



Ontario Curriculum Alignment for Engineer-in-Residence Secondary Classroom Activities: Science and Technological Education

Companion Document to EIR 2009-2010 Program Guide of Classroom Activities



E-I-R Classroom Activities, Grades 9 to 12

Content Areas	Grade 9	Grade 10	Grade 11	Grade 12
Chemistry	24. Structure and Infrastructure	24. Structure and Infrastructure 22. Busta Slime	24. Structure and Infrastructure	24. Structure and Infrastructure
Physics	24. Structure and Infrastructure	24. Structure and Infrastructure 89. Infrared Webcam	10. Humpty Dumpty - The Egg-Drop Challenge 22. Busta Slime 23. Cruising into the 21st Century 24. Structure and Infrastructure 26. Sail Car 27. Super Yo-Yo 29. Balloon Car 37. Roller Coaster Competition 40. Circus Physics 90. Pop Bottle Rocket	10. Humpty Dumpty - The Egg-Drop Challenge 22. Busta Slime 23. Cruising into the 21st Century 24. Structure and Infrastructure 26. Sail Car 27. Super Yo-Yo 29. Balloon Car 37. Roller Coaster Competition 40. Circus Physics 89. Infrared Webcam 90. Pop Bottle Rocket
Biology	24. Structure and Infrastructure	24. Structure and Infrastructure 94. Edible Cell	24. Structure and Infrastructure	24. Structure and Infrastructure
Earth and Space Science	24. Structure and Infrastructure	24. Structure and Infrastructure	24. Structure and Infrastructure	24. Structure and Infrastructure
Mathematics	24. Structure and Infrastructure 64. Egg Bungee Jump Competition	24. Structure and Infrastructure	24. Structure and Infrastructure	24. Structure and Infrastructure
Technology	9. Tower Geometry 10. Humpty Dumpty - The Egg-Drop Challenge 23. Cruising into the 21st Century 24. Structure and Infrastructure 28. Cardboard Chair 31. Mini-Sumo Bot Competition 32. Reverse Engineering 38. Da Vinci Unplugged 39. Blue Box Toy 49. High-Wire Mine Cart 75. HEADLIGHTS - Human Electricity Obstacle Course 93. Water for the World	9. Tower Geometry 10. Humpty Dumpty - The Egg-Drop Challenge 23. Cruising into the 21st Century 24. Structure and Infrastructure 28. Cardboard Chair 31. Mini-Sumo Bot Competition 38. Da Vinci Unplugged 39. Blue Box Toy 75. HEADLIGHTS - Human Electricity Obstacle Course 87. Lets Make Concrete 93. Water for the World	10. Humpty Dumpty - The Egg-Drop Challenge 11. Real Time Computer Control 24. Structure and Infrastructure 28. Cardboard Chair 31. Mini-Sumo Bot Competition 39. Blue Box Toy 51. Internet and Email 75. HEADLIGHTS - Human Electricity Obstacle Course 87. Lets Make Concrete 93. Water for the World	10. Humpty Dumpty - The Egg-Drop Challenge 11. Real Time Computer Control 24. Structure and Infrastructure 28. Cardboard Chair 31. Mini-Sumo Bot Competition 32. Reverse Engineering 39. Blue Box Toy 51. Internet and Email 87. Lets Make Concrete
Other		46. Computer Viruses (Computer Studies)	12. Computer Science - the Quality of Software (Computer Studies) 46. Computer Viruses (Computer Studies) 51. Internet and Email (Business Studies)	12. Computer Science - the Quality of Software (Computer Studies) 51. Internet and Email (Business Studies)

Ontario Curriculum Alignment for Engineer-in-Residence Secondary Classroom Activities: Science and Technological Education

Activity	Activity Title	Subject area /Course / Strand	Overall Expectation / Specific Expectation
9	Tower Geometry	<p>Technological Education: Exploring Technologies, Grade 9 Open (TIJ10) B. Technological Skills</p> <p>Technological Education: Construction Technology, Grade 10 Open (TCJ20) B. Design, Layout and Planning Skills</p>	<p>B1. use problem-solving processes and project-management strategies in the planning and fabrication of a product or delivery of a service B1.1 apply the steps of a design process or other problem-solving process to plan and develop products and services B1.2 apply the steps and/or techniques of appropriate problem-solving processes and methods to solve a variety of problems in different technological areas B1.5 demonstrate the ability to work cooperatively in a group environment to solve problems B2. fabricate products or deliver services, using a variety of resources B2.1 use appropriate tools, materials, and equipment to create products or deliver services B2.2 make accurate measurements using a variety of tools, in metric or imperial units, as appropriate</p> <p>B1. design construction projects, individually or in small groups, applying a design process to plan and develop the projects and other problem-solving processes to address various related problems and challenges B1.1 follow the steps of a design process to plan and develop a construction project B1.2 use appropriate problem-solving processes and techniques to address various specific problems or challenges that may arise in connection with a construction project B1.3 apply appropriate technological concepts as they work through design and/or problem-solving processes B3. apply the mathematical skills required in the planning and building of construction projects B3.5 prepare estimates, using appropriate metric and/or imperial units, of the materials required to complete construction projects, and estimate the cost of these materials</p>
10	Humpty Dumpty – The Egg Drop Challenge	<p>Technological Education: Exploring Technologies, Grade 9 Open (TIJ10) A. Technology Fundamentals</p>	<p>A1. demonstrate an understanding of the fundamental concepts and skills required in the planning and development of a product or service, including the use of a design process and/or other problem-solving processes and techniques A1.1 describe a design process or other problem solving process for planning and developing products and/or services A1.2 describe problem-solving processes and techniques for solving various kinds of problems in different technological areas A2. demonstrate the ability to use a variety of appropriate methods to communicate ideas and solutions A2.4 describe and use various forms of communication to document the progress and results of the development of a product or service A3. evaluate products or services in relation to specifications, user requirements, and operating conditions A3.1 evaluate a product or service, and processes associated with its development, on the basis of a set of criteria relevant to that product or service A3.2 suggest improvements to a product or service on the basis of a set of criteria relevant to that product or service</p>

