NATURAL SCIENCE OLYMPIAD, GRADES 4-6 – EXPLANATIONS

Question No.	Answer	Explanation
1	Δ	Atoms are the smallest particle of a chemical element or matter
		A molecule is formed by two or more atoms. Cells are the basic building blocks of all living things. Organisms are individual living things that carries on the activities of life by means of organs which have separate functions.
2	С	It amplifies the sound i.e. It makes the music louder
		(A) is incorrect because pitch is influenced either by the <i>length</i> of the string OR by the <i>tension</i> of the string.(B) is not a primary function of the instrument.
		(D) is incorrect because pitch is influenced either by the <i>length</i> of the string OR by the <i>tension</i> of the string.
		Since (A) and (D) are opposites, this often indicates that one of them is True, but not here.
3	А	All living organisms reproduce, this is part of the 7 life processes.
		Gemination is the development of a plant from a seed or spore. Only animals hunt for food, except for the Venus Flytrap. Only plants photosynthesize to produce their own food.
4	А	It reflects the light of the Sun.
		(B) is true BUT we cannot detect "moonlight" during bright daily sunshine.
		(C) This distractor is wrong because we often do see the Moon in daylight – if fact this photo shows "first Quarter" which is always visible during the morning.
		(D) If anyone selects this option it shows that their observing (observation) skills are seriously lacking.
5	D	High or low temperature causes the particles of matter to move faster (high) or slower (low) which could result in matter changing from one to another state. EG water (liquid) – low temperature – change into ice (solid) Water (liquid) – high temperature – change into vapor (gas)
		Temperature does have an effect; thus, no effect is incorrect. A change of temperature does cause matter to evaporate, but also can cause matter to freeze or melt. Thus, evaporation is one way of change only. A change of temperature does cause matter to freeze, but also can cause matter to evaporate or melt. Thus, freezing is one way of change only.

6	С	 When a taxi is running, only some of the chemical energy released when the fuel burns in the engine is used to move the vehicle. What is the rest of the energy changed to? C. Both A & B are true NOTE – exam technique {C} and {D} are opposites, so one is correct and the other is incorrect. Now look at {A} and {B} BOTH are correct so {C} is the required answer. 			
7	D	The skeletal system does not contract to produce movement. It is the muscles attached to the skeletal system that contracts and relax that produce movement. The skeletal system protects the internal organs like the heart, lungs and brain. The skeletal system provides stability and support to the body.			
		Red blood cells are formed in the red bone marrow of bones, which is part of the skeletal system.			
8	В	 The SKA is far from complete. Completion expected in 2029 A) SALT {South African Large Telescope is an optical telescope situated at Sutherland in the West Cape. It has the largest mirror in the Southern Hemisphere.} B) The Square Kilometre Array C) The Hubble Space Telescope is an optical telescope placed in low orbit around the Earth. D) The James Webb Space Telescope is an infrared telescope placed in orbit 1,5 million km away from Earth. The SKA is far from complete. We are only in Stage 0,5 out of FOUR. What has been completed is the 64 Dish Meerkat Array which is a precursor (although with 64 dishes it is the largest current installation in the world). Work on the official Stage 1 of the SKA only started in January 2024. 			
9	С	The temperature at C is high and at D it is low. This shows a decrease in temperature from hot to cool. Thus, it shows that the substance cooled down to reach room temperature. AB does not show a difference in temperature as the straight line indicated. BC shows a difference in temperature from a low to a high temperature. This shows that the substance was heated and not cooled down. DE shows that room temperature was reached, and the temperature stayed the same between these two points.			
10	D	 Q5. Note that the word ALL is in BLOCK CAPITALS this is a key point. A. Solar, wind and natural gas {Natural Gas is NOT renewable} B. Wave, tidal and coal {Coal is NOT renewable} C. Diesel, solar and wind {Diesel is NOT renewable} D. Wind, solar and wave {ALL THREE are renewable} 			

