



Are you ready for the 2019 Applied Science & Technology Exam?

So what's this document for?

This document is designed to help you get prepared for the Secondary 4 Applied Science & Technology exam.

Often parents and teachers will ask you 'Are you ready for the exam?'. Normally it is quite a difficult question to answer. That's where this document can help you.

This document is made up of a list of statements that you can use to assess which area(s) require more study. Simply read and reflect on each statement and decide whether or not you can place a checkmark in the 'yes' or 'not yet' column.

So, what if I'm NOT ready?

Don't panic! Knowing that there are some areas that require more work is a good thing as it gives you chance to do something about it and get better prepared.

The first and best resource is always your teacher; ask him/her for some extra explanations/help/resources.

There are some additional resources, however, that you can use.

You can login to the [LEARN](#) website to access the following resources:

- * [Success Checker](#) provides multiple choice questions to help check your knowledge
- * [SOS LEARN](#) offers live on-line tutorials

If your teacher has signed you up for the [Explore Learning](#) web site you can use the 'Gizmo' simulations to reinforce your learning.

What this document isn't . . .

This document is designed to help you prepare for the exam and give you an idea of which area(s) of the curriculum you need to focus on.

In the exam itself you will need to be able to APPLY these concepts in new situations and contexts, so simply having the knowledge isn't necessarily enough. For this reason, placing a checkmark in every 'Yes' box may NOT guarantee that you will "ace" the exam. However, your chances of success will greatly improve.

EARTH & SPACE

	Yes	Not Yet
Hydrosphere: Catchment Area		
I can define a catchment area as ' <i>a territory surrounding a waterway' (an area of land in which all the surface water drains into the same place)</i>		
I can describe and interpret some of the impacts of human activity on the waterways in a catchment area		
Atmosphere: Cyclone and Anticyclone		
I can explain the formation of cyclones (low-pressure areas) and anticyclones (high-pressure areas)		
Renewable and Non-Renewable Energy Resources		
I can describe technologies used to produce electricity using the energy resources in the lithosphere, hydrosphere and atmosphere		
I can describe the main impact of the use of energy resources in the lithosphere, hydrosphere and atmosphere		
Concepts related to Astronomy: Earth-Moon System		
I can describe the tides in terms of the gravitational effect of the Sun and Moon		

THE MATERIAL WORLD

	Yes	Not Yet
Chemical Changes: Combustion		
I can describe the recognizable manifestations of rapid combustion		
I can explain a combustion reaction using the fire triangle (oxidizing agent, fuel, and ignition temperature)		
Chemical Changes: Oxidation		
I can represent an oxidation reaction using the particle model		
I can associate known chemical reactions with oxidation reaction		
Electricity and Electromagnetism: Electrical Charge		
I understand that different particles have different charges (i.e. that a proton has a positive charge, a neutron has neutral (no) charge and an electron has a negative charge)		
I understand that two objects with similar electrical charges will repel each other and that two objects with opposite electrical charges will attract each other		
Electricity and Electromagnetism: Static Electricity		
I can describe static electricity as the transfer of electrons from one body to another		
I can predict how electrons will transfer based on a triboelectric series or a series of actions (conduction, friction)		
I understand Induction as the displacement of negative charges within a neutral object when it is close to a charged object		
Electricity and Electromagnetism: Ohm's Law		
I can explain the relationship between voltage, resistance and current intensity in an electrical circuit		
I can use the equation ($V=RI$) or graph to determine voltage, resistance and current intensity in an electrical circuit		
Electricity and Electromagnetism: Electrical Circuits		
I can describe the function of different components of an electrical circuit		



THE MATERIAL WORLD *(continued)*

	Yes	Not Yet
I can identify the two main types of electrical circuits (series, parallel)		
I can explain the differences between alternating and direct current		
I can recognize the symbols used in circuit diagrams		
I can represent a simple electrical circuit using a diagram and appropriate symbols		
Electricity and Electromagnetism: Relationship between Power and Electrical Energy		
I understand the relationship between power, voltage and current intensity		
I can use the equation ($P = VI$) or graph to determine power, voltage and current intensity in an electrical circuit		
I can explain the relationship between the power of an electrical appliance, the electrical energy it consumes and the amount of time it is in operation		
I can use the equation $E = P\Delta t$ to calculate the electrical energy consumed, the power of an electrical appliance and the amount of time it is in operation		
Electromagnetism: Forces of Attraction / Repulsion		
I understand that for magnets, different poles attract, while similar poles repel		
I can describe and interpret the magnetic field of a magnet and behaviour of a compass in the magnetic field of a magnet		
Electromagnetism: Magnetic Field of a Live Wire		
I can describe and interpret the magnetic field produced by a current-carrying wire (right-hand rule or left-hand rule)		
I can identify ways of modifying the intensity of the magnetic field produced by a current-carrying wire (type of wire, current intensity)		
I can compare the behaviour of a compass in the magnetic field of a magnet with that of a current-carrying wire		