10 (cont)	<p>Humpty Dumpty – The Egg Drop Challenge (continued)</p>	<p>Technological Education: Exploring Technologies, Grade 9 Open (TIJ1O) (continued) B. Technological Skills</p> <p>Technological Education: Technological Design, Grade 10 Open (TDJ2O) A. Technological Design Fundamentals</p> <p>Technological Education: Technological Design, Grade 11 University/College (TDJ3M) A. Technological Design Fundamentals</p> <p>Science: Physics, Grade 11 University (SPH3U) B. Kinematics</p> <p>C. Forces</p>	<p>B1. use problem-solving processes and project-management strategies in the planning and fabrication of a product or delivery of a service B1.4 use a variety of sources to research technological solutions to specific problems or challenges B1.5 demonstrate the ability to work cooperatively in a group environment to solve problems B2. fabricate products or deliver services, using a variety of resources B2.3 meet all design criteria in creating a product or delivering a service</p> <p>A1. identify and describe the purpose, scope, and steps of a design process A1.1 describe the purpose of design for a given project A1.2 identify the steps in a design process</p> <p>A1. demonstrate an understanding of factors and relationships that affect technological design and the design process A1.2 identify the steps in the design process and demonstrate an understanding of the relationships among the steps</p> <p>B2. investigate, in qualitative and quantitative terms, uniform and non-uniform linear motion, and solve related problems B2.1 use appropriate terminology related to kinematics, including, but not limited to: time, distance, position, displacement, speed, velocity, and acceleration [C] B2.4 conduct an inquiry into the uniform and non-uniform linear motion of an object B2.6 plan and conduct an inquiry into the motion of objects in one dimension, using vector diagrams and uniform acceleration equations [IP, PR, C] B3. demonstrate an understanding of uniform and non-uniform linear motion, in one and two dimensions B3.1 distinguish between the terms constant, instantaneous, and average with reference to speed, velocity, and acceleration, and provide examples to illustrate each term B3.2 distinguish between, and provide examples of, scalar and vector quantities as they relate to the description of uniform and non-uniform linear motion</p> <p>C2. investigate, in qualitative and quantitative terms, net force, acceleration, and mass, and solve related problems C2.3 conduct an inquiry into the relationship between the acceleration of an object and its net force and mass C3. demonstrate an understanding of the relationship between changes in velocity and unbalanced forces in one dimension C3.1 distinguish between, and provide examples of, different forces, and describe the effect of each type of force on the velocity of an object</p>
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10 (cont)	<p>Humpty Dumpty – The Egg Drop Challenge (continued)</p>	<p>Technological Education: Technological Design, Grade 12 University/College (TDJ4M) A. Technological Design Fundamentals</p> <p>Science: Physics, Grade 12 University (SPH4U) C. Energy and Momentum</p> <p>Science: Physics, Grade 12 College (SPH4C) B. Motion and its Applications</p> <p>E. Energy Transformations</p>	<p>A1. demonstrate an understanding of criteria, relationships, and other factors that affect technological design and the design process A1.2 describe how the results of each step in the design process affects the next step in the process A4. demonstrate an understanding of various types of models and prototypes, and describe the tools, materials, equipment, and processes for building, testing, and evaluating them A4.1 compare a variety of types of models and prototypes and modelling tools, equipment, materials, and procedures in terms of suitability, time, budget, and availability A4.3 describe criteria for assessing models and modelling processes for a given project</p> <p>C2. investigate, in qualitative and quantitative terms, through laboratory inquiry or computer simulation, the relationship between the laws of conservation of energy and conservation of momentum, and solve related problems C2.4 conduct a laboratory inquiry or computer simulation to test the law of conservation of energy during energy transformations that involve gravitational potential energy, kinetic energy, thermal energy, and elastic potential energy [PR, AI]</p> <p>B2. investigate, in qualitative and quantitative terms, the linear uniform and non-uniform motion of objects, and solve related problems B2.2 plan and conduct investigations to measure distance and speed for objects moving in one dimension in uniform motion [IP, PR] B2.3 plan and conduct investigations to measure constant acceleration for objects moving in one dimension [IP, PR]</p> <p>E2. investigate energy transformations and the law of conservation of energy, and solve related problems E2.4 design and construct a complex device that integrates energy transformations, and analyse its operation in qualitative and quantitative terms [IP, PR, AI] E2.5 investigate a simple energy transformation, explain the power and output, and calculate the energy [PR, AI, C] E3. demonstrate an understanding of diverse forms of energy, energy transformations, and efficiency E3.1 describe and compare various types of energy and energy transformations E3.2 explain the energy transformations in a system, using principles related to kinetic energy, gravitational potential energy, conservation of energy, and efficiency</p>
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22	Busta Slime	<p>Science: Science, Grade 10 Academic (SNC2D) C. Chemistry: Chemical Reactions</p> <p>Science: Science, Grade 10 Applied (SNC2P) C. Chemistry: Chemical Reactions and Their Practical Applications</p> <p>Science: Physics, Grade 11 University (SPH3U) C. Forces</p> <p>Science: Physics, Grade 12 University (SPH4U) B. Dynamics</p>	<p>C2. investigate, through inquiry, the characteristics of chemical reactions C2.5 plan and conduct an inquiry to identify the evidence of chemical change ([IP, PR, AI]</p> <p>C2. investigate, through inquiry, the characteristics of simple chemical reactions C2.3 conduct and observe inquiries related to simple chemical reactions, including synthesis, decomposition, and displacement reactions, and represent them using a variety of formats [PR, AI, C]</p> <p>C1. analyse and propose improvements to technologies that apply concepts related to dynamics and Newton's Laws, and assess the technologies' social and environmental impact C2.1 use appropriate terminology related to forces, including, but not limited to: mass, time, speed, velocity, acceleration, friction, gravity, normal force, and free-body diagrams [C] C2.2 conduct an inquiry that applies Newton's laws to analyse, in qualitative and quantitative terms, the forces acting on an object, and use free-body diagrams to determine the net force and the acceleration of the object [PR, AI, C] C2.5 plan and conduct an inquiry to analyse the effect of forces acting on objects in one dimension, using vector diagrams, free-body diagrams, and Newton's laws [IP, PR, AI, C]</p> <p>B1. analyse technological devices that apply the principles of the dynamics of motion, and assess the technologies' social and environmental impact B1.1 analyse a technological device that applies the principles of linear or circular motion [AL, C] B2. investigate in qualitative and quantitative terms, forces involves in uniform circular motion and motion in a plane and solve related problems B2.1 use appropriate terminology related to dynamics, including, but not limited to: inertial and non-inertial frames of reference, components, centripetal, period, frequency, static friction, and kinetic friction B2.3 analyse, in qualitative and quantitative terms, the relationships between the force of gravity, normal force, applied force, force of friction, coefficient of static friction, and coefficient of kinetic friction, and solve related two-dimensional problems using free-body diagrams, vector components, and algebraic equations [AI, C] B2.5 analyse, in qualitative and quantitative terms, the relationships between the motion of a system and the forces involved), and use free-body diagrams and algebraic equations to solve related problems [AI, C]</p>
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22 (cont)	Busta Slime (continued)	<p>Science: Physics, Grade 12 College (SPH4C) B. Motion and its Applications</p> <p>F. Hydraulic and Pneumatic Systems</p>	<p>B2. investigate, in qualitative and quantitative terms, the linear uniform and non-uniform motion of objects, and solve related problems B2.1 use appropriate terminology related to motion, including, but not limited to: distance, displacement, position, speed, acceleration, instantaneous, force, and net force [C] B2.2 plan and conduct investigations to measure distance and speed for objects moving in one dimension in uniform motion [IP, PR] B2.3 plan and conduct investigations to measure constant acceleration for objects moving in one dimension [IP, PR] B3. demonstrate an understanding of different kinds of motion and the relationships between speed, acceleration, displacement and distance B3.4 state Newton's laws, and apply them qualitatively and quantitatively to explain the motion of an object in one dimension B3.5 explain the relationship between the acceleration of an object and the net unbalanced force acting on that object</p> <p>F2. investigate fluid statics, fluid dynamics, and simple hydraulic and pneumatic systems; F2.5 use an inquiry process to determine the relationships between force, area, pressure, volume, and time in a hydraulic or pneumatic system (e.g., a hydraulic bottle rocket, a two cylinder circuit using small plastic syringes filled with air or water) [IP, PR, AI] F2.7 design and construct a hydraulic or pneumatic system (e.g., a braking system for a car, a clamping device, a model of a crane), solving problems as they arise, and evaluate the system with respect to mechanical advantage and efficiency [IP, PR, AI]</p>
23	Cruising into the 21 st Century	<p>Technological Education: Exploring Technologies, Grade 9 Open (TIJ10) B. Technological Skills</p> <p>C. Technology, the Environment, and Society</p> <p>Technological Education: Technological Design, Grade 10 Open (TDJ20) B. Technological Design Skills</p> <p>C. Technology, the Environment, and Society</p>	<p>B1. use problem-solving processes and project-management strategies in the planning and fabrication of a product or delivery of a service B1.1 apply the steps of a design process or other problem-solving process to plan and develop products and services B1.2 apply the steps and/or techniques of appropriate problem-solving processes and methods B2. fabricate products or deliver services, using a variety of resources B2.3 meet all design criteria in creating a product or delivering a service</p> <p>C2. demonstrate an awareness of how various technologies affect society, as well as how society influences technological developments C2.1 describe some of the effects that technological innovations of the past have had on society C2.5 describe how social and economic factors influence the development and use of technology</p> <p>B3. create and test models using a variety of techniques, tools, and materials B3.3 assess models and/or prototypes on the basis of prescribed criteria</p> <p>C2. describe how society influences technological innovation and how technology affects society C2.1 describe how society influences the development and use of technology C2.2 describe how various technological innovations have affected quality of life</p>

23 (cont)	Cruising into the 21 st Century (continued)	<p>Technological Education: Transportation Technology, Grade 10 Open (TTJ2O) C. Technology, the Environment, and Society</p> <p>Science: Physics, Grade 11 University (SPH3U) B. Kinematics</p> <p>C. Forces</p> <p>Science: Physics, Grade 12 University (SPH4U) C. Energy and Momentum</p> <p>Science: Physics, Grade 12 College (SPH4C) B. Motion and its Applications</p>	<p>C2. describe how society influences technological innovation and how technology affects society C2.1 describe how society influences the development and use of technology C2.2 describe how various technological innovations have affected quality of life</p> <p>B2. investigate, in qualitative and quantitative terms, uniform and non-uniform linear motion, and solve related problems B2.1 use appropriate terminology related to kinematics, including, but not limited to: time, distance, position, displacement, speed, velocity, and acceleration [C] B2.4 conduct an inquiry into the uniform and non-uniform linear motion of an object B2.6 plan and conduct an inquiry into the motion of objects in one dimension, using vector diagrams and uniform acceleration equations [IP, PR, C] B3. demonstrate an understanding of uniform and non-uniform linear motion, in one and two dimensions B3.1 distinguish between the terms constant, instantaneous, and average with reference to speed, velocity, and acceleration, and provide examples to illustrate each term B3.2 distinguish between, and provide examples of, scalar and vector quantities as they relate to the description of uniform and non-uniform linear motion</p> <p>C2. investigate, in qualitative and quantitative terms, net force, acceleration, and mass, and solve related problems C2.3 conduct an inquiry into the relationship between the acceleration of an object and its net force and mass C3. demonstrate an understanding of the relationship between changes in velocity and unbalanced forces in one dimension C3.1 distinguish between, and provide examples of, different forces, and describe the effect of each type of force on the velocity of an object</p> <p>C2. investigate, in qualitative and quantitative terms, through laboratory inquiry or computer simulation, the relationship between the laws of conservation of energy and conservation of momentum, and solve related problems C2.4 conduct a laboratory inquiry or computer simulation to test the law of conservation of energy during energy transformations that involve gravitational potential energy, kinetic energy, thermal energy, and elastic potential energy [PR, AI]</p> <p>B2. investigate, in qualitative and quantitative terms, the linear uniform and non-uniform motion of objects, and solve related problems B2.2 plan and conduct investigations to measure distance and speed for objects moving in one dimension in uniform motion [IP, PR] B2.3 plan and conduct investigations to measure constant acceleration for objects moving in one dimension [IP, PR]</p>
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23 (cont)	Cruising into the 21 st Century (continued)	Science: Physics, Grade 12 College (SPH4C) (continued) E. Energy Transformations	E2. investigate energy transformations and the law of conservation of energy, and solve related problems E2.4 design and construct a complex device that integrates energy transformations, and analyse its operation in qualitative and quantitative terms [IP, PR, AI] E2.5 investigate a simple energy transformation, explain the power and output, and calculate the energy [PR, AI, C] E3. demonstrate an understanding of diverse forms of energy, energy transformations, and efficiency E3.1 describe and compare various types of energy and energy transformations E3.2 explain the energy transformations in a system, using principles related to kinetic energy, gravitational potential energy, conservation of energy, and efficiency
24	Structure and Infrastructure	Science: All grades 9 to 12 A. Scientific Investigation Skills and Career Exploration Technological Education: Exploring Technologies, Grade 9 Open (TIJ10) D. Professional Practice and Career Opportunities Technological Education: Technological Design, Grade 10 Open (TDJ20) D. Professional Practice and Career Opportunities Technological Education: Computer Engineering Technology, Grade 11 University /College (TEJ3M) D. Professional Practice and Career Opportunities	A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields A2.1 identify and describe a variety of careers related to the fields of science under study and the education and training necessary for these careers D2. identify careers in various technological fields, and describe the educational requirements for them D2.1 describe secondary and postsecondary education pathways (i.e., selection of courses, programs, experiential learning opportunities, and other learning opportunities at the secondary and postsecondary levels, including apprenticeship training, certificate programs, college programs, and/or university programs) leading to a variety of careers in technological fields D2.2 use various criteria to assess selected careers in technological fields D2. identify careers related to technological design, and the education and training required for them. D2.1 identify a variety of career opportunities related to technological design D2.2 identify and compare the education and/or training required for various careers in technological design D3. describe various careers related to computer technology and electronics, and the entry requirements for these careers D3.1 describe various careers related to computer technology and electronics that require postsecondary education

