Compete
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Preparatory Material

ICATS SCIENCE CONTEST

Grade 7-8

INTERNATIONAL
CATS CONTESTS
COMPETENCE & APTITUDE TESTING SERVICES
FASTEST GROWING CONTESTS IN PAKISTAN

ICATS SCIENCE Contest 2017

JUVENILES GRADE 7 & 8

INTERNATIONAL CATS CONTESTS

COMPETENCE & APTITUDE TESTING SERVICES

ICATS SCIENCE CONTEST 2017

JUVENILES (GRADE 7 & 8)

TIME ALLOWED : 90 MINUTES
MAXIMUM MARKS : 90
TOTAL QUESTIONS : 30 MCQS

INSTRUCTIONS

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2. INSTRUCTIONS FROM THE EXAMINATION INVIGILATORS MUST BE CARRIED OUT PROMPTLY.
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Q1. **Cellular respiration converts the energy stored in sugars to high-energy molecules called ATP.**

Which cell structure carries out cellular respiration?

A Nucleus

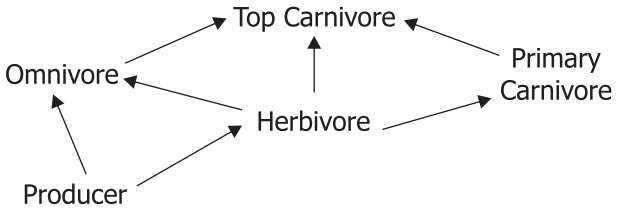
B Chloroplast

C Mitochondrion

D Endoplasmic reticulum

Q2. **The following food web shows the flow of energy between organisms in an ecosystem**

Ecosystem Food Web



More producers are introduced into the ecosystem. How will this introduction likely affect the other organisms in the ecosystem?

A The additional producers may not affect the other organisms because there is plenty of room in the ecosystem for plants.

B The number of organisms may decrease because the producers will require more energy, which they will receive from the other organisms.

C The additional producers may decrease the number of herbivores because they may outcompete the herbivores for energy from the omnivores.

D The number of organisms may increase because plants provide energy to primary consumers, which then transfer energy to the carnivores

Q3. **Which chemical equation is balanced to show that mass is conserved during the reaction?**

A $Na + Cl_2 \longrightarrow NaCl$

B $2H_2O_2 \longrightarrow 2H_2O + O_2$

C $CH_4 + O_2 \longrightarrow CO_2 + 2H_2O$

D $AgNO_3 + MgCl_2 \longrightarrow AgCl + MgNO_3$

Q4. **Which table describes adaptations that allow organisms to survive in a desert environment?**

A

Organism	Adaptation to Environment
Plant	Sharp needles for protection
	Thick stems that store water
Animal	Hump of fatty tissue that cools animal
	Nostrils that close, trapping exhaled water vapor

B

Organism	Adaptation to Environment
Plant	Leaves drop off trees to avoid fungal infection
	Produces cones that protect seeds
Animal	White-colored fur to blend in with environment
	Active at night and sleep during day

C

Organism	Adaptation to Environment
Plant	Broad, flat leaves that capture sunlight
	Deep roots that anchor plant during windstorms
Animal	Dark-colored fur that absorbs heat
	Sharp claws for digging in soil

D

Organism	Adaptation to Environment
Plant	Produces colorful flowers to attract pollinators
	Grows long vines to climb toward sunlight
Animal	Oily fur for water resistance
	Webbed feet for swimming in water

Q5. **The following image shows Device X, found in a power grid system**

What is the role of this device within the electrical grid system?

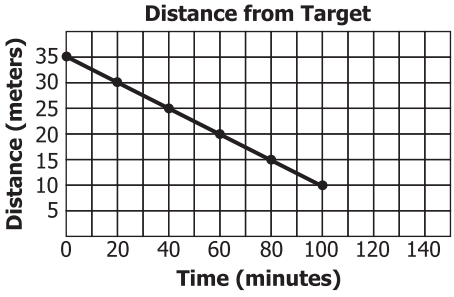
A It is a generator that produces the current needed inside the home.

B It is a distributor that diverts power from the distribution line to the home.

C It is a transformer that reduces the voltage between the power line and the home.

D It is a regulator that limits the amount of electric power in the wire to the home.

Q6. **The following graph shows the distance of an object from its target every 20 minutes.**



If the object's speed is constant, when will it reach its target?

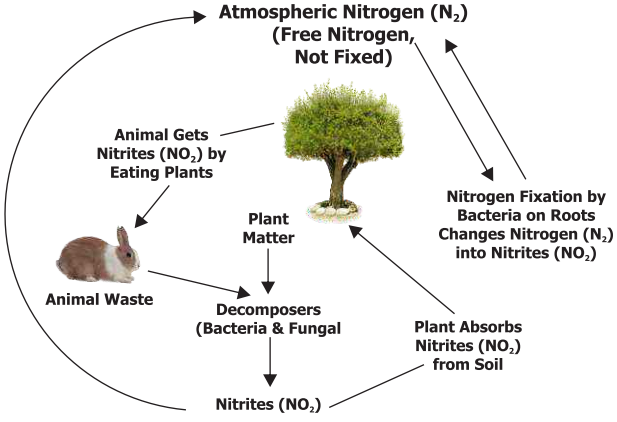
A about 105 minutes

B about 110 minutes

C about 120 minutes

D about 140 minutes

Q7. **The following diagram shows the nitrogen cycle.**



Animals need nitrite (NO_2) to make proteins. Nitrogen (N_2) is found in the air but is not in a form that animals can use. Through the nitrogen cycle, nitrogen from the atmosphere becomes nitrite.

