

Environmental Science & Technology

June 2019 Exam Preparation

MATERIAL WORLD

	Yes	Not Yet
Properties of solutions: Concentration		
I can determine the concentration of an aqueous solution (g/L, percentage, ppm, mol/L)		
Properties of solutions: Electrolytic dissociation		
I can associate the strength of an electrolyte with its degree of dissociation qualitatively		
Chemical changes: Oxidation		
I can associate a chemical equation in which oxygen is one of the reactants with one of the possible cases of an oxidation reaction		
Chemical changes: Salts		
I can determine the molecular formula of the salt produced by the neutralization of a given acid and a given base		
Chemical changes: Types of bonds		
I can define a covalent bond as “a bond resulting from a sharing of electrons”		
I can make a schematic representation of a covalent bond		
I can identify molecules that feature a covalent bond		
I can define an ionic bond as “a bond resulting from the gain or loss of electrons”		
I can make a schematic representation of an ionic bond		
I can identify molecules that feature an ionic bond		
I can associate an ionic bond with an electrolytic substance		
Chemical changes: Stoichiometry		
I can determine the quantities of reactants or products using stoichiometric calculations (gram or mole)		
Chemical changes: Endothermic and exothermic reactions		
I can distinguish an endothermic reaction from an exothermic reaction according to perceptible signs		
I can distinguish an endothermic reaction from an exothermic reaction according to the position of the energy term in the chemical equation		



	Yes	Not Yet
Nuclear change: Nuclear stability		
I can explain nuclear stability as the case where the nucleus of the atom is held together by an optimal number of neutrons		
Nuclear change: Radioactivity		
I can define radioactivity as “the emission of particles or energy by the nuclei of atoms following nuclear transformations”		
I can associate the use of radioactivity with technological applications		
Transformation of energy: Relationship between thermal energy, specific heat capacity, mass and temperature variation		
I can describe qualitatively the relationship between the change in thermal energy (quantity of heat) of a substance, its mass, its specific heat capacity and the variations in temperature to which its exposed		
I can apply the mathematical relationship between thermal energy, mass, specific heat capacity and temperature variation ($\Delta E = Q = mc\Delta T$)		
Transformation of energy: Effective force		
I can define effective force as “the component of the applied force parallel to the direction of travel”		
I can determine graphically the magnitude of the effective force in a given situation		
Transformation of energy: Relationship between work, force and distance travelled		
I can describe qualitatively the relationship between the work done, the force applied on a body and the distance travelled by the body		
I can apply the mathematical relationship between work, effective force and distance travelled ($W = F\Delta d$)		
Transformation of energy: Relationship between mass and weight		
I can describe qualitatively the relationship between mass and weight		
I can apply the mathematical relationship between mass and weight ($F_g = mg$)		
	Yes	Not Yet



Transformation of energy: Relationship between potential energy, mass, acceleration and distance traveled		
I can describe qualitatively the relationship between the potential energy of a body, its mass, its gravitational acceleration and the distance it travels		
I can apply the mathematical relationship between potential energy, mass, gravitational acceleration and the distance travelled ($E_p = mgh$)		
Transformation of energy: Relationship between kinetic energy, mass and speed		
I can describe qualitatively the relationship between the kinetic energy of a body, its mass and its speed		
I can apply the mathematical relationship between kinetic energy, mass and speed ($E_k = \frac{1}{2}mv^2$)		
Transformation of energy: Relationship between work and energy		
I can describe qualitatively the relationship between the work done on a body and the energy change within that body		
I can apply the mathematical relationship between work and energy ($W = \Delta E$)		
Structure of matter: Neutron		
I can describe the position and electrical charge of the neutron in an atom		
Structure of matter: Simplified atomic model		
I can represent an atom of a given element using the simplified atomic model		
Structure of matter: Nomenclature and notation rules		
I can apply nomenclature and notation rules to name the molecule or write the molecular formula of binary compounds		
Structure of matter: Polyatomic ions		
I can recognize the common polyatomic ions(e.g. NH_4^+ , OH^- , NO_3^- , CO_3^{2-} , SO_4^{2-} , PO_4^{3-}) by their name, their formula or their composition		
	Yes	Not Yet
Structure of matter: Concept of the mole		

I can define the mole as the unit of measure of the amount of a substance		
I can express an amount of a substance in moles		
Structure of matter: Avogadro's number		
I can express a quantity of particles using Avogadro's number		
Periodic classification: Atomic number		
I can associate the atomic number of an element with the number of protons it has		
Periodic classification: Isotopes		
I can define isotopes as atoms of the same element whose nuclei have different numbers of neutrons and therefore different atomic masses		
I can define a radioactive isotope as an isotope whose atomic nucleus is unstable		
Periodic classification: Relative atomic mass		
I can explain qualitatively the concept of relative atomic mass		
Periodic classification: Periodicity of properties		
I can define the periodicity of certain properties of elements		
Electricity: Kirchhoff's Laws		
I can describe the distribution of current in various components of an electrical circuit		
I can determine the value of the current flowing in various components of a series or parallel circuit		
I can describe the distribution of the voltage across various components of an electrical circuit		
I can determine the value of the voltage across various components of a series or parallel circuit		
I can determine the value of the equivalent resistance of a series or parallel circuit using Ohm's law and Kirchhoff's laws		
Electricity: Electrical field		
I can describe qualitatively the effect of an electrical field on electrically charged particles		
	Yes	Not Yet
Electricity: Coulomb's Law		