11	D	Metamorphosis is a biological process by which an animal physically develops including birth transformation or hatching, involving a change in the animal's body structure until adulthood.
		Butterflies do change, every time they change, they do not look like the adult animal. Evolve is similar to changing, this does not suggest that the infant animal looks like the adult. It has to go through physical changes first. Baby animals are normally dependent on adult animals for food and protection. Butterflies go through stages and are not dependent on the adult to survive
12	A	Evidence of avian "birdlike" dinosaurs can be seen is the fossil imprint of feathers impressed in the slate from the quarry in Bavaria, so
		(A) some dinosaurs had feathers are correct.
		(B) Flight is NOT limited to dinosaurs e.g. Bats and Insects can fly. Pterosaurs could also fly BUT they were not true dinosaurs.
		 (C). Some dinosaurs had beaks – but so do duck-billed platypus. (D). Some dinosaurs had claws – actually ALL dinosaurs had claws, as do cats and dogs and birds and even people, but no insects have claws.
13	С	A chemical change is any change that causes the new substance to be formed. When wood is burned, ash forms. Ash is a new substance with different chemical composition than wood.
		Wood cannot melt. Thus, this is incorrect.
		Wood cannot boil. Wood is a solid and not a liquid that can boil. Wood can be cut but does not change in chemical structure when cut. It still is wood.
		(Recommendation : Replace the yellow paragraph with the following paragraph in blue) A, B, and D are all examples of substances that undergo physical changes only. No new substances are formed when these changes take place.
14	С	Climate Change question:
		 A. A nuclear Power Station like Koeberg. B. A Pumped-storage Power Station like Drakensberg. C. A Coal-fired Power Station like Kusile. D. A Hydroelectric Power Station like Gariep.
		Only (C) Kusile uses fossil fuels. Both (B) & (D) use hydroelectricity. Koeberg (A) uses uranium fuel rods. Koeberg does produce radioactive waste but this is safe IF CAREFULLY HANDLED.

15	С	Photosynthesis is the conversion of sunlight (light energy) to produce food (chemical energy).
		Respiration is the process of breathing and diffusion by which living things obtain oxygen and excrete waste material.
		Transpiration is the exhalation of water vapor through stomata in plants.
<mark>16</mark>	В	 Q7. The photograph was taken in the Sahara Desert near Cairo, 60 km from the Mediterranean coast. It shows a fossilised skeleton of a whale that died about 40000 years ago. How is it possible for a whale skeleton to be so far from the sea? A. Sea-levels were lower during an ice-age at that time. B. Sea-levels were higher after the end of an ice-age at that time. C. Dinosaurs had dragged the whale carcase carcass far inland. D. Hyaenas had moved the skeleton up the beach. (None of the above)
		Once again the fact that (A) and (B) are opposites should draw the attention of the
		Ich ce again the fact that (A) and (B) are opposites should draw the attention of the learners. Exam technique tells you to pay attention here. (A) cannot be valid as that would have made the whales even further off-shore. (B) looks correct because <i>if the sea level was higher and then retreated, then it is logical that marine animals could have been stranded by the retreating waters (which is exactly what happened).</i> Of course something could have dragged a carcase out of shallow water up the beach BUT this is a whole whale carcase AND it is 60 KILOMETRES from the Mediterranean Coastline. That would have taken a massive vehicle like a bulldozer with tank tracks to drag such a large carcase BUT such vehicles did not exist 40 thousand years ago. So what else is wrong with (C) and (D)?? Firstly (C) dinosaurs had been extinct (except for birds) for over 60 million years AND
		although many dinosaurs were big enough, the largest dinosaurs were herbivores and would not have touched a stinking, rotting whale carcase. Although a T-Rex was carnivorous and big enough to move a carcase <i>a few metres</i> it would have torn pieces of meat out and eaten them on the spot. Lots of small carnivorous dinosaurs, like velociraptor, would have feasted as a pack and not moved the carcass at all. Secondly, the fact that the skeleton was fossilised intact is clear evidence that the carcass was buried undisturbed , so scavengers are out of the question.
		Enrichment : The fossilised whale skeleton is actually one of several dozen marine skeletons lying far inland. Clearly the animals were stranded as the sea-level retreated leaving them trapped in the " <i>Valley of the Whales</i> " (Wadi al Hitan) 150 km SW of Cairo.
17	D	Metals are shiny, solid at room temperature, are malleable, ductile and are good conductors of heat and electricity. Non-Metals are dull. Their states at room temperature vary, they are brittle and are not good conductors of heat and electricity. All of the above is the correct answer.