24 (cont)	Structure and Infrastructure (continued)	<p>Technological Education: Construction Engineering Technology, Grade 11 College (TCJ3C) E. Professional Practice and Career Opportunities</p> <p>Technological Education: Manufacturing Engineering Technology, Grade 11 University/College (TMJ3M) D. Professional Practice and Career Opportunities</p> <p>Technological Education: Technological Design and the Environment, Grade 11 Open (TDJ3O) D. Professional Practice and Career Opportunities</p> <p>Technological Education: Computer Engineering Technology, Grade 12 University/College (TEJ4M) D. Professional Practice and Career Opportunities</p> <p>Technological Education: Construction Engineering Technology, Grade 12 College (TCJ4C) E. Professional Practice and Career Opportunities</p> <p>Technological Education: Manufacturing Engineering Technology, Grade 12 University/College (TMJ4M) D. Professional Practice and Career Opportunities</p>	<p>E2. describe career opportunities in the construction industry, and the importance of lifelong learning for these careers E2.1 identify careers in construction technology, and describe the education and training required for these careers</p> <p>D2. demonstrate an understanding of postsecondary pathways that lead to career opportunities in the manufacturing industry D2.2 identify and describe the specific education and training requirements necessary for careers in the manufacturing industry</p> <p>D2. identify careers related to technological design, and describe the training and education required for these careers D2.1 identify a variety of career opportunities related to technological design</p> <p>D3. assess career opportunities related to computer technology and electronics, and explain the importance of postsecondary education and lifelong learning in the computer technology industry D3.1 assess various career opportunities related to computer technology and electronics</p> <p>E2. demonstrate an understanding of careers in the construction industry and the education, training, and workplace skills required for these careers E2.1 describe a variety of careers in the construction industry, and identify relevant postsecondary programs and their admission requirements</p> <p>D3. demonstrate an understanding of the postsecondary programs associated with manufacturing, and establish a personalized career pathway D3.1 demonstrate an understanding of the range of career opportunities within the manufacturing industry</p>
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24 (cont)	Structure and Infrastructure (continued)	<p>Technological Education: Technological Design in the 21st Century, Grade12 Open (TDJ40) D. Professional Practice and Career Opportunities</p> <p>Mathematics – All grades 9 to 12 Mathematical Process Expectations</p>	<p>D2. investigate and describe a variety of careers related to technological design, and describe the training and education required for them D2.1 describe a variety of career and business opportunities related to technological design</p> <p>Make connections among mathematical concepts and procedures, and relate mathematical ideas to situations or phenomena drawn from other contexts</p>
26	Sail Car	<p>Science: Physics, Grade 11 University (SPH3U) B. Kinematics</p> <p>C. Forces</p>	<p>B2. investigate, in qualitative and quantitative terms, uniform and non-uniform linear motion, and solve related problems B2.1 use appropriate terminology related to kinematics, including, but not limited to: time, distance, position, displacement, speed, velocity, and acceleration [C] B2.5 solve problems involving distance, position, and displacement [A1, C] B2.6 plan and conduct an inquiry into the motion of objects in one dimension, using vector diagrams and uniform acceleration equations [IP, PR, C] B3. demonstrate an understanding of uniform and non-uniform linear motion, in one and two dimensions B3.1 distinguish between the terms constant, instantaneous, and average with reference to speed, velocity, and acceleration, and provide examples to illustrate each term B3.2 distinguish between, and provide examples of, scalar and vector quantities as they relate to the description of uniform and non-uniform linear motion</p> <p>C2. investigate, in qualitative and quantitative terms, net force, acceleration, and mass, and solve related problems C2.1 use appropriate terminology related to forces, including, but not limited to: mass, time, speed, velocity, acceleration, friction, gravity, normal force, and free-body diagrams [C] C2.2 conduct an inquiry that applies Newton's laws to analyse, in qualitative and quantitative terms, the forces acting on an object, and use free-body diagrams to determine the net force and the acceleration of the object [PR, A1, C] C2.5 plan and conduct an inquiry to analyse the effect of forces acting on objects in one dimension, using vector diagrams, free-body diagrams, and Newton's laws [IP, PR, A1, C] C3. demonstrate an understanding of the relationship between changes in velocity and unbalanced forces in one dimension C3.3 state Newton's laws, and apply them, in qualitative terms, to explain the effect of forces acting on objects</p>

26 (cont)	Sail Car (continued)	<p>Science: Physics, Grade 12 University (SPH4U) B. Dynamics</p> <p>Science: Physics, Grade 12 College (SPH4C) B. Motion and its Applications</p>	<p>B2. investigate, in qualitative and quantitative terms, forces involved in uniform circular motion and motion in a plane, and solve related problems</p> <p>B2.3 analyse, in qualitative and quantitative terms, the relationships between the force of gravity, normal force, applied force, force of friction, coefficient of static friction, and coefficient of kinetic friction, and solve related two-dimensional problems using free-body diagrams, vector components, and algebraic equations [AI, C]</p> <p>B2.5 analyse, in qualitative and quantitative terms, the relationships between the motion of a system and the forces involved, and use free-body diagrams and algebraic equations to solve related problems [AI, C]</p> <p>B2.6 analyse, in qualitative and quantitative terms, the forces acting on and the acceleration experienced by an object in uniform circular motion in horizontal and vertical planes, and use free-body diagrams and algebraic equations to solve related problems [AI, C]</p> <p>B3. demonstrate an understanding of the forces involved in uniform circular motion and motion in a plane</p> <p>B3.2 explain the advantages and disadvantages of static and kinetic friction in situations involving various planes</p> <p>B2. investigate, in qualitative and quantitative terms, the linear uniform and non-uniform motion of objects, and solve related problems</p> <p>B2.1 use appropriate terminology related to motion, including, but not limited to: distance, displacement, position, speed, acceleration, instantaneous, force, and net force [C]</p> <p>B2.2 plan and conduct investigations to measure distance and speed for objects moving in one dimension in uniform motion [IP, PR]</p> <p>B2.3 plan and conduct investigations to measure constant acceleration for objects moving in one dimension [IP, PR]</p> <p>B2.8 plan and conduct an inquiry to determine the relationship between the net force acting on an object and its acceleration in one dimension [IP, PR, AI]</p> <p>B2.9 analyse, in quantitative terms, the forces acting on an object, and use free-body diagrams to determine net force and acceleration of the object in one dimension [AI, C]</p> <p>B3. demonstrate an understanding of different kinds of motion and the relationships between speed, acceleration, displacement, and distance</p> <p>B3.4 state Newton's laws, and apply them qualitatively and quantitatively to explain the motion of an object in one dimension</p> <p>B3.5 explain the relationship between the acceleration of an object and the net unbalanced force acting on that object</p>
27	Super Yo-Yo	<p>Science: Physics, Grade 11 University (SPH3U) B. Kinematics</p>	<p>B2. investigate, in qualitative and quantitative terms, uniform and non-uniform linear motion, and solve related problems</p> <p>B2.1 use appropriate terminology related to kinematics, including, but not limited to: time, distance, position, displacement, speed, velocity, and acceleration [C]</p> <p>B2.5 solve problems involving distance, position, and displacement [AI, C]</p> <p>B2.6 plan and conduct an inquiry into the motion of objects in one dimension, using vector diagrams and uniform acceleration equations [IP, PR, C]</p> <p>B3. demonstrate an understanding of uniform and non-uniform linear motion, in one and two dimensions</p>

