1. A. Make a VENN diagram of the following Chart showing what classes each student was enrolled in this semester.

<table>
<thead>
<tr>
<th>Name</th>
<th>Math</th>
<th>Language Arts</th>
<th>Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashley</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Betsy</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Chris</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Devonte</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Eder</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Frank</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>George</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Heather</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Isabella</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Jessica</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Krista</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

B. \((LA)\): \(\mathbb{E} B, C, D, H, J^3\)

C. \((\text{Math} \cap \text{Science})\): \(\mathbb{E} A, C, E^3\)

D. \((\text{Math})'\): \(\mathbb{E} B, F, G, H, J^3\)

E. \((\text{Math} \cup LA)\): \(\mathbb{E} A, B, C, D, E, H, I, J, K^3\)

F. \((\text{Math} \cup LA)'\): \(\mathbb{E} F, G^3\)

G. \((\text{Math} \cap LA)'\): \(\mathbb{E} A, E, I, K^3\)

H. \((\text{Math} \cap LA \cap \text{Science})\): \(\mathbb{E} C^3\)

I. \((\text{Math} \cup LA) \cap \text{Science}\): \(\mathbb{E} A, B, C, E^3\)

J. \((\text{Math} \cap LA) \cup \text{Science}\): \(\mathbb{E} A, B, C, D, E, G^3\)

2. Given \(A = \{1, 2, 3, 6, 9\}\), \(B = \{2, 4, 6, 7, 8\}\), and \(\Omega = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}\) answer the following.

A. \((A \cap B)\): \(\mathbb{E} 2, 6, 7^3\)

B. \((A \cup B)\): \(\mathbb{E} 1, 2, 3, 4, 6, 7, 8, 9^3\)

C. \((A)'\): \(\mathbb{E} 4, 5, 8^3\)

D. \((A \cap B)'\): \(\mathbb{E} 1, 3, 4, 5, 8, 9^3\)
3. A manager that owns 3 local area Car Maintenance Garages was researching certifications of mechanics that worked for her company. Consider the following Venn diagram.

a. How many mechanics worked for her company?
   \[4 + 1 + 3 + 2 + 2 + 0 + 3 + 3 = 18\]

b. How many of the mechanics are certified by ASE to do work on Brakes?
   \[4 + 2 + 2 + 1 = 9\]

c. How many of the mechanics are certified by ASE to do work on Brakes and Tune-Ups (Brakes \(\cap\) Tune-Ups)?
   \[2 + 2 = 4\]

d. How many of the mechanics are certified by ASE to do work on either A/C or Tune-Ups (A/C \(\cup\) Tune-Ups)?
   \[1 + 3 + 2 + 0 + 2 + 3 = 11\]

e. How many of the mechanics have their certification in Brakes or A/C but not in Tune-Ups?
   \[4 + 1 + 3 = 8\]

4. The following Venn diagram shows a breakdown of a small high schools sports program.

a. How many students play only Tennis?
   \[14\]

b. How many students play basketball and tennis?
   \[3 + 2 = 5\]

c. How many students play basketball or softball/baseball?
   \[Basketball \cup Baseball/Softball\]
   \[12 + 8 + 20 + 2 + 3 + 2 = 47\]

d. How many students play baseball/softball or tennis but not basketball?
   \[(Baseball/Softball \cup Tennis) \cap (Basketball)'\]
   \[14 + 2 + 14 = 28\]

e. How many students that play a sport do not play basketball?
   \[14 + 2 + 14 = 28\]

f. How many students attend this school?
   \[12 + 8 + 20 + 2 + 3 + 2 + 14 + 552 = 613\]

g. How many students do not play tennis in total?
   \[613 - 14 - 2 - 3 - 2 = 592\]

5. In the state of Oregon, all of the area codes start with a number greater than 4 and end in an odd number (e.g., 503-232-1235, 971-923-5648). Let \( A \) represent the set of all area codes that start with an even number. Let \( B \) represent the set of all area codes that could be used in Oregon by the requirements stated earlier.

Let \( A = \{ \text{First # EVEN} \} \)

Let \( B = \{ \text{First # > 4 & Last # ODD} \} \)

Which might be an area code that belongs to the set \( (A \cap B) \)?

A. 403  \( \text{First # \leq 4} \)
B.  79  \( \text{First # ODD} \)
C. 892  \( \text{Last # EVEN} \)
D. 631  \( \text{First # EVEN AND > 4} \)

Which might be an area code that belongs to the set \( (A \cap B') \)?

A. 403  \( \text{First # EVEN & CAN"'T BE FROM ORG. SINCE FIRST # \leq 4} \)
B.  79  \( \text{First # ODD} \)
C. 892  \( \text{First # > 4} \)
D. 631  \( \text{First # > 4} \)

Which might be an area code that belongs to the set \( (A' \cap B') \)?

A. 403  \( \text{First # ODD AND CAN"'T BE FROM OREGON} \)
B.  79  \( \text{BIC LAST # EVEN} \)
C. 892  \( \text{BIC Last # EVEN} \)
D. 631

6. In a particular state, the first character on a license plate is always a letter. The last character is always a digit from 0 to 9. Let \( V \) represents the set of all license plates beginning with a vowel, and \( O \) represents the set of all license plates that end with an odd number,

\( V = \{ \text{begins with a vowel} \} \)

\( O = \{ \text{end in an odd #} \} \)

Which might be a license plate that belongs to the set \( (V \cap O) \)?

A. E23 PC6  \( \text{Vowel at beginning} \)
B. MG4 3F5  \( \text{Odd at end} \)
C. AR8 8X9  \( \text{Vowel at beginning} \)
D. T7M Z56  \( \text{Odd at end} \)

Which might be a license plate that belongs to the set \( (V \cap O') \)?

A. E23 PC6  \( \text{Vowel at beginning} \)
B. MG4 3F5  \( \text{Odd at end} \)
C. AR8 8X9  \( \text{Vowel at beginning} \)
D. T7M Z56  \( \text{Odd at end} \)

Which might be a license plate that belongs to the set \( (V' \cap O') \)?

A. E23 PC6  \( \text{Vowel at beginning} \)
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C. AR8 8X9  \( \text{Vowel at beginning} \)
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