Exhibit P9.6: Number of TIMSS Advanced Physics Topics in the Intended Curriculum

Reported by National Research Coordinators

Country	All Physics (22 topics)	Mechanics and Thermodynamics (9 topics)	Electricity and Magnetism (6 topics)	Wave Phenomena and Atomic/Nuclear Physics (7 topics)
France	15	5	3	7
Italy	17	4	6	7
Lebanon	22	9	6	7
Norway	21	9	6	6
Portugal	19	8	5	6
Russian Federation	20	9	6	5
Slovenia	22	9	6	7
Sweden	22	9	6	7
United States	21	9	6	6

In the United States, the number of TIMSS Advanced physics topics covered varies by state and course type. The data shown in this table reflect the maximum number of topics that may be covered in each content domain.

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

TIMSS Advanced 2015 Physics Topics

A. Mechanics and Thermodynamics

1) Applying Newton's laws and laws of motion
2) Forces, including frictional force, acting on a body
3) Forces acting on a body moving in a circular path; the body's centripetal acceleration, speed, and circling time
4) The law of gravitation in relation to the movement of celestial objects
5 Kinetic and potential energy; conversation of mechanical energy
6) The law of conservation of momentum; elastic and inelastic collisions
7) The first law of thermodynamics
8) Heat transfer and specific heat capacities
9) The law of ideal gases; expansion of solids and liquids in relation to temperature change

B. Electricity and Magnetism

1) Electrostatic attraction or repulsion between isolated charged particles — Coulomb's law
2) Charged particles in an electric field
3) Electrical circuits; using Ohm's law and Joule's law
4) Charged particles in a magnetic field
5) Relationship between magnetism and electricity; magnetic fields around electric conductors; electromagnetic induction
6) Faraday's and Lenz's laws of induction

C. Wave Phenomena and Atomic/Nuclear Physics

1) Mechanical waves; the relationship between speed, frequency, and wavelength
2) Electromagnetic radiation; wavelength and frequency of various types of waves (radio, infrared, visible light, x-rays, gamma rays)
3) Thermal radiation, temperature, and wavelength
4) Reflection, refraction , interference, and diffraction
5) The structure of the atom and its nucleus; atomic number and atomic mass; electromagnetic emission and absorption and the behavior of electrons
6) Wave-particle duality and the photoelectric effect; types of nuclear reactions and their role in nature and society; radioactive isotopes
7) Mass-energy equivalence in nuclear reactions and particle transformations