27 (cont)	Super Yo-Yo (continued)	<p>Science: Physics, Grade 11 University (SPH3U) (continued) B. Kinematics</p> <p>C. Forces</p> <p>Science: Physics, Grade 12 University (SPH4U) B. Dynamics</p> <p>Science: Physics, Grade 12 College (SPH4C) B. Motion and its Applications</p>	<p>B3.1 distinguish between the terms constant, instantaneous, and average with reference to speed, velocity, and acceleration, and provide examples to illustrate each term B3.2 distinguish between, and provide examples of, scalar and vector quantities as they relate to the description of uniform and non-uniform linear motion</p> <p>C2. investigate, in qualitative and quantitative terms, net force, acceleration, and mass, and solve related problems C2.1 use appropriate terminology related to forces, including, but not limited to: mass, time, speed, velocity, acceleration, friction, gravity, normal force, and free-body diagrams [C] C2.2 conduct an inquiry that applies Newton's laws to analyse, in qualitative and quantitative terms, the forces acting on an object, and use free-body diagrams to determine the net force and the acceleration of the object [PR, AI, C] C2.5 plan and conduct an inquiry to analyse the effect of forces acting on objects in one dimension, using vector diagrams, free-body diagrams, and Newton's laws [IP, PR, AI, C] C3. demonstrate an understanding of the relationship between changes in velocity and unbalanced forces in one dimension C3.3 state Newton's laws, and apply them, in qualitative terms, to explain the effect of forces acting on objects</p> <p>B2. investigate, in qualitative and quantitative terms, forces involved in uniform circular motion and motion in a plane, and solve related problems B2.3 analyse, in qualitative and quantitative terms, the relationships between the force of gravity, normal force, applied force, force of friction, coefficient of static friction, and coefficient of kinetic friction, and solve related two-dimensional problems using free-body diagrams, vector components, and algebraic equations [AI, C] B2.5 analyse, in qualitative and quantitative terms, the relationships between the motion of a system and the forces involved, and use free-body diagrams and algebraic equations to solve related problems [AI, C] B2.6 analyse, in qualitative and quantitative terms, the forces acting on and the acceleration experienced by an object in uniform circular motion in horizontal and vertical planes, and use free-body diagrams and algebraic equations to solve related problems [AI, C] B3. demonstrate an understanding of the forces involved in uniform circular motion and motion in a plane B3.2 explain the advantages and disadvantages of static and kinetic friction in situations involving various planes</p> <p>B2. investigate, in qualitative and quantitative terms, the linear uniform and non-uniform motion of objects, and solve related problems; B2.1 use appropriate terminology related to motion, including, but not limited to: distance, displacement, position, speed, acceleration, instantaneous, force, and net force [C] B2.2 plan and conduct investigations to measure distance and speed for objects moving in one dimension in uniform motion [IP, PR]</p>
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27 (cont)	Super Yo-Yo (continued)	<p>Science: Physics, Grade 12 College (SPH4C) (continued) B. Motion and its Applications</p>	<p>B2.3 plan and conduct investigations to measure constant acceleration for objects moving in one dimension [IP, PR] B2.8 plan and conduct an inquiry to determine the relationship between the net force acting on an object and its acceleration in one dimension [IP, PR, AI] B2.9 analyse, in quantitative terms, the forces acting on an object, and use free-body diagrams to determine net force and acceleration of the object in one dimension [AI, C] B3. demonstrate an understanding of different kinds of motion and the relationships between speed, acceleration, displacement, and distance B3.4 state Newton's laws, and apply them qualitatively and quantitatively to explain the motion of an object in one dimension B3.5 explain the relationship between the acceleration of an object and the net unbalanced force acting on that object</p>
28	Cardboard Chair	<p>Technological Education: Exploring Technologies, Grade 9 Open (TIJ10) A. Technology Fundamentals</p> <p>B. Technological Skills</p> <p>Technological Education: Technological Design, Grade 10 Open (TDJ20) A. Technological Design Fundamentals</p>	<p>A1. demonstrate an understanding of the fundamental concepts and skills required in the planning and development of a product or service, including the use of a design process and/or other problem-solving processes and techniques A1.4 incorporate appropriate technological concepts in the design, fabrication or delivery, and evaluation of a product or service A1.5 describe the characteristics of a variety of materials used in the fabrication of a product or the delivery of a service and identify other relevant considerations to be made in relation to those materials A1.6 demonstrate an understanding of the roles of various team members in a group project A3. evaluate products or services in relation to specifications, user requirements, and operating conditions A3.1 evaluate a product or service, and processes associated with its development, on the basis of a set of criteria relevant to that product or service A3.2 suggest improvements to a product or service on the basis of a set of criteria relevant to that product or service</p> <p>B1. use problem-solving processes and project-management strategies in the planning and fabrication of a product or delivery of a service B1.1 apply the steps of a design process or other problem-solving process to plan and develop products and services B1.2 apply the steps and/or techniques of appropriate problem-solving processes and methods to solve a variety of problems in different technological areas B2. fabricate products or deliver services, using a variety of resources B2.3 meet all design criteria in creating a product or delivering a service</p> <p>A1. identify and describe the purpose, scope, and steps of a design process A1.1 describe the purpose of design for a given project in terms of key technological concepts A1.2 identify the steps in a design process A4. explain the purpose of building models and prototypes, and identify tools, materials, and methods for building and testing them A4.3 identify key criteria for assessing designs for a given project</p>

28 (cont)	Cardboard Chair (continued)	<p>Technological Education: Technological Design, Grade 10 Open (TDJ2O) (continued) B. Technological Design Skills</p>	<p>B3. create and test models and/or prototypes, using a variety of techniques, tools, and materials B3.1 use appropriate tools, equipment, and materials to create design models and/or prototypes B3.3 assess models and/or prototypes on the basis of prescribed criteria</p>
		<p>Technological Education: Technological Design, Grade 11 University/College (TDJ3M) A. Technological Design Fundamentals</p>	<p>A1. demonstrate an understanding of factors and relationships that affect technological design and the design process A1.2 identify the steps in the design process, and demonstrate an understanding of the relationships among the steps A1.5 establish design criteria based on client interviews, consultations, and research A2. describe appropriate strategies, techniques, and tools for researching, organizing, planning, and managing design projects and related activities, with an emphasis on financial, human, and material resources A2.2 research and describe strategies for the planning, organization, and management of human, material, and financial resources for a design project A4. demonstrate an understanding of a variety of tools, materials, equipment, and processes used to build, test, and evaluate models and prototypes A4.3 identify various criteria for assessing models and the methods and equipment used to perform the assessment</p>
		<p>B. Technological Design Skills</p>	<p>B3. create and test models and/or prototypes, using a variety of techniques, tools, and materials B3.1 create design models and/or functional prototypes using appropriate tools, equipment, and materials B3.3 assess products and/or processes on the basis of student-developed criteria</p>
		<p>Technological Education: Technological Design, Grade 12 University/College (TDJ4M) A. Technological Design Fundamentals</p>	<p>A1. demonstrate an understanding of criteria, relationships, and other factors that affect technological design and the design process A1.2 describe how the results of each step in the design process affects the next step in the process A1.3 identify and establish design criteria for a variety of clients and environments, based on interviews with clients, technical requirements, and research A4. demonstrate an understanding of various types of models and prototypes, and describe the tools, materials, equipment, and processes for building, testing, and evaluating them A4.1 compare a variety of types of models and modelling tools, equipment, materials, and procedures in terms of suitability, time, budget, and availability A4.3 describe criteria for assessing models and modelling for a given project</p>
		<p>B. Technological Design Skills</p>	<p>B3. create, test, and analyse models and/or prototypes, using a variety of techniques, tools, and materials B3.1 select and use appropriate tools, equipment, and materials when creating design models and/or functional prototypes B3.3 analyse products and/or processes on the basis of student-justified criteria</p>

