Ohio Science Correlation (Grade 9)

Reference: Academic Content Standards p.138 (Word document)

Introduction

This document correlates Yenka Science software to the content performance indicators of the Ohio science core curriculum. It highlights specific areas of the curriculum that are covered by Yenka Science and points to resources that will be useful when teaching the material.

The terminology we have used in this document is as follows:

- **Product***:* this is the relevant Yenka Science product, covering Physics and Chemistry. These products can be used independently of each other, and more information can be found on the Yenka website.

- **Online activity**: these are lesson plans for classroom activities for use with the Yenka software. Students work through these independently by interacting with a Yenka simulation, following notes and answering questions to learn about an aspect of the curriculum material. Some of these lesson kits are suitable for use as a whiteboard presentation, and are referred to as *online demonstrations.*

- **Model***:* a short pre-made Yenka model with instructions, which will give pupils the opportunity to apply their knowledge of a subject. These models are found under the *Content* tab when Yenka is opened.

Since all the Yenka Science titles are simulators, they will help you to cover other areas of the curriculum too. This is just a list of the activities and models that are currently available; there are plenty of other experiments you can simulate. You may wish to look at the tutorials under *Getting Started* in Yenka, and the *training videos* provided on the website, to explore more of the potential uses of the software, and show you how to create your own models.

Earth and Space Sciences

Area	Indicator	Product	Content
The Universe	2. Describe the current scientific evidence that supports the theory of the explosive expansion of the universe, the Big Bang, over 10 billion years ago.	Yenka Light and Sound	Model: - Doppler Shift
	3. Explain that gravitational forces govern the characteristics and movement patterns of the planets, comets and asteroids in the solar system.	Yenka Motion	Online activity: - Weight Online demonstrations: - Orbit - Projectile with Varying Gravity

Physical Sciences

Area	Indicator	Product	Content
Nature of Matter	4. Show that when elements are listed in order according to the number of protons (called the atomic number), the repeating patterns of physical and chemical properties identify families of elements. Recognize that the periodic table was formed as a result of the repeating pattern of electron configurations.	Yenka Inorganic Chemistry	Related online activities: - Electron Arrangements and the Formulae of Compounds - Periodic Table (1) - Periodicity in Group 1 - Periodicity of Group 7 – Reactions
	7. Show how atoms may be bonded together by losing, gaining or sharing electrons and that in a chemical reaction, the number, type of atoms and total mass must be the same before and after the reaction (e.g., writing correct chemical formulas and writing balanced chemical equations).	Yenka Inorganic Chemistry	Online activities: - **Mass Changes in Chemical Reactions** - **Reactivity Series and Electricity** - Chemical Formulae and Equations - Properties of Ionic Materials - Properties of Covalent Materials See also: - **Mass Changes During Chemical Reactions** - Writing Chemical Equations 1 - Writing Chemical Equations 2 - Writing Chemical Equations 3

	8. Demonstrate that the pH scale (0-14) is used to measure acidity and classify substances or solutions as acidic, basic, or neutral.	Yenka Inorganic Chemistry	Online activities: - Universal Indicator See also: - Mixing Acids and Alkalis - Different Indicators - pH and model: - pH and indicators (Acids, Bases and Salts)
	9. Investigate the properties of pure substances and mixtures (e.g., density, conductivity, hardness, properties of alloys, superconductors and semiconductors).	Yenka Inorganic Chemistry	Online activities: - Substances and Mixtures - Particles in Elements, Compounds and Mixtures - Elements, Compounds, Mixtures and Changing State - Heating Curves
	10. Compare the conductivity of different materials and explain the role of electrons in the ability to conduct electricity.	Yenka Electrochemistry	Online activities: - Cells - Cells II Online demonstrations: - Electrolysis of Lead Bromide - Making a simple cell Model: - Ionic, covalent and metallic (conductivity) (Classifying Materials) See also: - Electrolysis of Sulfuric Acid
Nature of Energy	11. Explain how thermal energy exists in the random motion and vibrations of atoms and molecules. Recognize that the higher the temperature, the greater the average atomic or molecular motion, and during changes of state the temperature remains constant.	Yenka Inorganic Chemistry	Online activity: - The Behaviour of Solids, Liquids and Gases - Heating Curves See also: - States of Matter