18	С	Drying morogo in traditional ways.		
		A disadvantage of drying Morogo in th	nis way could be	A B and D are all
		A. The food is preserved naturally wi	thout refrigeration.	advantages.
		B. The process does not require any	electricity.	-
		C. Rainy weather can ruin the produc	ct.	
		D. The dried morogo can easily by re	ehydrated and cooked.	
19	A	A whale is covered with hair and breathe a are considered mammals. Animal X has hair and can fly (not stated in covered with hair makes it a mammal. The are covered with hair. Group B are birds. Their bodies are covered covering of X is different. Group C are fish. Their bodies are covered Group D is a reptile which have scaly bodi	air. It produces milk to such n question paper) – the fac e defining characteristic of ed with feathers and they o d with scales and they can ies.	kle their young. They ct that the body is mammals is that they can fly. The body swim using fins.
20	D	Large Dinosaurs became extinct		
		A. 230 million years ago	The age of the dinosaurs	began about 245
			million years ago and last	ed until the end
		B. 195 million years ago	of the Cretaceous period,	, 66.04 million
		C. 141 million years ago	years ago.	
21	A	Oil is less dense than water. Oil is more vi molecular forces of attraction in oil.	scous than water, so this	points to higher
		The molecules that make up oil is larger th	nan those that make up wa	ater.
		Chemical structure of water is H ₂ 0. Oils ha	ave a complex mixture of h	ydrocarbons, which
		are long chains of carbon and hydrogen at Water molecules are polar and attract eac	toms. In other. Oil molecules are	nonpolar and are not
		very attracted to each other.		
22	В	A house is normally wired using parallel A. During load shedding there is less li B. This ensures that the voltage is the C. This ensures that the same current D. This is false – houses are wired in s	l circuits. The most importa ikely to be damage done to same (230V) throughout flows through every part o series.	ant reason for this is o electrical appliances. the whole house. f the circuit.
N g S h	Note: Tl g <mark>lobes v</mark> SAME e ave the	he common response is usually about if one will still function, BUT what is more import everywhere across the whole house. <i>In para</i> <i>e same voltage. In parallel, ALL parts of th</i>	e globe fuses, <mark>all lights go</mark> tant is that the voltage MU allel, ALL parts of the cir he circuit will always hav	out the remaining JST BE THE cuit will always e the same voltage

	NB: diffe 230V If set Beca they	Because houses are wired in parallel, we can buy different appliances at rent times and switch some ON while others are OFF (e.g. 230V light bulbs, V kettle, 230V TV, refrigerator, etc.). ries was used, the voltage of the lights will change when you switch the kettle on. truse ALL houses are wired in parallel we are able to buy different appliances but are ALL 230volts
23	D	 When human expand their living area, they tend to destroy natural habitats of animals. Plants will be destroyed, and animals will move elsewhere to seek a place to live, feel safe and find food. Because plants are destroyed and animals move, it decreases the overall population numbers in the affected area. There will be increased competition, but most organisms will leave and find new habitats to live in. Because animals leave the affected area, they will be vulnerable in new habitats.
24	D	When plants are removed, insects would not be able to pollinate plants. Valuable topsoil is fragile and prone to being lost. It takes more than 1000 years for good topsoil to form in Nature. If farming too many sheep or cattle than can be sustainably fed by pastures (grazing lands), the removal of plant material which can bind the soil within its roots leads to fragile soil which is easily washed away by rivers or blown away by wind. A. Contamination of ground water sources B. Increased pollution C. Soil erosion D. All of the above Run-off from cattle pens where large numbers of cattle are concentrated and fed in so-called "Feed Lots" can lead to pollution as urine and faeces are washed into drains leading to streams and rivers. This will lead to (A) contamination of ground water sources BUT feed lots do not constitute "overgrazing" as such, and soil erosion does not occur. When farms are "over-grazed" the animals are typically thin and unhealthy. Feed Lots produce high quality meat from healthy-looking animals BUT often the managers use high doses of antibiotics to prevent illness in the crowded conditions. This can lead to bacteria that are resistant to antibiotics. This resistance is transmitted to humans as they consume the meat, and may make medicines we use less effective.
25	A	 A solid has a fixed shape with tightly packed molecules. Iron filings are small solid pieces with fixed particles that seems to flow and take the shape of the container. Yet they considered to be solids. Liquid – Has no definite shape (takes the shape of the container). Has definite volume. Particles are free to move over each other, but are still attracted to each other. Gas – Particle expands Particles move freely and fill the whole container. Has no fixed shape or volume. Plasma – Plasma is superheated matter, so hot that electrons are ripped away from atoms forming an ionized gas.

