



Science Assessment Framework

ICAS
International Competitions and Assessments for Schools



UNSW Global
THE UNIVERSITY OF NEW SOUTH WALES
SYDNEY • AUSTRALIA

Paper	Knowledge area	Measuring and Observing	Interpreting Data	Predicting/Concluding from Data	Investigating	Reasoning/Problem Solving
		Questions may require students, for example, to:				
A (Year 3)	Earth and Beyond	determine similarities and differences between rocks	understand tables relating to planetary data	make a prediction about seasonal changes	investigate seasons and the Sun's movement across the sky	determine how weather affects living and non-living things
	Natural and Processed Materials	observe absorption of liquids by paper towels	interpret tables containing information about household products	draw conclusions about the differences between natural and synthetic materials	understand the need to test and investigate new designs	examine the processes involved in recycling materials
	Life and Living	measure the length of living things	identify habitats for certain living things	examine the function of different body parts of living things	examine differences between living and non-living things	determine characteristics of living things from presented data
	Energy and Change	read a thermometer	interpret results of a test for floating and sinking	predict the magnetic effect of certain objects	investigate the uses of sound	select the most efficient machinery to achieve an outcome
		Questions may require students to do all the above as well as, for example, the following:				
B (Year 4)	Earth and Beyond	observe geographical features including mountains and rivers	identify equipment needed for humans to go into space	understand how sedimentary rocks form	investigate the effect of wind on objects	deduce Earth's rotation from diagrams
	Natural and Processed Materials	observe differences between natural and synthetic materials	understand graphs relating to recycling materials	make conclusions about physical properties of materials	investigate making and using paper	advantages and disadvantages of designs
	Life and Living	identify human senses	use keys to distinguish between animals	predict the effect of change on food webs	experiment about attractants to bees	deduce how humans have affected living and non-living cycles
	Energy and Change	observe changes in ingredients when heated	interpret simple changes in energy	predict the effect of different forces applied to objects	investigate how sounds are made and used	deduce the direction and speed of cogs

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		Questions may require students to do all the above as well as, for example, the following:				
C (Year 5)	Earth and Beyond	observe different cloud patterns	interpret information given on a geological time scale	predict the position of stars at different times of the night	investigate weather patterns	deduce position of shadows during the day
	Natural and Processed Materials	identify crystal structures of simple salts	identify issues relating to pollution from graphical data	examine differences between solids, liquids and gases	carry out and report on simple experiments performed with household materials	examine heat expansion in metals
	Life and Living	measure living things using printed scales	use dichotomous keys to classify living things	identify trends in simple food webs	understand the function of controls in biological experiments	examine differences in teeth in animals
	Energy and Change	examine simple circuits	interpret diagrams relating to the flow of electricity in circuits	draw a conclusion about energy sources	investigate the properties of wind, water and air	use simple electric circuit diagrams
		Questions may require students to do all the above as well as, for example, the following:				
D (Year 6)	Earth and Beyond	observe differences between weathering and erosion	read weather maps	conclude about natural phenomena	investigate variations in air and water temperatures	deduce youngest rock layer from fossil dating
	Natural and Processed Materials	observe differences between fresh and processed foods	examine tables relating to the density of food stuffs	conclude about the chemical composition of coins	distinguish between physical and chemical changes	deduce rates of expansion when metal bars are heated
	Life and Living	differentiate between human body parts	use habitat maps to identify local plants and animals	use food webs to work out relationships between living things	investigate resources needed for survival of living things	identify how habitats can be polluted by human activities
	Energy and Change	examine light globes of different voltages	understand graphs of sounds of different loudness	predict current flow and energy loss in a short circuit	investigate hotspots in a microwave oven	examine the ranges of radio frequencies

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		Questions may require students to do all the above as well as, for example, the following:				
E (Year 7)	Earth and Beyond	measure the size of celestial bodies using ratio scales	interpret graphs about sedimentary data	identify objects from contour maps	investigate properties of rocketry	predict movements from tectonic plates
	Natural and Processed Materials	identify building structures using diagrams and drawings	interpret tables relating to organic and inorganic substances	examine the chemical processes involved in food manufacturing	identify correct laboratory equipment to use in experiments	identify sources of chemical pollution in aquatic and terrestrial environments
	Life and Living	measure animals using relative sizes	use taxonomic keys to differentiate between living things	make inferences from animal dental formulas	examine relationships between variables in biological experiments	determine the trophic position of living things in food chains
	Energy and Change	measure electrical power	examine differences in energy emissions	draw conclusions from data relating to sound	make predictions about reflected and refracted rays of light	calculate speed and acceleration from given formulas
		Questions may require students to do all the above as well as, for example, the following:				
F (Year 8)	Earth and Beyond	examine and identify differences between sedimentary, metamorphic and igneous rocks	interpret diagrams relating to the hydrosphere, lithosphere and atmosphere	compare models of the solar system and universe	investigate advantages and disadvantages of renewable and non-renewable energy	understand the structure of the Earth
	Natural and Processed Materials	observe the particle models of matter	examine graphs relating to changes of state (solid, liquid and gas)	draw conclusions about the properties of solids and non-metals	examine variables associated with the production of common gases	determine the molecular structure of compounds and elements using models
	Life and Living	identify different parts of the cell	classify living and non-living things based on structure and form	understand the function of different systems of the human body	investigate the role of organisms in ecosystems	understand interactions of marine organisms
	Energy and Change	observe transformation of energy into sound, light or heat	identify energy emission differences	conclude how objects may be moved indirectly	draw conclusions about the speed of sound in different mediums	deduce the velocity of moving objects

