

a) $A = \{\text{Aluminum, Cobalt, Copper, Indium, Iron, Magnesium, Silver, Sodium, Strontium, Titanium}\}$

$B = \{\text{Selenium, Silicon, Silver, Sodium, Strontium, Sulfur}\}$

$C = \{\text{Carbon, Cobalt, Copper, Helium, Indium, Oxygen, Silver, Sodium, Sulfur}\}$

b) $A^C = \{\text{Boron, Carbon, Helium, Oxygen, Selenium, Silicon, Sulfur}\}$

$B^C = \{\text{Aluminum, Boron, Carbon, Cobalt, Copper, Helium, Indium, Iron, Magnesium, Oxygen, Titanium}\}$

$C^C = \{\text{Aluminum, Boron, Iron, Magnesium, Selenium, Silicon, Strontium, Titanium}\}$

c) $A \cap B = \{\text{Silver, Sodium, Strontium}\}$

$A \cap C = \{\text{Cobalt, Copper, Indium, Silver, Sodium}\}$

$B \cap C = \{\text{Silver, Sodium, Sulfur}\}$

$A^C \cap B = \{\text{Selenium, Silicon, Sulfur}\}$

$B^C \cap C = \{\text{Carbon, Cobalt, Copper, Helium, Indium, Oxygen}\}$

$C^C \cap A = \{\text{Aluminum, Iron, Magnesium, Strontium, Titanium}\}$

d) $A \cup B = \{\text{Aluminum, Cobalt, Copper, Indium, Iron, Magnesium, Selenium, Silicon, Silver, Sodium, Strontium, Sulfur, Titanium}\}$

$A \cup C = \{\text{Aluminum, Carbon, Cobalt, Copper, Helium, Indium, Iron, Magnesium, Oxygen, Silver, Sodium, Strontium, Sulfur, Titanium}\}$

$B \cup C = \{\text{Carbon, Cobalt, Copper, Helium, Indium, Oxygen, Selenium, Silicon, Silver, Sodium, Strontium, Sulfur}\}$

$B^C \cup A = \{\text{Aluminum, Boron, Carbon, Cobalt, Copper, Helium, Indium, Iron, Magnesium, Oxygen, Silver, Sodium, Strontium, Titanium}\}$

$C^C \cup B = \{\text{Aluminum, Boron, Iron, Magnesium, Selenium, Silicon, Silver, Sodium, Strontium, Sulfur, Titanium}\}$

$A^C \cup C = \{\text{Boron, Carbon, Cobalt, Copper, Helium, Indium, Oxygen, Selenium, Silicon, Silver, Sodium, Sulfur}\}$

e) $(A \cap B) \cap C = \{\text{Silver, Sodium}\}$

$(A \cap C) \cap B = \{\text{Silver, Sodium}\}$

$(B \cap C) \cap A = \{\text{Silver, Sodium}\}$

f) $(A \cup B) \cup C = \{\text{Aluminum, Carbon, Cobalt, Copper, Helium, Indium, Iron, Magnesium, Oxygen, Selenium, Silicon, Silver, Sodium, Strontium, Sulfur, Titanium}\}$

$(A \cup C) \cup B$ is the same

(B union C) union A is the same

g) $(A \cup B)^C = \{\text{Boron, Carbon, Helium, Oxygen}\}$

$A^C \cap B^C = \text{the same}$

h) $(C \cap B)^C = \{\text{Aluminum, Boron, Carbon, Cobalt, Copper, Helium, Indium, Iron, Magnesium, Oxygen, Selenium, Silicon, Strontium, Titanium}\}$

$C^C \cup B^C$ is the same

i) $A \cap (B \cup C) =$

$A \cap \{\text{Carbon, Cobalt, Copper, Helium, Indium, Oxygen, Selenium, Silicon, Silver, Sodium, Strontium, Sulfur}\}$

$= \{\text{Cobalt, Copper, Indium, Silver, Sodium, Strontium}\}$

$(A \cap B) \cup (A \cap C) =$

$\{\text{Silver, Sodium, Strontium}\} \cup \{\text{Cobalt, Copper, Indium, Silver, Sodium}\}$

$= \{\text{Cobalt, Copper, Indium, Silver, Sodium, Strontium}\}$

j) $B \cup (A \cap C) = B \cup \{\text{Cobalt, Copper, Indium, Silver, Sodium}\} =$

$\{\text{Cobalt, Copper, Indium, Selenium, Silicon, Silver, Sodium, Strontium, Sulfur}\}$

$(B \cup A) \cap (B \cup C) =$

$\{\text{Aluminum, Cobalt, Copper, Indium, Iron, Magnesium, Selenium, Silicon, Silver, Sodium, Strontium, Sulfur, Titanium}\} \cap$

$\{\text{Carbon, Cobalt, Copper, Helium, Indium, Oxygen, Selenium, Silicon, Silver, Sodium, Strontium, Sulfur}\}$

$= \{\text{Cobalt, Copper, Indium, Selenium, Silicon, Silver, Sodium, Strontium, Sulfur}\}$

k) $(B^C)^C = \{\text{Aluminum, Boron, Carbon, Cobalt, Copper, Helium, Indium, Iron, Magnesium, Oxygen, Titanium}\}^C = \{\text{Selenium, Silicon, Silver, Sodium, Strontium, Sulfur}\}$. Yes

l) The universe. Any set union with its complement is the universe. Not a surprise.

m) Empty set. Any set intersected with its complement is the empty set. Not a surprise.

n) Just B. It's like adding zero. We add no elements to B. Not a surprise.

o) The universe. The universe can't get any bigger by including elements from another set. Not a surprise.

p) Just C. Everything in C is also in the universe, so we don't take anything away from C. Not a surprise.

q) Empty set. There's nothing in the empty set, so there's nothing that the 2 sets both have. Not a surprise.

