

**Exhibit P2.1: Descriptions of the TIMSS Advanced 2015 International Benchmarks of Physics Achievement**

<b>625</b>	<b>Advanced International Benchmark</b>	●
<p><i>Students communicate their understanding of laws of physics to solve problems in practical and abstract contexts. They apply knowledge of the motion of objects in freefall, of heat and temperature, and of electric circuits and electric fields. Students communicate understanding of magnetic fields and of phenomena related to mechanical and electromagnetic waves, and demonstrate understanding of atomic and nuclear physics. Students design experimental procedures and interpret results, synthesize information in complex diagrams and graphs depicting abstract physics concepts to solve problems, provide multi-step calculations of a variety of physical quantities in a range of contexts, draw conclusions about physical phenomena, and provide explanations to communicate scientific knowledge.</i></p>		
<b>550</b>	<b>High International Benchmark</b>	○
<p><i>Students apply basic laws of physics in solving problems in a variety of situations. They apply knowledge of forces and motion, communicate understanding of the laws of conservation of energy and momentum, and apply knowledge of heat and temperature to solve problems. Students apply knowledge of Ohm's Law and Joule's Law to electric circuits, solve problems involving charged particles in magnetic fields, and apply knowledge of magnetic fields and electromagnetic induction to solve problems. They show understanding of phenomena related to electromagnetic waves and knowledge of nuclear reactions. Students interpret information in complex diagrams and graphs depicting abstract concepts, derive formulas and provide calculations of a variety of physical quantities in a range of contexts, evaluate explanations for physical phenomena, and provide brief explanations to communicate scientific knowledge.</i></p>		
<b>475</b>	<b>Intermediate International Benchmark</b>	●
<p><i>Students demonstrate some basic knowledge of the physics underlying a range of phenomena. They use their knowledge of forces and motion to solve problems, apply knowledge of heat and temperature to energy transfers, and of conservation laws to everyday and abstract contexts. They show knowledge of electric fields, point charges, and electromagnetic induction. Students apply knowledge of phenomena related to mechanical and electromagnetic waves and knowledge of atomic and nuclear physics to solve problems. Students interpret information in diagrams and graphs to solve problems, calculate a variety of physical quantities in a range of contexts, and evaluate statements to identify explanations for physical phenomena.</i></p>		

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS Advanced 2015