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G (Year 9)	Earth and Beyond	measure the size of atmospheric phenomena such as cyclones	determine the characteristics of the Sun from graphical and tabulated data	determine the effects of UV light on living and non-living things	generate hypotheses and predictions in relation to the weather	analyse data in relation to luminosity of planets and stars
	Natural and Processed Materials	determine the purpose of dials on measuring equipment	understand the properties of metals	understand representations of simple molecules	establish the sequence in writing up scientific experiments	determine the type of products formed during chemical reactions
	Life and Living	identify and classify living things based on written descriptions	identify pests in Australia from data	understand and use biological terminology	understand methods of random sampling of living things in ecosystems	examine exponential growth in living systems
	Energy and Change	measure power using special instruments	determine the paths of projectiles from a series of photographs or diagrams	determine forces in specific situations	investigate conversions between potential and kinetic energy	deduce relative movement in rotating systems
		Questions may require students to do all the above as well as, for example, the following:				
H (Year 10)	Earth and Beyond	measure geological structures using relative sized objects	interpret relative differences in spectral emission lines	classify stars based on brightness and magnitude	recognise problems associated with extraterrestrial investigations	explain atmospheric phenomena both on Earth and on other planets
	Natural and Processed Materials	identify differences in solvents	understand the properties of acids and bases	identify the effects of alcohol on human functioning	understand the use of substances including catalysts in experiments	establish rules relating to isotopes
	Life and Living	identify organ parts of living things	examine transverse sections of living and non-living things	extrapolate graphical information about growth rates of living things	test the function of specific organs and tissues in living things	classify species using non-traditional methods
	Energy and Change	measure changes in temperature using scales other than Celsius	identify the effects of electric currents on humans	understand the movement of a series of gears	assess the safety risks associated with experiments involving electricity	compare the different forces acting on a body in the air and in water

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I (Year 11)	Earth and Beyond	measure distances using planetary scales	understand the effect of wind chill on the human body	examine evidence relating to the formation of the universe	differentiate between accuracy and precision in experiments	examine effects of magnetic fields on Earth and on other planets
	Natural and Processed Materials	observe differences using planetary scales	use graphs relating to melting points, boiling points, temperature and pressure	determine the implications of the properties of ionic liquids	examine activation energy and the use of catalysts	use the law of constant proportion and the law of conservation
	Life and Living	observe differences between living things at the sub-species level	identify animals based on dental information	estimate populations of living and non-living things in specific environments	perform experiments involving living things	identify the role of genetics in inheritance and mutations in living things
	Energy and Change	observe records showing the movement of Earth's magnetic poles	understand differences between renewable and non-renewable energy	differentiate between AC and DC circuits	understand the relationship between magnetic and electric fields	determine the amount of energy released from different reactions
		Questions may require students to do all the above as well as, for example, the following:				
J (Year 12)	Earth and Beyond	determine the age of geological structures from rock stratigraphy	examine cloud formation and El Nino effect	identify the stages in the evolution of the Sun and other stars	hypothesise about the composition of celestial bodies	predict structures from geological maps
	Natural and Processed Materials	measuring nanotechnology objects	determine the relative abundance of atoms and elements in the universe	relate total dissolved solids to conductivity	understand the effects of various gases on human physiology	determine proportions of atoms in compounds
	Life and Living	measure microscopic organisms using nanometre scales	interpret complex life history cycles of parasites and viruses	classify animals to sub-species level	examine the ethics of the use of living subjects in experiments	examine effects of mutations in DNA and RNA
	Energy and Change	measure macroscopic energy changes such as earthquakes and explosions	identify gravitational effects of the moon on tides	follow the movement of Earth's magnetic poles	identify changes in energy at the sub-atomic level	calculate refraction angles and velocity of earthquake waves



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