenium 101.07 101.07	45 IIIB Rh Rhodium 102.905 102.9055	46 IIIB Pd Palladium 106.42 106.42	47 IIIB Ag Silver 107.868 107.8682	48 IIIB Cd Cadmium 112.414 112.414	49 IIIB In Indium 114.818 114.818	50 IIIB Sn Tin 118.710 118.710	51 IIIB Sb Antimony 121.757 121.757	52 IIIB Te Tellurium 127.603 127.603	53 IIIB I Iodine 126.905 126.90547	54 IIIB Xe Xenon 131.29 131.29
55 IIIB Cs Cesium 132.905 132.90545196	56 IIIB Ba Barium 137.327 137.327	57-71 IIIB Lanthanides	72 IIIB Hf Hafnium 178.49 178.49	73 IIIB Ta Tantalum 180.948 180.94788	74 IIIB W Tungsten 183.84 183.84	75 IIIB Re Rhenium 186.207 186.207	76 IIIB Os Osmium 190.23 190.23	77 IIIB Ir Iridium 192.222 192.222	78 IIIB Pt Platinum 195.084 195.084	79 IIIB Au Gold 196.967 196.966569	80 IIIB Hg Mercury 200.59 200.59	81 IIIB Tl Thallium 204.38 204.38	82 IIIB Pb Lead 207.2 207.2	83 IIIB Bi Bismuth 208.98 208.98	84 IIIB Po Polonium 209 209	85 IIIB At Astatine 210 210	86 IIIB Rn Radon 222 222
87 IIIB Fr Francium 223 223	88-103 IIIB Actinides		104 IIIB Rf Rutherfordium 261 261	105 IIIB Db Dubnium 262 262	106 IIIB Sg Seaborgium 266 266	107 IIIB Bh Bohrium 264 264	108 IIIB Hs Hassium 277 277	109 IIIB Mt Meitnerium 268 268	110 IIIB Ds Darmstadtium 285 285	111 IIIB Rg Roentgenium 282 282	112 IIIB Cn Copernicium 285 285	113 IIIB Nh Nihonium 284 284	114 IIIB Fl Flerovium 289 289	115 IIIB Mc Moscovium 288 288	116 IIIB Lv Livermorium 293 293	117 IIIB Ts Tennessine 289 289	118 IIIB Og Oganesson 294 294
87 IIIB La Lanthanum 138.905 138.905	88 IIIB Ce Cerium 140.12 140.12	89 IIIB Pr Praseodymium 140.908 140.908	90 IIIB Nd Neodymium 144.24 144.24	91 IIIB Pm Promethium 144.913 144.913	92 IIIB Sm Samarium 150.36 150.36	93 IIIB Eu Europium 151.964 151.964	94 IIIB Gd Gadolinium 157.25 157.25	95 IIIB Tb Terbium 158.925 158.925	96 IIIB Dy Dysprosium 162.50 162.50	97 IIIB Ho Holmium 164.930 164.930	98 IIIB Er Erbium 167.259 167.259	99 IIIB Tm Thulium 168.930 168.930	100 IIIB Yb Ytterbium 173.054 173.054	101 IIIB Lu Lutetium 174.967 174.967			
87 IIIB Ac Actinium 227.033 227.033	90 IIIB Th Thorium 232.038 232.038	91 IIIB Pa Protactinium 231.036 231.036	92 IIIB U Uranium 238.029 238.029	93 IIIB Np Neptunium 237.048 237.048	94 IIIB Pu Plutonium 244.064 244.064	95 IIIB Am Americium 243.061 243.061	96 IIIB Cm Curium 247.070 247.070	97 IIIB Bk Berkelium 247.070 247.070	98 IIIB Cf Californium 251.080 251.080	99 IIIB Es Einsteinium 252.083 252.083	100 IIIB Fm Fermium 257.103 257.103	101 IIIB Md Mendelevium 258.106 258.106	102 IIIB No Nobelium 259.108 259.108	103 IIIB Lr Lawrencium 262.109 262.109			

# Questions Using Elements of Thought

- Purpose
  - What am I trying to accomplish?
- Questions
  - What question am I raising or addressing?
  - Am I considering the complexities?
- Information
  - What information or experience am I using?
  - What information do I need?
- Inferences/Conclusions
  - How did I reach this conclusion?
  - Is there another way to interpret the information?

# Questions Using Elements of Thought

- Concepts
  - What is the main idea here, and can I explain it?
- Assumptions
  - What am I taking for granted?
  - What have I assumed?
- Implications/Consequences
  - What am I implying?
- Points of View
  - From what point of view am I looking at this issue?
  - Is there another point of view I should consider?

# Intellectual Standards

- Clarity – Further elaboration, examples
- Accuracy – Verify, check out
- Precision – More specific, further details
- Relevance – Relate to question
- Depth – Complexities, difficulties
- Breadth – Another perspective, other point of view
- Logic – Makes sense, conclusions follow evidence
- Significance – Central idea, most important facts
- Fairness – Vested interest in the issue

# Standards and Elements

- Intellectual Standards should be applied to the Elements of Thought.
- This approach can be used to:
  - Analyze contents of an article
  - Analyze and assess research
  - Help you formulate your own conclusions
  - Help you take a reasoned stand on an issue
- This leads to developing Intellectual Traits.

# Intellectual Traits

- Intellectual Humility - Realize limits of own knowledge
- Intellectual Courage - Ideas/beliefs/views that counter our own
- Intellectual Empathy - See the other side
- Intellectual Autonomy - Think for yourself
- Intellectual Integrity - Hold yourself to consistent, high standards
- Intellectual Perseverance - Work through confusion
- Confidence in Reason - Believe that high standards will win out
- Fair-mindedness - Treat all viewpoints alike



# Egocentric Thinking

It's true because:

- I believe it
- We believe it
- I want to believe it
- I have always believed it
- It is in my own interest to believe it



# Using Critical Thinking

Examples:

- Approaching questions
- Solving problems
- Deciding on a course of action

**Requires active thinking,  
the use of reason,  
and an open mind.**