29 (cont)	Balloon Car (continued)	<p>Science: Physics, Grade 12 University (SPH4U) B. Dynamics</p> <p>Science: Physics, Grade 12 College (SPH4C) B. Motion and its Applications</p>	<p>B2. investigate, in qualitative and quantitative terms, forces involved in uniform circular motion and motion in a plane, and solve related problems B2.3 analyse, in qualitative and quantitative terms, the relationships between the force of gravity, normal force, applied force, force of friction, coefficient of static friction, and coefficient of kinetic friction, and solve related two-dimensional problems using free-body diagrams, vector components, and algebraic equations [AI, C] B2.5 analyse, in qualitative and quantitative terms, the relationships between the motion of a system and the forces involved, and use free-body diagrams and algebraic equations to solve related problems [AI, C] B2.6 analyse, in qualitative and quantitative terms, the forces acting on and the acceleration experienced by an object in uniform circular motion in horizontal and vertical planes, and use free-body diagrams and algebraic equations to solve related problems [AI, C] B3. demonstrate an understanding of the forces involved in uniform circular motion and motion in a plane B3.2 explain the advantages and disadvantages of static and kinetic friction in situations involving various planes</p> <p>B2. investigate, in qualitative and quantitative terms, the linear uniform and non-uniform motion of objects, and solve related problems B2.1 use appropriate terminology related to motion, including, but not limited to: distance, displacement, position, speed, acceleration, instantaneous, force, and net force [C] B2.2 plan and conduct investigations to measure distance and speed for objects moving in one dimension in uniform motion [IP, PR] B2.3 plan and conduct investigations to measure constant acceleration for objects moving in one dimension [IP, PR] B2.8 plan and conduct an inquiry to determine the relationship between the net force acting on an object and its acceleration in one dimension [IP, PR, AI] B2.9 analyse, in quantitative terms, the forces acting on an object, and use free-body diagrams to determine net force and acceleration of the object in one dimension [AI, C] B3. demonstrate an understanding of different kinds of motion and the relationships between speed, acceleration, displacement, and distance B3.4 state Newton's laws, and apply them qualitatively and quantitatively to explain the motion of an object in one dimension B3.5 explain the relationship between the acceleration of an object and the net unbalanced force acting on that object</p>
31	Mini-Sumo Bot Competition	<p>Technological Education: Exploring Technologies, Grade 9 Open (TIJ10) A. Technology Fundamentals</p>	<p>A1. demonstrate an understanding of the fundamental concepts and skills required in the planning and development of a product or service, including the use of a design process and/or other problem-solving processes and techniques A1.4 incorporate appropriate technological concepts in the design, fabrication or delivery, and evaluation of a product or service A1.5 describe the characteristics of a variety of materials used in the fabrication of a product or the delivery of a service and identify other relevant considerations to be made in relation to those materials A1.6 demonstrate an understanding of the roles of various team members in a group project</p>

31 (cont)	Mini-Sumo Bot Competition (continued)	<p>Technological Education: Technological Design in the 21st Century, Grade 12 Open (TDJ4O) A. Technological Design Fundamentals</p> <p>B. Technological Design Skills</p>	<p>A1. describe the design process and ways in which technological design is influenced by societal needs A1.1 describe the purpose of design for a given project with reference to key technological concepts A1.3 describe the steps in the design process A1.4 describe the relationship between various steps of the design process</p> <p>A4. demonstrate an understanding of various kinds of models and prototypes, and describe methods and equipment for making and assessing them A4.2 describe ways to assess models on the basis of various design criteria</p> <p>B3. construct models and prototypes, using a variety of techniques, tools, and materials, and assess these models and prototypes in terms of the design criteria B3.1 use appropriate tools, equipment, and materials to create design models and prototypes B3.3 analyse products and/or processes in terms of established criteria and constraints</p>
32	Reverse Engineering	<p>Technological Education: Exploring Technologies, Grade 9 Open (TIJ1O) B. Technological Skills</p> <p>Technological Education: Manufacturing Engineering Technology, Grade 12 University/College (TMJ4M) B. Manufacturing Technology Skills</p>	<p>B1. use problem-solving processes and project-management strategies in the planning and fabrication of a product or delivery of a service B1.2 apply the steps and/or techniques of appropriate problem-solving processes and methods to solve a variety of problems in different technological areas</p> <p>B1. apply a design process to plan and develop solutions, products, or services in response to challenges in manufacturing technology B1.1 use reverse engineering to explain existing products or processes in terms of function; B1.2 demonstrate proficiency in using a design process to plan and develop solutions to manufacturing-related challenges</p>
37	Roller Coaster Competition	<p>Science: Physics, Grade 11 University (SPH3U) C. Forces</p>	<p>C2. investigate, in qualitative and quantitative terms, net force, acceleration, and mass, and solve related problems C2.1 use appropriate terminology related to forces, including, but not limited to: mass, time, speed, velocity, acceleration, friction, gravity, normal force, and free-body diagrams [C] C2.2 conduct an inquiry that applies Newton's laws to analyse, in qualitative and quantitative terms, the forces acting on an object, and use free-body diagrams to determine the net force and the acceleration of the object [PR, AI, C] C2.3 conduct an inquiry into the relationship between the acceleration of an object and its net force and mass, and analyse the resulting data [PR, AI] C2.4 analyse the relationships between acceleration and applied forces such as the force of gravity, normal force, force of friction, coefficient of static friction, and coefficient of kinetic friction, and solve related problems involving forces in one dimension, using free-body diagrams and algebraic equations [AI, C] C2.5 plan and conduct an inquiry to analyse the effect of forces acting on objects in one dimension, using vector diagrams, free-body diagrams, and Newton's laws [IP, PR, AI, C]</p>

37 (cont)	Roller Coaster Competition (continued)	<p>Science: Physics, Grade 11 University (SPH3U) (continued) C. Forces</p> <p>Science: Physics, Grade 12 University (SPH4U) B. Dynamics</p> <p>Science: Physics, Grade 12 College (SPH4C) B. Motion and its Applications</p>	<p>C3. demonstrate an understanding of the relationship between changes in velocity and unbalanced forces in one dimension C3.1 distinguish between, and provide examples of, different forces, and describe the effect of each type of force on the velocity of an object C3.3 state Newton's laws, and apply them, in qualitative terms, to explain the effect of forces acting on objects</p> <p>B2. investigate, in qualitative and quantitative terms, forces involved in uniform circular motion and motion in a plane, and solve related problems B2.3 analyse, in qualitative and quantitative terms, the relationships between the force of gravity, normal force, applied force, force of friction, coefficient of static friction, and coefficient of kinetic friction, and solve related two-dimensional problems using free-body diagrams, vector components, and algebraic equations [AI, C] B2.5 analyse, in qualitative and quantitative terms, the relationships between the motion of a system and the forces involved, and use free-body diagrams and algebraic equations to solve related problems [AI, C] B2.6 analyse, in qualitative and quantitative terms, the forces acting on and the acceleration experienced by an object in uniform circular motion in horizontal and vertical planes, and use free-body diagrams and algebraic equations to solve related problems [AI, C] B3. demonstrate an understanding of the forces involved in uniform circular motion and motion in a plane B3.2 explain the advantages and disadvantages of static and kinetic friction in situations involving various planes</p> <p>B2. investigate, in qualitative and quantitative terms, the linear uniform and non-uniform motion of objects, and solve related problems B2.1 use appropriate terminology related to motion, including, but not limited to: distance, displacement, position, speed, acceleration, instantaneous, force, and net force [C] B2.2 plan and conduct investigations to measure distance and speed for objects moving in one dimension in uniform motion [IP, PR] B2.3 plan and conduct investigations to measure constant acceleration for objects moving in one dimension [IP, PR] B2.8 plan and conduct an inquiry to determine the relationship between the net force acting on an object and its acceleration in one dimension [IP, PR, AI] B2.9 analyse, in quantitative terms, the forces acting on an object, and use free-body diagrams to determine net force and acceleration of the object in one dimension [AI, C] B3. demonstrate an understanding of different kinds of motion and the relationships between speed, acceleration, displacement, and distance B3.4 state Newton's laws, and apply them qualitatively and quantitatively to explain the motion of an object in one dimension B3.5 explain the relationship between the acceleration of an object and the net unbalanced force acting on that object</p>
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38	Da Vinci Unplugged	<p>Technological Education: Exploring Technologies, Grade 9 Open (TIJ10) B. Technological Skills</p> <p>C. Technology, the Environment, and Society</p> <p>Technological Education: Technological Design, Grade 10 Open (TDJ20) A. Technological Design Fundamentals</p> <p>B. Technological Design Skills</p>	<p>B1. use problem-solving processes and project-management strategies in the planning and fabrication of a product or delivery of a service B1.1 apply the steps of a design process or other problem-solving process to plan and develop products and services B1.2 apply the steps and/or techniques of appropriate problem-solving processes and methods to solve a variety of problems in different technological areas B1.3 identify and discuss solutions that have been developed to address key technological problems or meet human needs in various areas of technology B1.5 demonstrate the ability to work cooperatively in a group environment to solve problems</p> <p>C2. demonstrate an awareness of how various technologies affect society, as well as how society influences technological developments C2.1 describe some of the effects that technological innovations of the past have had on society</p> <p>A2. identify and describe tools, strategies, and skills needed for project research, planning, and organization A2.1 identify sources of pertinent information for a project A2.2 identify appropriate methods, strategies, and tools for developing designs and for planning and organizing projects and related activities A3. demonstrate an understanding of how design ideas are represented graphically A3.1 identify different methods for representing design ideas graphically A3.2 correctly use drafting standards, conventions, and tools A3.3 identify various types of technical drawings A4. explain the purpose of building models and prototypes, and identify tools, materials, and methods for building and testing them A4.1 explain the purposes of building models and prototypes</p> <p>B3. create and test models using a variety of techniques, tools, and materials B3.1 use appropriate tools, equipment, and materials to create design models and/or prototypes B3.2 use appropriate measuring methods and scales when creating models and prototypes; B3.3 assess models and/or prototypes on the basis of prescribed criteria B4. use suitable communication methods throughout the design process B4.2 report and reflect on their experience with the design process, using a suitable oral and/or written format</p>
39	Blue Box Toy	<p>Technological Education: Exploring Technologies, Grade 9 Open (TIJ10) A. Technological Design Fundamentals</p>	<p>A1. demonstrate an understanding of the fundamental concepts and skills required in the planning and development of a product or service, including the use of a design process and/or other problem-solving processes and techniques A1.4 incorporate appropriate technological concepts in the design, fabrication or delivery, and evaluation of a product or service A1.5 describe the characteristics of a variety of materials used in the fabrication of a product or the delivery of a service and identify other relevant considerations to be made in relation to those materials</p>

