

Name: \_\_\_\_\_

## Unit B Summary

### Chapter 4.0 Mechanical systems use forces to transfer energy.

Key Concepts	Chapter Summary
<ul style="list-style-type: none"> <li>• A force is a push or a pull on an object.</li> <li>• <math>W = F \times d</math></li> <li>• A machine is a mechanical system that makes doing work easier.</li> <li>• <math>MA = F_{out}/F_{in}</math></li> <li>• Ideal mechanical advantage assumes that the machine has zero friction.</li> </ul>	<ul style="list-style-type: none"> <li>• The force of gravity (weight) is the product of the object's mass and the Earth's gravitational field. (4.1)</li> <li>• Work is done when a force causes something to move and energy is transferred. (4.2)</li> <li>• Machines make work easier by increasing the force applied to the object, by increasing the distance over which the force is applied, or by changing the direction of the force. (4.3)</li> <li>• The amount by which a machine can multiply the input force is called mechanical advantage (MA). (4.3)</li> <li>• Ideal mechanical advantage (IMA) assumes that the machine has zero friction. (4.3)</li> </ul>

### Chapter 5.0 Mechanical systems involve machines that are designed to do work efficiently.

Key Concepts	Chapter Summary
<ul style="list-style-type: none"> <li>• A simple machine requires the application of a single force to do the work.</li> <li>• Two or more simple machines that operate together form a mechanism.</li> <li>• <math>Efficiency = W_{out}/W_{in}</math></li> <li>• Machines can be made more efficient by reducing friction.</li> </ul>	<ul style="list-style-type: none"> <li>• The six types of simple machines are the lever, pulley, wheel and axle, inclined plane, screw, and wedge. (5.1)</li> <li>• The IMA of simple machines can be calculated as the ratio of lengths, ratio of radii, or the number of support strings. (5.1)</li> <li>• The efficiency of a machine measures the useful work done by the machine compared to the work needed to operate the machine. (5.2)</li> <li>• Friction causes the input work to be transformed into thermal energy, thus decreasing the efficiency of the machine. (5.2)</li> </ul>

### Chapter 6.0 Systems have an impact on our society.

Key Concepts	Chapter Summary
<ul style="list-style-type: none"> <li>• A non-mechanical system is a procedure or process designed to perform a task.</li> <li>• Systems develop from a need.</li> <li>• Automating a system may have social, economic, and environmental effects.</li> </ul>	<ul style="list-style-type: none"> <li>• Information and support are required to keep a non-mechanical system working efficiently. (6.1)</li> <li>• Productivity is the amount of output that is produced per unit of time. (6.2)</li> <li>• Automated systems replace human workers with machines that react without human intervention. (6.2)</li> <li>• The criteria for evaluating a system include efficiency, safety, cost, and environmental impact. (6.2)</li> </ul>