THE MATERIAL WORLD *(continued)*

	Yes	Not Yet
Electromagnetism: Magnetic Field of a Solenoid		
I can interpret the magnetic field produced by a solenoid (right-hand rule or left-hand rule)		
I can name ways of changing the intensity of the magnetic field produced by a solenoid (nature of the core, intensity of the current, number of turns)		
Electromagnetism: Electromagnetic Induction		
I can describe ways of inducing electrical current in a wire		
Transformation of Energy: Law of Conservation of Energy		
I can explain the law of conservation of energy		
I can apply the law of conservation of energy in different situations		
Transformation of Energy: Energy Efficiency		
I can define energy efficiency of a device or system as <i>'the proportion of energy consumed that is transformed into effective work'</i>		
I can determine the energy efficiency of a device by using the formula Energy Efficiency = $\frac{\text{amount of useful energy}}{\text{amount of energy consumed}} \times 100$		
I can explain how to improve the energy efficiency of an electrical appliance		
Fluids: Archimedes' Principle		
I can describe the relationship between the weight of the water displaced by an immersed body and the buoyant force		
I can explain the buoyancy of a body in terms of Archimedes' principle		
Fluids: Pascal's Law		
I can recognize technical objects or technological systems whose operation is based on Pascal's principle		
I understand the concept of pressure qualitatively and quantitatively ($P=F/A$) and how its related to Pascal's Law		



THE MATERIAL WORLD *(continued)*

	Yes	Not Yet
Fluids: Bernoulli's Principle		
I can describe the relationship between the velocity of a fluid (air, water, and other liquids) and its pressure		
I can explain the concept of lift in terms of Bernoulli's principle		
Force and Motion: Force		
I can describe the effects produced by a force (change in the state of motion of a body, distortion of a body)		
Force and Motion: Types of Forces		
I can recognize different types of forces (including magnetic, gravitational, and frictional forces) in technical objects or technological systems		
Force and Motion: Equilibrium of Two Forces		
I can understand and describe conditions under which a body subjected to two forces can be in equilibrium		
Force and Motion: Relationship between Constant Speed, Distance and Time		
I can explain the relationship between speed, distance and time		
I can use the equation $v = d/\Delta t$ to calculate speed, distance and time		
Force and Motion: Distinction between Mass and Weight		
I can explain the relationship between mass and weight		
I can use the equation $F_g = mg$ to calculate mass and weight		

THE TECHNOLOGICAL WORLD

	Yes	Not Yet
Graphical Language		
I can interpret an exploded view drawing of a technical object		
I can identify and use force and motion symbols		
I can recognize the types of lines used in graphic representations		
Graphical Language: Multiview Orthogonal Projection		
I can draw a multiview orthogonal projection of a simple object.		
I can interpret assembly drawings of technical objects consisting of a small number of parts		
Graphical Language: Functional Dimensioning		
I can define functional dimensioning as <i>'the set of specific tolerances related to certain parts responsible for the smooth operation of an object'</i>		
I understand that play is <i>'the space allowed between two parts to ensure that they can move freely'</i>		
Graphical Language: Developments (Prism, Cylinder, Pyramid, Cone)		
I understand how three-dimensional shapes (prism, cylinder, pyramid, cone) can be created from sheet stock		
I can draw developments of simple solids		
Graphical Language: Standards and Representations		
I can choose the appropriate type of diagram for a given representation		
I can represent different types of motion related to the operation of an object using the appropriate symbols (rectilinear translation, rotation, helical)		

