# Chapter 9 Optimization Review

<table>
<thead>
<tr>
<th>Desired Shape</th>
<th>What you are given</th>
<th>The following equations will be useful:</th>
</tr>
</thead>
</table>
| Maximi{ng a rectangular area } given its perimeter  
With 4 sides of fencing  
\[ P = 4w \]  
\[ A = l \times w \quad \text{or} \quad A = w^2 \] | Perimeter | |
| Maximi{ng a rectangular area } given its perimeter  
With 3 sides of Fencing  
\[ P = 4w \]  
\[ A = l \times w \quad \text{or} \quad A = 2w^2 \] | Perimeter | |
| Maximi{ng a rectangular area } given its perimeter  
With 2 sides of fencing  
\[ P = 2w \]  
\[ A = l \times w \quad \text{or} \quad A = w^2 \] | Perimeter | |
| Minimi{zing the surface area } of a square-based prism  
\[ V = s^3 \] | Volume | |
| Maximi{ning the volume } of a square-based prism  
\[ SA = 6s^2 \] | Surface Area | |
| Maximi{ning the volume } of a cylinder  
\[ h = d \]  
\[ h = 2r \]  
\[ \text{Surface Area} \] | Substituting \( h = 2r \) into  
\[ SA = 2\pi r^2 + 2\pi rh \], we get  
\[ SA = 2\pi r^2 + 4\pi r^2 \]  
\[ SA = 6\pi r^2 \] | |
| Minimi{zing the surface area } of a cylinder  
\[ h = d \]  
\[ h = 2r \]  
\[ \text{Volume} \] | Substituting \( h = 2r \) into  
\[ V = \pi r^2 h \], we get  
\[ V = \pi r^2 (2r) \]  
\[ V = 2\pi r^3 \] | |