The following table gives the number of respondents who obtained each score.

<table>
<thead>
<tr>
<th>score</th>
<th>number</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>24</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

The numbers in parentheses below show the number of people who missed each question.

For each of questions A and B, match the grammars on the left with the sets they generate on the right. The correspondence is one-to-one. The start symbol in all cases is $S$.

### A.

1. $S \rightarrow aSbb \mid \varepsilon$  
   d(0)  
   a. $\{x \in \{a, b\}^* \mid x = \text{rev } x\}$
2. $S \rightarrow aaSb \mid \varepsilon$  
   e(0)  
   b. $\{a, b\}^*$
3. $S \rightarrow aSb \mid bSa \mid SS \mid \varepsilon$  
   c(0)  
   c. $\{x \in \{a, b\}^* \mid \#a(x) = \#b(x)\}$
4. $S \rightarrow aSa \mid bSb \mid a \mid b \mid SS \mid \varepsilon$  
   a(2)  
   d. $\{a^n b^m \mid m = 2n\}$
5. $S \rightarrow aSb \mid bSa \mid a \mid b \mid SS \mid \varepsilon$  
   b(4)  
   e. $\{a^n b^m \mid n = 2m\}$

### B.

6. $S \rightarrow aSb \mid T \mid T \rightarrow bTa \mid \varepsilon$  
   b(3)  
   a. $\{a^n b^{n+m} a^m \mid n, m \geq 0\}$
7. $S \rightarrow TT \mid T \rightarrow aTb \mid \varepsilon$  
   c(2)  
   b. $\{a^n b^m a^m b^n \mid n, m \geq 0\}$
8. $S \rightarrow TU \mid T \rightarrow aTb \mid \varepsilon \mid U \rightarrow bUa \mid \varepsilon$  
   a(4)  
   c. $\{a^n b^m a^m b^m \mid n, m \geq 0\}$

### C. The following is a grammar in Greibach normal form for the set of balanced parentheses. The start symbol is $S$.

$$S \rightarrow [B] \quad B \rightarrow ] \mid ]S | [BB$$

Which of the following sentential forms would not occur in any derivation of the string $]]][][]]]$?

a. $[[BB$

b. $[[B$

c. $][][BB$

d. $][][B$

e. $][][][][B$ (4)

f. $][][][B$

In this Greibach normal form grammar, the number of $B$’s in any sentential form generated from $S$ is always the same as the number of unmatched left parens in the terminal string generated so far.