THE TECHNOLOGICAL WORLD *(continued)*

	Yes	Not Yet
Mechanical Engineering: Adhesion and Friction of Parts		
I can describe the advantages/ disadvantages of the adhesion and friction of parts in a technical object		
I understand the factors that affect adhesion and friction		
Mechanical Engineering: Linking of Mechanical Parts		
I can recognize and describe the characteristics of the links in a technical object (direct or indirect, rigid or flexible, removable or permanent, partial or complete)		
I can determine the characteristics of links that are most suitable in the design of a technical object		
I can judge the choice of assembly solutions in a technical object		
I can explain the purpose of limiting motion (degree of freedom) in a technical object		
I can explain the choice of a type of link in a technical object.		
Mechanical Engineering: Guiding Control		
I understand that Guiding is the function performed by a component that controls the motion of a moving component so that it follows a specific trajectory		
I can identify components that guide in a technical object		
I can explain the choice of a type of guiding control in a technical object		
Mechanical Engineering: Motion Transmission Systems		
I understand the construction and characteristics of friction gears (wheels) as a motion transmission system		
I understand the construction and characteristics of pulleys and belt as a motion transmission system		
I understand the construction and characteristics of a gear assembly as a motion transmission system		
I understand the construction and characteristics of sprocket wheels and chain as a motion transmission system		

THE TECHNOLOGICAL WORLD *(continued)*

	Yes	Not Yet
I understand the construction and characteristics of wheel and worm gear as a motion transmission system		
I am familiar with the symbols for the above five (5) systems		
I can use the terms “driver component,” “intermediate component” and “driven component” in the explanations of mechanical systems		
I can describe the reversibility of a motion transmission system		
I can explain the choice of a motion transmission system in a technical object		
Mechanical Engineering: Speed Changes		
I can explain speed changes in a technical object		
I can perform a simple calculation of the ratio between the driver and driven components		
Mechanical Engineering: Motion Transformation Systems		
I understand the construction and characteristics of a screw gear system as a motion transformation system		
I understand the construction and characteristics of a cam (and follower) as a motion transformation system		
I understand the construction and characteristics of connecting rods and how they may be used in a motion transformation system		
I understand the construction and characteristics of slides and how they may be used in a motion transformation system		
I understand the construction and characteristics of cranks and how they may be used in a motion transformation system		
I understand the construction and characteristics of rotating slider crank mechanisms as a motion transformation system		
I understand the construction and characteristics of a rack-and-pinion as a motion transformation system		
I am familiar with the symbols for the above seven (7) components/systems		



THE TECHNOLOGICAL WORLD (*continued*)

	Yes	Not Yet
I can use the terms “driver component,” “intermediate component” and “driven component” in the explanation of mechanical systems		
I can describe the reversibility of a motion transformation system		
I can explain the choice of a motion transformation system in a technical object		
I can distinguish between cams and eccentric cams		
Electrical Engineering: Power Supply		
I understand that a power supply has <i>‘the ability to provide an electrical current’</i>		
I can determine the source of current in technical objects with an electrical circuit		
Electrical Engineering: Conduction, Insulation and Protection		
I can analyze the factors that affect electrical conductivity (section, length, nature, temperature of conductor)		
I can use the colour code to determine the electrical resistance of a resistor		
Electrical Engineering: Control		
I can identify unipolar switches		
I can distinguish between unidirectional and bidirectional switches		
Electrical Engineering: Transformation of Energy		
I can identify and explain the transformation of energy (electricity, light, heat, vibration, magnetism) in different components of a circuit		
I can describe the energy transformations (electricity, light, heat, vibration, magnetism) that take place in electrical or electronic appliances		
Electrical Engineering: Other Functions		
I can describe the function of a diode		
I can describe the function of a condenser		

THE TECHNOLOGICAL WORLD *(continued)*

	Yes	Not Yet
I can describe the function of a relay		
Materials: Constraints		
I can define a constraint as ' <i>an external force (shearing, compression, deflection, torsion and tension) that is exerted on materials and that has a tendency to deform them</i> '		
Materials: Characteristics of Mechanical Properties		
I can define certain mechanical properties of materials: ductility, hardness, elasticity, fragility, malleability, resilience and stiffness		
I can explain the choice of a material based on its properties		
Materials: Other Properties		
I can define certain properties of materials : chemical neutrality, corrosion resistance, electrical conductivity, heat resistance, and thermal conductivity		
Materials: Heat Treatments		
I understand that heat treatments can be used to change the properties of materials (quenching increases hardness but fragility as well)		
Materials: Types and Properties		
I can relate the use of thermoplastics to their properties		
I can relate the use of thermosetting plastics to their properties		
I can relate the use of ceramics to their properties		
Materials: Modification of Properties		
I can describe different treatments to prevent degradation of materials		
Manufacturing: Characteristics of Drilling, Tapping, Threading and Bending		
I can describe the characteristics of the tools needed to shape a material		