39 (cont)	Blue Box Toy (continued)	<p>Technological Education: Technological Design, Grade 10 Open (TDJ2O) (continued) B. Technological Design Skills</p> <p>C. Technology, the Environment, and Society</p> <p>Technological Education: Technological Design, Grade 11 University/College (TDJ3M) A. Technological Design Fundamentals</p> <p>B. Technological Design Skills</p> <p>C. Technology, the Environment, and Society</p>	<p>B4. use suitable communication methods throughout the design process B4.2 report and reflect on their experience with the design process, using a suitable oral and/or written format</p> <p>C1. demonstrate an understanding of environmentally responsible practices, and apply them throughout the technological design process C1.2 describe and apply best practices for conserving energy and other resources during the design process</p> <p>A1. demonstrate an understanding of factors and relationships that affect technological design and the design process A1.2 identify the steps in the design process, and demonstrate an understanding of the relationships among the steps A5. use appropriate terminology and communication methods to document, report, and present progress and results A5.1 use technical terminology correctly when documenting, reporting on, and presenting design projects A5.4 demonstrate an understanding of the components of a technical report</p> <p>B3. create and test models and/or prototypes, using a variety of techniques, tools, and materials B3.1 create design models and/or functional prototypes using appropriate tools, equipment, procedures, and materials B3.2 use appropriate metric and imperial measuring tools, scales, and proportion techniques when creating and assessing models and/or prototypes B3.3 assess products and/or processes on the basis of student-developed criteria B4. use a variety of formats and tools to create and present reports summarizing the design process and to reflect on decisions made during the process B4.1 create and present reports summarizing design choices and the steps taken in the design process, using a variety of formats and tools B4.2 report and reflect on decisions made throughout the design process, using a variety of oral and/or written formats.</p> <p>C1. demonstrate an understanding of environmentally responsible design practices, and apply them in the technological design process and related activities C1.2 describe, advocate, and apply best practices for conserving energy and other resources when designing a product or process</p>
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39 (cont)	Blue Box Toy (continued)	<p>Technological Education: Technological Design and the Environment, Grade 11 Open (TDJ3O) A. Technological Design Fundamentals</p> <p>B. Technological Design Skills</p> <p>C. Technology, the Environment, and Society</p> <p>Technological Education: Technological Design, Grade 12 University/College (TDJ4M) A. Technological Design Fundamentals</p>	<p>A1. describe the design process, and identify ways in which technological design can address an environmental need or challenge A1.3 identify and describe the steps in the design process</p> <p>A2. describe and apply strategies, techniques, and tools for researching, planning, and organizing projects to meet a specific environmental or other need A2.3 plan ways to apply the principles of sustainability and minimize environmental harm throughout the design process for a project</p> <p>A4. compare various kinds of models and prototypes and identify criteria, equipment, and methods for assessing them A4.2 identify criteria for assessing designs A4.3 identify criteria for assessing the environmental friendliness of a design and of the processes required to produce it</p> <p>B3. construct models and prototypes using a variety of techniques, tools, and materials, and assess these models and prototypes in terms of the design criteria B3.3 test models and/or prototypes, and evaluate designs using student-generated criteria</p> <p>B4. report on the progress, environmental rationale, and results of the design process, using appropriate formats and styles B4.1 present a report summarizing the design choices, progress, and results of the design project, with an emphasis on how the design deals with environmental concerns, using a variety of tools B4.2 report and reflect on the decisions they made and their experiences throughout the design process, using appropriate written and/or oral formats</p> <p>C1. demonstrate an understanding of environmentally responsible design practices and strategies, and apply them in the technological design process and related activities C1.2 describe and apply best practices for conserving energy and other resources when designing a product or process</p> <p>A1. demonstrate an understanding of criteria, relationships, and other factors that affect technological design and the design process A1.3 identify and establish design criteria for a variety of clients and environments, based on interviews with clients, technical requirements, and research</p> <p>A4. demonstrate an understanding of various types of models and prototypes, and describe the tools, materials, equipment, and processes for building, testing, and evaluating them A4.1 compare a variety of types of models and prototypes and modelling tools, equipment, materials, and procedures in terms of suitability, time, budget, and availability A4.3 describe criteria for assessing models and modelling processes for a given project</p> <p>A5. use appropriate technical language and communications methods to document, report, present, and market design ideas and results A5.1 use technical terminology correctly when documenting design projects, reporting and presenting results, and marketing designs</p>
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39 (cont)	Blue Box Toy (continued)	<p>Technological Education: Technological Design, Grade 12 University/College (TDJ4M) (continued) B. Technological Design Skills</p> <p>C. Technology, the Environment, and Society</p> <p>Technological Education: Technological Design in the 21st Century, Grade 12 Open (TDJ4O) A. Technological Design Fundamentals</p> <p>B. Technological Design Skills</p> <p>C. Technology, the Environment, and Society</p>	<p>B3. create, test, and analyse models and/or prototypes, using a variety of techniques, tools, and materials B3.3 analyse products and/or processes on the basis of student-justified criteria, with an emphasis on marketability B4. use a variety of formats and tools to create and present reports summarizing and evaluating the design process, to analyse decisions made during the process, and to advocate the final design B4.1 create and present reports summarizing and evaluating all aspects of the design process, using a variety of tools, with an emphasis on promotional and marketing strategies B4.2 report on and analyse decisions made throughout the design process, and advocate for the final design, using a variety of oral and/or written formats</p> <p>C1. demonstrate an understanding of environmentally responsible design practices, and apply them in the technological design process and related activities C1.3 describe, advocate for, and apply best practices for conserving energy and other resources when designing a product or process</p> <p>A1. describe the design process and ways in which technological design is influenced by societal needs A1.1 describe the purpose of design for a given project with reference to key technological concepts A1.2 describe ways in which societal needs, including environmental and economic factors, influence technological design A1.3 describe the steps in the design process A1.4 describe the relationship between various steps of the design process</p> <p>B3. construct models and prototypes, using a variety of techniques, tools, and materials, and assess these models and prototypes in terms of the design criteria B3.1 use appropriate tools, equipment, and materials to create design models and prototypes B3.3 analyse products and/or processes in terms of established criteria and constraints B4. report on design choices, the societal influences that helped determine those choices, project evaluations, and reflections on their experiences throughout the design process, using appropriate formats and styles B4.1 create and present reports summarizing design choices and results of evaluations of projects, using a variety of appropriate formats, with an emphasis on how the design was affected by societal influences B4.2 report and reflect on their experiences throughout the design process, assessing individual skills development and the productivity and dynamics of the team, using appropriate written and/or oral formats</p> <p>C1. demonstrate an understanding of environmentally responsible design practices and strategies, and apply them in the technological design process and related activities C1.2 describe, promote, and apply design practices that conserve energy and other resources</p>
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40	Circus Physics	<p>Science: Physics, Grade 11 University (SPH3U) C. Forces</p> <p>Science: Physics, Grade 12 University (SPH4U) B. Dynamics</p> <p>Science: Physics, Grade 12 College (SPH4C) B. Motion and its Applications</p>	<p>C2. investigate, in qualitative and quantitative terms, net force, acceleration, and mass, and solve related problems</p> <p>C2.1 use appropriate terminology related to forces, including, but not limited to: mass, time, speed, velocity, acceleration, friction, gravity, normal force, and free-body diagrams [C]</p> <p>C2.2 conduct an inquiry that applies Newton's laws to analyse, in qualitative and quantitative terms, the forces acting on an object, and use free-body diagrams to determine the net force and the acceleration of the object [PR, AI, C]</p> <p>C2.4 analyse the relationships between acceleration and applied forces such as the force of gravity, normal force, force of friction, coefficient of static friction, and coefficient of kinetic friction, and solve related problems involving forces in one dimension, using free-body diagrams and algebraic equations [AI, C]</p> <p>C2.5 plan and conduct an inquiry to analyse the effect of forces acting on objects in one dimension, using vector diagrams, free-body diagrams, and Newton's laws [IP, PR, AI, C]</p> <p>C3. demonstrate an understanding of the relationship between changes in velocity and unbalanced forces in one dimension</p> <p>C3.1 distinguish between, and provide examples of, different forces (e.g., friction, gravity, normal force), and describe the effect of each type of force on the velocity of an object</p> <p>C3.3 state Newton's laws, and apply them, in qualitative terms, to explain the effect of forces acting on objects</p> <p>B2. investigate, in qualitative and quantitative terms, forces involved in uniform circular motion and motion in a plane, and solve related problems</p> <p>B2.1 use appropriate terminology related to dynamics, including, but not limited to: inertial and non-inertial frames of reference, components, centripetal, period, frequency, static friction, and kinetic friction [C]</p> <p>B2.3 analyse, in qualitative and quantitative terms, the relationships between the force of gravity, normal force, applied force, force of friction, coefficient of static friction, and coefficient of kinetic friction, and solve related two-dimensional problems using free-body diagrams, vector components, and algebraic equations [AI, C]</p> <p>B2.5 analyse, in qualitative and quantitative terms, the relationships between the motion of a system and the forces involved, and use free-body diagrams and algebraic equations to solve related problems [AI, C]</p> <p>B3. demonstrate an understanding of the forces involved in uniform circular motion and motion in a plane</p> <p>B3.1 distinguish between reference systems (inertial and non-inertial) with respect to the real and apparent forces acting within such systems</p> <p>B3.2 explain the advantages and disadvantages of static and kinetic friction in situations involving various planes</p> <p>B2. investigate, in qualitative and quantitative terms, the linear uniform and non-uniform motion of objects, and solve related problems;</p> <p>B2.1 use appropriate terminology related to motion, including, but not limited to: distance, displacement, position, speed, acceleration, instantaneous, force, and net force [C]</p> <p>B2.2 plan and conduct investigations to measure distance and speed for objects moving in one dimension in uniform motion [IP, PR]</p>
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40 (cont)	Circus Physics (continued)	Science: Physics, Grade 12 College (SPH4C) (continued) B. Motion and its Applications	B2.3 plan and conduct investigations to measure constant acceleration for objects moving in one dimension [IP, PR] B2.8 plan and conduct an inquiry to determine the relationship between the net force acting on an object and its acceleration in one dimension [IP, PR, AI] B2.9 analyse, in quantitative terms, the forces acting on an object, and use free-body diagrams to determine net force and acceleration of the object in one dimension [AI, C] B3. demonstrate an understanding of different kinds of motion and the relationships between speed, acceleration, displacement, and distance B3.1 distinguish between constant, instantaneous, and average speed, and give examples of each involving uniform and non-uniform motion B3.4 state Newton's laws, and apply them qualitatively and quantitatively to explain the motion of an object in one dimension B3.5 explain the relationship between the acceleration of an object and the net unbalanced force acting on that object
46	Computer Viruses	Computer Studies: Introduction to Computer Studies, Grade 10 Open (ICS2O) A. Understanding Computers Computer Studies: Introduction to Computer Science, Grade 11 University (ICS3U) C. Computer Environments and Systems Computer Studies: Introduction to Computer Programming, Grade 11 College (ICS3C) D. Computers and Society	A5. explain the importance of software updates and system maintenance to manage the performance and increase the security of a computer A5.1 describe different types of malware and common signs of an intrusion, and explain how to prevent malware attacks A5.2 explain the importance of maintaining software to increase computer security and maintain hardware and software compatibility C2. use appropriate file maintenance practices to organize and safeguard data C2.2 describe procedures to safeguard data and programs from malware, and devise a thorough system protection plan D2. describe and apply procedures for safe computing to safeguard computer users and their data D2.3 describe procedures to safeguard data and programs from malware