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26	В	Dat	a Table				
			Average Surface Temperat ure	Composition of the Atmosphere	Average Distance from the Sun	Days needed to orbit the Sun	
		Mercury	300°C	None	58 000 000 km	88 days	
		Venus	470∘C	Mostly carbon dioxide	108 000 00 0 km	225 days	
		Earth	17ºC	78% Nitrogen and 21% oxygen with 0.3% carbon dioxide	150 000 00 0 km	365 ¼ days	
		Which one of A. Merce B. The la C. The la If this D. Merce Merce	of the followin ury absorbs le ury actually a arge amount onger time Ve was valid the away. ury has a roc cury's rocks a	ing reasons correctly ess sunshine becau obsorbs more sunlight of CO_2 in the atmost enus uses to orbit the planets would be line ky surface which reflact the could retain a lot o	explains why se it lacks an a <i>ht BUT it radiat</i> phere of Venus he Sun causes <i>hotter and hotte</i> flects most of th <i>f the heat but t</i>	Venus is hotter than Mercury atmosphere. <i>Tes the heat away</i> s creates a 'greenhouse effe it to heat up more. <i>The FURTHER they are</i> he Sun's heat away. <i>There is no "Greenhouse Effe</i>	'? :ct.' : <i>ect"</i>
27	D	Special attri A, B and C a	butes needeo are all necess	d for life (as we know sary for life as we kr	w it) now it.		
28	A	Cultural gro knowledge i In recent ye and transmi	ups spread k in history was ars Visual art t indigenous	nowledge through tr s shared in this way. t, practical activities knowledge.	raditional storie and written lan	s, most of the indigenous guage are used to represen	t
29	В	Which of the	ese four majo	or planets is describe	ed as rocky?		
			Both (A) P dwarf / mi Neptune is a rocky su	luto and (B) Venus inor planet and this s an Ice Giant and J rface. Venus is one	happen to be F disqualifies Pl upiter is a Gas of the four Ro	ROCKY planets BUT Pluto is a uto. Giant – neither of them has cky planets.	a ;
		A. Sati B. Ver C. Nep D. Jun	urn nus otune iter				
		- P					
30	В	The provide answer wou	d items are fl Ild be B: 1 & 2	exible, water resista 2.	ant and light we	eight, therefore the correct	