I can apply the mathematical relationship between the electrical force, the magnitude of the electrical charges and the distance separating these charges ($F = kq_1 q_2 / r^2$)		
Electromagnetism: Magnetic field of a solenoid		
I can describe 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)		
I can explain the use of solenoids in technological applications		



LIVING WORLD

	Yes	Not Yet
Ecology: Ecological footprint		
I can explain the concept of ecological footprint		
Ecology: Ecotoxicology		
I can define a contaminant as <i>“an agent that causes changes in the physical, chemical or biological properties of an environment or an organism”</i>		
I can define bioaccumulation as <i>“the process by which a contaminant from the environment or food supply accumulates in an organism”</i>		
I can explain bioaccumulation in food chains (biomagnification)		
I can define bioconcentration as <i>“a special case of bioaccumulation by which an organism accumulates a contaminant through direct contact with its environment (from sources other than food)”</i>		
I can define the toxicity threshold of a substance as <i>“the minimum concentration of a substance that produces a significant harmful effect in an organism (mg/kg of the organism’s mass)”</i>		
I can describe factors that influence the toxicity of a contaminant		
Genetics		
I can define heredity		
I can define a gene as being, in most cases, <i>“a DNA segment that carries the code for synthesizing one or more proteins”</i>		
I can describe the composition (nitrogen bases, sugar, phosphate) and the overall structure (bonding of bases on the double helix) of a DNA molecule		
I can define what an hereditary trait is		
I can name hereditary traits in an individual or population		
I can define an allele as <i>“a possible form of a gene”</i>		
I can define a homozygote as <i>“an individual with two identical alleles for a particular character trait”</i>		
I can define a heterozygote as <i>“an individual with two different alleles for a particular character trait”</i>		
I can describe the phenomena of dominant and recessive character traits		
	Yes	Not Yet

Genetics (<i>continued</i>)			
I can define genotype			
I can define phenotype			
I can describe an individual's genotype and phenotype for a character trait			
I can describe the role of DNA in protein synthesis			
I can explain the phenomena of transcription and translation of a strand of DNA			
I can explain the relationship between the crossbreeding carried out by humans on animals and plants and the desired traits obtained			

EARTH AND SPACE

	Yes	Not Yet
Lithosphere: Soil Depletion		
I can explain how human activities contribute to soil depletion		
Lithosphere: Buffering capacity		
I can define buffering capacity of a soil as <i>“its ability to limit pH variations”</i>		
I can explain the advantages of a good soil buffering capacity		
Lithosphere: Contamination		
I can name soil contaminants		
Lithosphere: Phosphorous cycle		
I can describe transformations related to the circulation of phosphorous		
Hydrosphere: Water contaminants		
I can name water contaminants		
Hydrosphere: Eutrophication		
I can explain the natural process of eutrophication of a body of natural water		
I can explain how human activities accelerate the eutrophication of a body of natural water		
Atmosphere: Prevailing winds		
I can describe the effect of prevailing winds on the dispersal of air pollutants in a given region		
Atmosphere: Soil Contamination		
I can name air contaminants		

TECHNOLOGICAL WORLD

	Yes	Not Yet
Graphical language: orthogonal projections		
I can interpret assembly drawings of technical objects consisting of a small number of parts		
Graphical language: axonometric projection (exploded view)		
I can name the characteristics of an exploded view		
I can explain the purpose of exploded views (projection accompanying the assembly instructions or specifications for an object)		
Graphical language: Dimensional tolerances		
I can define tolerance as <i>“the required manufacturing precision (dimensions indicated on the drawing, along with allowances)”</i>		
Mechanical engineering: Degree of freedom of a part		
I can explain the purpose of limiting motion (degree of freedom) in a technical object		
Mechanical engineering: Adhesion and friction of parts		
I can describe the advantages and disadvantages of the adhesion and friction of parts in a technical object		
Mechanical engineering: Motion transformation system		
I can explain the choice of a motion transformation system (screw gear, cams, connecting rods, cranks, slider-crank mechanism, rack-and-pinion drive, eccentric) in a technical object		
Electrical engineering: Conduction, insulation and protection		
I can use the colour code to determine the electrical resistance of a resistor		
I can describe the operation of a printed circuit		
Electrical engineering: Control		
I can distinguish between unipolar and bipolar switches		
I can distinguish between unidirectional and bidirectional switches		
Electrical engineering: Other functions		
I can describe the function of certain electronic components (condenser, diode, transistor, relay)		

	Yes	Not Yet
Materials: Heat treatments		
I can define heat treatments as “ways of changing the properties of materials”		
Manufacturing: Machines and tools		
I can associate shaping processes with the types of materials used		
I can determine the appropriate shaping techniques based on direct observation of technical objects		
Manufacturing: Characteristics of laying out, drilling, tapping and threading		
I can associate laying out (marking) with saving materials, shaping techniques and the types of materials to be shaped		
I can describe the characteristics of the tools needed to shape a material to be machined		
Manufacturing: Direct measurement		
I can explain the purpose of direct measurement (using a ruler) to control the machining of a part		
I can explain the choice of the direct measurement instrument used (a vernier caliper is more precise than a ruler)		
Biotechnology: Cloning		
I can define cloning as “a reproductive process that results in an identical copy of an organism, a tissue or a cell, whether genetically modified or not”		
I can describe the main advantages and disadvantages of cloning		
Biotechnology: Wastewater treatment		
I can describe treatments used to decontaminate wastewater		
Biotechnology: Biodegradation of pollutants		
I can describe ways to promote biodegradation of pollutants		