49	High-Wire Mine Cart	<p>Technological Education: Exploring Technologies, Grade 9 Open (TIJ1O) B. Technological Skills</p>	<p>B1. use problem-solving processes and project-management strategies in the planning and fabrication of a product or delivery of a service B1.1 apply the steps of a design process or other problem-solving process to plan and develop products and services B1.2 apply the steps and/or techniques of appropriate problem-solving processes and methods to solve a variety of problems in different technological areas B1.5 demonstrate the ability to work cooperatively in a group environment to solve problems B2. fabricate products or deliver services, using a variety of resources B2.3 meet all design in creating a product or delivering a service</p>
51	Internet and Email	<p>Business Studies: Information and Communication Technology: The Digital Environment, Grade 11 Open (BTA3O) Digital Literacy</p> <p>Business Studies: Information and Communication Technology: Multimedia Solutions, Grade 12 College (BTX4C) The Electronic Business Environment</p> <p>Technological Education: Computer Engineering Technology, Grade 11 University/College (TEJ3M) A. Computer Technology Fundamentals</p> <p>Technological Education: Computer Engineering Technology, Grade 12 University/College (TEJ4M) A. Computer Technology Fundamentals</p>	<p>demonstrate effective use of tools and techniques of electronic research identify and describe the types of electronic sources that can be used for research explain efficient search techniques that can be used to locate relevant information</p> <p>assess workplace settings from an information and communication technology perspective explain terminology related to computer networks describe a variety of network topologies</p> <p>A4. describe network concepts, services, and security A4.2 explain the fundamental aspects of TCP/IP addressing as it pertains to workstations on a network</p> <p>A4. demonstrate an understanding of network addressing and routing A4.1 describe the function of routed protocols (e.g., IP, IPX) and routing protocols in the transmission of data over a network A4.3 describe IP addressing and subnetting strategies for IP networks</p>

64	Egg Bungee Jump Competition	<p>Mathematics: Principles of Mathematics, Grade 9 Academic (MPM1D) Linear Relations</p> <p>Mathematics: Foundations of Mathematics, Grade 9 Applied (MFM1P) Linear Relations</p>	<p>apply data-management techniques to investigate relationships between two variables demonstrate an understanding of the characteristics of a linear relation <i>Using Data Management to Investigate Relationships</i> interpret the meanings of points on scatter plots or graphs that represent linear relations, including scatter plots or graphs in more than one quadrant pose problems, identify variables, and formulate hypotheses associated with relationships between two variables design and carry out an investigation or experiment involving relationships between two variables, including the collection and organization of data, using appropriate methods, equipment, and/or and techniques describe trends and relationships observed in data, make inferences from data, compare the inferences with hypotheses about the data, and explain any differences between the inferences and the hypotheses</p> <p><i>Understanding Characteristics of Linear Relations</i> construct tables of values, scatter plots, and lines or curves of best fit as appropriate, using a variety of tools, for linearly related and non-linearly related data collected from a variety of sources determine the equation of a line of best fit for a scatter plot, using an informal process</p> <p>apply data-management techniques to investigate relationships between two variables determine the characteristics of linear relations <i>Using Data Management to Investigate Relationships</i> interpret the meanings of points on scatter plots or graphs that represent linear relations, including scatter plots or graphs in more than one quadrant carry out an investigation or experiment involving relationships between two variables, including the collection and organization of data, using appropriate methods, equipment, and/or technology describe trends and relationships observed in data, make inferences from data, compare the inferences with hypotheses about the data, and explain any differences between the inferences and the hypotheses</p> <p><i>Determining Characteristics of Linear Relations</i> construct tables of values and graphs, using a variety of tools, to represent linear relations derived from descriptions of realistic situations construct tables of values, scatter plots, and lines or curves of best fit as appropriate, using a variety of tools, for linearly related and non-linearly related data collected from a variety of sources</p>
75	HEADLIGHTS – Human Electricity Obstacle Course	<p>Technological Education: Exploring Technologies, Grade 9 Open (TJ10) A. Technological Design Fundamentals</p>	<p>A1. demonstrate an understanding of the fundamental concepts and skills required in the planning and development of a product or service, including the use of a design process and/or other problem-solving processes and technique A1.1 describe a design process or other problem solving process for planning and developing products and/or services A1.2 describe problem-solving processes and techniques for solving various kinds of problems in different technological areas A1.6 demonstrate an understanding of the roles of various team members in a group project A2. demonstrate the ability to use a variety of appropriate methods to communicate ideas and solutions</p>

75 (cont)	HEADLIGHTS – Human Electricity Obstacle Course (continued)	Technological Education: Technological Design and the Environment, Grade 11 Open (TDJ3O) (continued) B. Technological Design Skills	B4.1 present a report summarizing the design choices, progress, and results of the design project, with an emphasis on how the design deals with environmental concerns, using a variety of tools B4.2 report and reflect on the decisions they made and their experiences throughout the design process, using appropriate written and/or oral formats
87	Let's Make Concrete	Technological Education: Manufacturing Technology, Grade 10 Open (TMJ2O) A. Manufacturing Technology Fundamentals Technological Education: Construction Engineering Technology, Grade 11 College (TCJ3C) A. Construction Technology Fundamentals Technological Education: Construction Technology, Grade 11 Workplace (TCJ3E) A. Construction Technology Fundamentals Technological Education: Manufacturing Engineering Technology, Grade 11 University/College (TMJ3M) B. Manufacturing Technology Skills	A3. identify and explain how various materials, tools, and equipment are used in the manufacture of products A3.2 describe the properties and characteristics of various natural and manufactured materials and their suitability for use in manufacturing A1. demonstrate an understanding of construction materials, processes, and components A1.2 identify and describe the properties of common natural and manufactured building materials A1.3 identify and describe the processes used to produce a variety of construction materials A5. use construction terminology correctly A5.1 use correct terminology to identify and describe materials, supplies, and structural components A1. identify and describe a variety of construction materials, components, and processes A1.4 identify the materials and methods used to manufacture various construction components A1.5 identify various construction processes A3. use construction terminology correctly A3.1 use correct terminology to identify and describe construction materials A3.2 use correct terminology to describe construction processes and techniques B2. demonstrate an understanding of the appropriate selection of materials to manufacture products to meet specific needs B2.1 demonstrate an understanding of destructive and non-destructive tests to evaluate material properties B2.2 evaluate material properties as they relate to specific project needs