31	С	There are three possibilities, either A is brighter OR B is brighter OR A&B are equally bright.
		This is simple to understand – the two lamps have the same resistance AND there is only ONE currentImage: Constraint of themthrough both of them.AB
		This would vary only if the two cells (in series) were to be reconnected in parallel. In which case they would still be equally bright BUT not as bright as they are with the series battery.
32	В	The organ of sexual reproduction in plants are the flowers. Male gametes are found in pollen grains and produced in the anthers of the flower. Female gametes are found in the ovules and produced in the ovary of the flower.
		Water absorption in plants are(is) done by the root systems of plants. The movement of water in the plant is assisted by xylem. Leaves contain chlorophyll that capture sunlight and carbon dioxide to create food for the plant. The root-system of plants assists with anchoring the plant in the ground
33	D	Q13. How many moons did Galileo identify around Jupiter?
		A 95. B. 79. In 1610 Galileo pointed his home-made telescope at
		C. 61. D. 4. Jupiter and spotted FOUR moons orbiting the Gas Giant viz. Io, Calisto, Europa and Ganymede.
		Galileo pointed his telescope at Venus and discovered that it has phases (meaning that it lies closer to the Sun than we do), then he looked at the Moon and realised that it has a rough surface with mountains, craters and flat plains which he thought might be seas (Mare in Latin). He also realised that the cloudy band known as the Milky Way is actually made up of many pin points of light which are distant stars. He also observed the Sun (only near sunrise or sunset) and also used projection onto a white card – in this way he discovered SUNSPOTS and thus that the Sun rotates. Since he was careful, stories that he went blind because of his observations 25 years earlier are false. Galileo did go blind in later life because of cataracts and glaucoma which were unrelated to his earlier solar observations (Look up D. Sobel, "Galileo's Daughter" page 354, Walker & Co., New York 1999).
34	A	The bigger the surface area, the quicker the ice will melt. Because the ice blocks in Bag Q is smaller, it has a bigger surface area than the block of ice in Bag P, therefor bag Q will melt quicker over a period.
35	В	B is correct BUT could be improved to read
		 A. Wrong – kinetic Energy is NOT stored. B. Detential energy in the hew is converted to kinetic energy in the errow on
		release of the bow string.
		C & D are false

36	С	Most phytoplankton are single celled plants. Plants absorb carbon dioxide and produce oxygen for living organism. Coral and jelly fish are classified as marine invertebrates. Since they are invertebrates, they breath oxygen and excrete carbon dioxide. A sea turtle is a vertebrate, they breath oxygen and excrete carbon dioxide.
37	В	 Lunar phases caused by? A. The Moon turns on its axis once a month. B. The Moon orbits the Earth once a month. C. The Earth orbits the Sun once a year. D. Clouds cover part of the Moon.
		The light from the Sun illuminates one half of the Moon – the side away from the Sun is the dark side. The view from Earth changes as the Moon circles the Earth. When the moon is between Earth and the Sun, the dark side is facing Earth and we cannot see the Moon. As the Moon moves around, a thin sliver of the illuminated half become visible to us here on Earth. This is called the "Birth of the Moon." As the Moon moves further and further around the Earth, more and more of the illuminated half becomes visible – this is called " <i>waxing</i> ." First we see a "crescent," then a half, then a ³ / ₄ , and then (two weeks after New Moon) we see the fully illuminated half i.e. "Full Moon." Thereafter the Moon "wanes" over the next 2 weeks until only the dark side faces us.
38	В	A magnet will attract metal objects. The fact that X and Y connects means that they either both magnets or that one is a metal and the other a magnet. Aluminum is not attracted to magnets thus; X and Y will not join. Plastic is not attracted to magnets; thus X and Y won't join.
39	В	 A car is struck by lightning. (Was not included in the question paper) The reason the occupants of the car will be safe from the lightning strike A. is because it has rubber tyres B. is because the metal body conducts the electricity around the car. C. is because the electric charge of lightning is very small. D. this is nonsense – they are NOT safe at all.

		 The principle was explained in 1820 by British Physicist Michael Faraday. A car acts as a "Faraday Cage" because the closed metal body channels the lightning around the passengers, directing the huge charge along the outside until it can jump to the ground. NB: Because like charges repel, on contacting the car body, the LIKE Charges repel and stay as far away from each other as possible thus on the outside of the metal body, so lightening runs down the outside of the car body before jumping the last 15 cm to the ground. NB It has nothing to do with the rubber tyres. Just don't touch the car body and don't stick your hand out of the window.
40	С	The red data book documents rare and endangered species of animal, plants and fungi that exist within an environment.
		Ecosystem books are the interconnected businesses and people that create, publish, distribute and sell books.
		The Ecosystem data book documents a comprehensive record of biological information
		The biodiversity data (book), documents where and when species have been recorded.
		The Green data book is the smallest sized book that provides complete information related to environmental data.