			and model: - Solids, liquids and gases (Classifying Materials)
	12. Explain how an object's kinetic energy depends on its mass and its speed ($KE=½mv^2$).	Yenka Motion	Online activity: - Kinetic Energy Formula Models: - Kinetic energy (changing mass) (Energy and Motion) - Kinetic energy (changing speed) (Energy and Motion)
	13. Demonstrate that near Earth's surface an object's gravitational potential energy depends upon its weight (*mg* where *m* is the object's mass and *g* is the acceleration due to gravity) and height (*h*) above a reference surface ($PE=mgh$).	Yenka Motion	Online activity: - Work Done Against Gravity See also: - Weight
	15. Trace the transformations of energy within a system (e.g., chemical to electrical to mechanical) and recognize that energy is conserved. Show that these transformations involve the release of some thermal energy.	Yenka Motion Yenka Inorganic Chemistry Yenka Motion Yenka Electricity	Online activities: - Mass and Gravitational Acceleration - Investigating Energy Changes in Reactions Online demonstration: - Playground Scenes Model: - Transforming Energy (Electrical Energy)
	16. Illustrate that chemical reactions are either endothermic or exothermic (e.g., cold packs, hot packs and the burning of fossil fuels).	Yenka Inorganic Chemistry	Online activities: - Endothermic Reactions - Energy Changes in Reactions (2) Online demonstrations: - Exothermic Reactions Model: - Endothermic and exothermic (Energy)

			See also: - Reaction - Investigating Energy Changes in Reactions - Combustion
	18. Demonstrate that electromagnetic radiation is a form of energy. Recognize that light acts as a wave. Show that visible light is a part of the electromagnetic spectrum (e.g., radio waves, microwaves, infrared, visible light, ultraviolet, X-rays, and gamma rays).	Yenka Light and Sound	Model: - Electromagnetic spectrum (Waves)
	19. Show how the properties of a wave depend on the properties of the medium through which it travels. Recognize that electromagnetic waves can be propagated without a medium.	Yenka Light and Sound	Online activities: - Wave Refraction 1 - X-rays in Medicine Models: - Absorption of radiation (Waves) - Speed of Sound (Waves)
	20. Describe how waves can superimpose on one another when propagated in the same medium. Analyze conditions in which waves can bend around corners, reflect off surfaces, are absorbed by materials they enter, and change direction and speed when entering a different material.	Yenka Light and Sound	Online activities: - Wave Refraction 1 - Wave Refraction 2 - Refraction – Turning Light - Light Rays 1 Online demonstrations: - Microwave Reflection Interference - Coherence Models: - Absorption of radiation (Waves) - Diffraction (Waves) - Interference (Waves) - Reflection and Refraction (Waves) - Refraction (Optics) See also: - Refraction and Colour

Forces and Motion	21. Demonstrate that motion is a measurable quantity that depends on the observer's frame of reference and describe the object's motion in terms of position, velocity, acceleration and time.	Yenka Motion	Related online activities: - V-T Graphs and Distance 1 - V-T Graphs and Distance 2 - V-T Graphs and Distance 3 - Speed – Basics - Graphs Showing Speed at Different Times Related models: - Acceleration (Describing Motion) - Distance-time graphs (Describing Motion) - Velocity-time graphs (Describing Motion)
	22. Demonstrate that any object does not accelerate (remains at rest or maintains a constant speed and direction of motion) unless an unbalanced (net) force acts on it.	Yenka Motion	Model: - Newton's first law (Force and Acceleration)
	23. Explain the change in motion (acceleration) of an object. Demonstrate that the acceleration is proportional to the net force acting on the object and inversely proportional to the mass of the object. (F net =ma. Note that weight is the gravitational force on a mass.)	Yenka Motion	Online activities: - Force and Acceleration - M and A for Fixed Force - F and A for Fixed Mass Models: - Newton's second law (Force and Acceleration) - Weight (Force and Acceleration) See also: - F = ma - Finding Force - F = ma - Finding Mass - F = ma - Acceleration - F = ma - The Full Set
	24. Demonstrate that whenever one object exerts a force on another, an equal amount of force is exerted back on the first object.	Yenka Motion	Model: - Newton's third law (Force and Acceleration) Online demonstrations: - Orbit - Newton Cradle

	25. Demonstrate the ways in which frictional forces constrain the motion of objects (e.g., a car traveling around a curve, a block on an inclined plane, a person running, an airplane in flight).	Yenka Motion	Online demonstrations: - Inclined Plane - Friction Up and Down a Slope - Sliding Blocks

Scientific Enquiry

Area	Indicator	Product	Content
Doing Scientific Enquiry	2. Research and apply appropriate safety precautions when designing and conducting scientific investigations (e.g., OSHA, Material Safety Data Sheets [MSDS], eyewash, goggles and ventilation).		Safety precautions are highlighted in many of the Yenka activities and demonstrations. In particular, hazards associated with the use of chemicals are pointed out, and students are made aware of the additional safeguards required to conduct the experiments in a real laboratory situation.