87 (cont)	Let's Make Concrete (continued)	<p>Technological Education: Manufacturing Technology, Grade 11 College (TMJ3C) A. Manufacturing Technology Fundamentals</p> <p>B. Manufacturing Technology Skills</p> <p>Technological Education: Manufacturing Technology, Grade 11 Workplace (TMJ3E) A. Manufacturing Technology Fundamentals</p> <p>Technological Education: Manufacturing Technology, Grade 12 Workplace (TMJ4E) A. Manufacturing Technology Fundamentals</p>	<p>A2. demonstrate an understanding of material conversion processes A2.3 describe and demonstrate the correct use of a variety of processes for forming materials, using various tools and equipment A2.4 describe material conversions such as the separation process; the addition process; the process of making changes to contours; and the process of changing the properties</p> <p>B2. demonstrate a working knowledge of the characteristics of various materials and the proper selection of materials for the manufacture of a product B2.1 identify the factors that affect material selection and suitability for the manufacture of a product</p> <p>A3. describe and demonstrate the correct use of processes required for making material conversions A3.3 describe and demonstrate the correct use of a variety of processes for forming materials, using various tools and equipment</p> <p>A3. demonstrate a working knowledge of the processes required for making material conversions A3.3 demonstrate correct processes for forming materials, using various tools and equipment</p>
89	Infrared Webcam	<p>Science: Science, Grade 10 Academic (SNC2D) E. Physics: Light and Geometric Optics</p> <p>Science: Physics, Grade 12 University (SPH4U) E. The Wave Nature of Light</p>	<p>E1. evaluate the effectiveness of technological devices and procedures designed to make use of light, and assess their social benefits E1.1 analyse a technological device or procedure related to human perception of light, and evaluate its effectiveness [AI, C]</p> <p>E3. demonstrate an understanding of various characteristics and properties of light, particularly with respect to reflection in mirrors and reflection and refraction in lenses E3.2 identify and label the visible and invisible regions of the electromagnetic spectrum E3.7 identify the factors, in qualitative and quantitative terms, that affect the refraction of light as it passes from one medium to another</p> <p>E3. demonstrate an understanding of the properties of waves and light in relation to diffraction, refraction, interference, and polarization E3.3 use the concepts of refraction, diffraction, polarization, and wave interference to explain the separation of light into colours in various situations</p>

90	Pop Bottle Rocket	<p>Science: Physics, Grade 11 University (SPH3U) C. Forces</p> <p>Science: Physics, Grade 12 University (SPH4U) B. Dynamics</p>	<p>C2. investigate, in qualitative and quantitative terms, net force, acceleration, and mass, and solve related problems C2.1 use appropriate terminology related to forces, including, but not limited to: mass, time, speed, velocity, acceleration, friction, gravity, normal force, and free-body diagrams [C] C2.2 conduct an inquiry that applies Newton's laws to analyse, in qualitative and quantitative terms, the forces acting on an object, and use free-body diagrams to determine the net force and the acceleration of the object [PR, AI, C] C2.5 plan and conduct an inquiry to analyse the effect of forces acting on objects in one dimension, using vector diagrams, free-body diagrams, and Newton's laws [IP, PR, AI, C]</p> <p>C3. demonstrate an understanding of the relationship between changes in velocity and unbalanced forces in one dimension C3.1 distinguish between, and provide examples of, different forces, and describe the effect of each type of force on the velocity of an object C3.3 state Newton's laws, and apply them, in qualitative terms, to explain the effect of forces acting on objects</p> <p>B1. analyse technological devices that apply the principles of the dynamics of motion, and assess the technologies' social and environmental impact B1.1 analyse a technological device that applies the principles of linear or circular motion [AI, C]</p> <p>B2. investigate, in qualitative and quantitative terms, forces involved in uniform circular motion and motion in a plane, and solve related problems; B2.3 analyse, in qualitative and quantitative terms, the relationships between the force of gravity, normal force, applied force, force of friction, coefficient of static friction, and coefficient of kinetic friction, and solve related two-dimensional problems using free-body diagrams, vector components, and algebraic equations [AI, C] B2.5 analyse, in qualitative and quantitative terms, the relationships between the motion of a system and the forces involved, and use free-body diagrams and algebraic equations to solve related problems [AI, C]</p>
93	Water for the World	<p>Technological Education: Exploring Technologies, Grade 9 Open (TIJ10) B. Technological Skills</p> <p>C. Technology, the Environment, and Society</p>	<p>B1. use problem-solving processes and project-management strategies in the planning and fabrication of a product or delivery of a service B1.3 identify and discuss solutions that have been developed to address key technological problems or meet human needs in various areas of technology B1.5 demonstrate the ability to work cooperatively in a group environment to solve problems</p> <p>C2. demonstrate an awareness of how various technologies affect society, as well as how society influences technological developments C2.5 describe how social and economic factors influence the development and use of technology</p>

93 (cont)	Water for the World (continued)	<p>Technological Education: Health Care, Grade 10 Open (TPJ2O) C. Health Care, the Environment, and Society</p> <p>Technological Education: Manufacturing Technology, Grade 10 Open (TMJ2O) A. Manufacturing Technology Fundamentals</p> <p>B. Manufacturing Technology Skills</p> <p>Technological Education: Technological Design, Grade 10 Open (TDJ2O) B. Technological Design Skills</p> <p>C. Technology, the Environment, and Society</p> <p>Technological Education: Technological Design and the Environment, Grade 11 Open (TDJ3O) B. Technological Design Skills</p> <p>C. Technology, the Environment, and Society</p>	<p>C1. demonstrate an understanding of environmental issues related to health care and personal well-being C1.1 identify current environmental issues and describe their implications for human health and well-being</p> <p>A2. demonstrate an understanding of how a design process is used in the planning and development of a manufacturing project A2.1 identify and describe the steps of a design process used to plan and develop solutions to challenges in manufacturing technology</p> <p>B1. apply an appropriate design process to plan and develop a product B1.1 follow a design process that includes identification of the particular need or problem, consideration of design criteria and constraints, development of multiple solutions, selection of the optimal solution, evaluation of the product, and life cycle assessment (LCA);</p> <p>B3. create and test models using a variety of techniques, tools, and materials B3.3 assess models and/or prototypes on the basis of prescribed criteria</p> <p>C2. describe how society influences technological innovation and how technology affects society C2.1 describe how society influences the development and use of technology C2.2 describe how various technological innovations have affected quality of life</p> <p>B1. use appropriate tools and strategies to research, plan, and organize design projects that have environmentally sound designs and production processes B1.2 investigate and describe economic and environmental factors that should be considered during the design process</p> <p>C1. demonstrate an understanding of environmentally responsible design practices and strategies, and apply them in the technological design process and related activities C1.2 describe and apply best practices for conserving energy and other resources when designing a product or process</p> <p>C2. describe how society influences technological innovation and how technology affects society C2.1 research and report on how society influences technology C2.2 describe how technological design has benefited society</p>
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93 (cont)	Water for the World (continued)	<p>Technological Education: Manufacturing Engineering Technology, Grade 11 University/College (TMJ3M) A. Manufacturing Technology Fundamentals</p> <p>Technological Education: Manufacturing Technology, Grade 11 College (TMJ3C) A. Manufacturing Technology Fundamentals</p>	<p>A2. demonstrate an understanding of the steps and processes required to produce a product A2.2 identify and analyse the factors that must be considered when planning production</p> <p>A1. demonstrate an understanding of how a design process is used in the planning and development of a manufacturing project A1.4 use brainstorming strategies, web diagrams, and trial-and-error activities as part of the design process to develop the best possible solution to a manufacturing challenge</p>
94	Edible Cell	<p>Science: Biology, Grade 10 Academic (SNC2D) B. Biology: Tissues, Organs, and Systems of Living Things</p> <p>Science: Biology, Grade 10 Applied (SNC2P) B. Biology: Tissues, Organs, and Systems</p>	<p>B2. investigate cell division, cell specialization, organs, and systems in animals and plants, using research and inquiry skills, including various laboratory techniques B2.3 examine different plant and animal cells under a microscope or similar instrument, and draw labelled biological diagrams to show how the cells' organelles differ [PR, C] B3. demonstrate an understanding of the hierarchical organization of cells, from tissues, to organs, to systems in animals and plants B3.3 explain the links between specialized cells, tissues, organs, and systems in plants and animals</p> <p>B2. investigate cell division, cell specialization, and the organization of systems in animals, including humans, using various laboratory techniques B2.3 investigate, using a microscope or similar instrument, cell specialization in the human body, focusing on different types of human cells, and draw labelled biological diagrams of each type of cell [PR, C] B3. demonstrate an understanding of the hierarchical organization of cells, from tissues, to organs, to systems in animals, including humans B3.2 describe the structure, function, and importance of specialized cells and tissues in multi- cellular organisms</p>