Which of these can be concluded about the importance of bacteria in the nitrogen cycle?

A Bacteria are important because they make nitrites that animals need.

B Bacteria are important because they change nitrogen into nitrites that animals need.

C Bacteria are important because they allow plant roots to absorb nitrites from the air.

D Bacteria are important because they decompose plant matter that compete with living plants for nitrites.

Q8. **Lisa learned that there may be a link between global warming and stronger hurricanes. She decided to follow these guidelines in order to reduce levels of carbon dioxide (CO_2).**

- **Walk more.**
- **Use recycled paper.**
- **Use energy-efficient appliances.**
- **Use fluorescent bulbs instead of incandescent bulbs.**

Which statement logically explains whether these methods are useful in decreasing global warming?

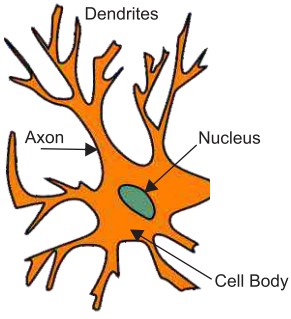
A These methods are not useful because they all release CO_2 into the atmosphere.

B These methods are not useful because they all release heat energy into the atmosphere.

C These methods are useful because they all reduce the amount of CO_2 released into the atmosphere.

D These methods are useful because they all reduce the use of renewable energy sources instead of fossil fuels.

Q9. **Chris viewed the following cell through a microscope lens.**



Which type of cell is Chris observing?

A Nerve cell

B Bone cell

C Blood cell

D Muscle cell

Q10. **Which situation is explained by Newton's first law of motion?**

A A basketball bounces upward when it is dropped on the floor.

B You can lift more mass with the same force using a longer lever.

C Even though you stop pedaling your bicycle, you keep moving forward.

D More fuel is required to accelerate a large truck than is required to accelerate a small car.

Q11. **A certain virus causes people to catch colds and other infections more easily.**

Which body system does the virus affect?

A Circulatory **B** Digestive **C** Immune **D** Nervous

Q12. **A sewer system operator would like to use electromagnetic radiation to destroy bacteria and other organisms in filtered wastewater before it is released into the environment.**

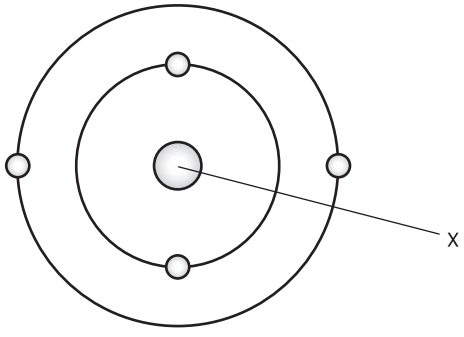
Which type of electromagnetic radiation is capable of treating the wastewater?

A Ultraviolet **B** Infrared **C** Visible **D** Radio

Q13. **Which of these is a renewable energy resource that does not produce carbon dioxide?**

A Coal **B** Wind **C** Biomass **D** Fossil fuel

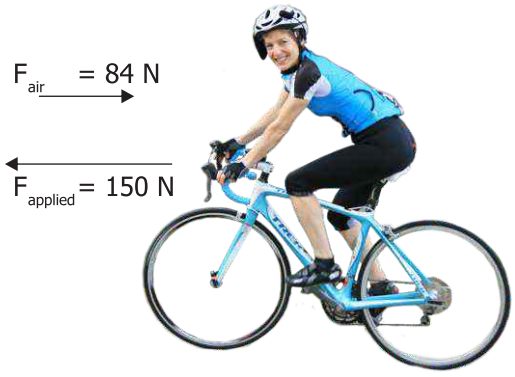
Q14.



Which of these best describes one of the subatomic particles that could be found at location X in the model of an atom shown above?

A It has mass but no charge.
B It has no mass and a positive charge.
C It has a large mass and a negative charge.
D It has no mass and an equal number of positive and negative charges.

Q15. **The diagram below shows two different forces acting on a cyclist riding a bicycle.**



The total mass of the cyclist and the bicycle is 100.0 kg. Based on this information, what is the acceleration of the cyclist?

A 0.66m/s² backward, because the force of the air slows the cyclist down

B 0.66m/s² forward, because the applied force is greater than the force of the air

C 2.3m/s² backward, because the forces are opposite and not equal

D 2.3m/s² forward, because the cyclist's inertia is greater than the force of the air

Q16. **Which list of characteristics describes organisms classified as animals?**

A Unicellular, prokaryotic, autotrophic

B Multicellular, eukaryotic, heterotrophic

C Unicellular, eukaryotic, heterotrophic

D Multicellular, eukaryotic, autotrophic

Q17. **The table shows the chemical formulas for four substances.**

Substance	Chemical Formula
1	C_2H_6O
2	C_8H_{18}
3	CH_3CH_2Br
4	$C_4H_{10}O$

Which substances have the same number of carbon atoms?

A Substances 1 and 2

B Substances 2, 3, and 4

C Substances 2 and 3 only

D Substances 1 and 3

Q18. **The list includes six situations.**

- **A book sliding across a table at a constant speed**
- **A ball sitting on a shelf**
- **A can rolling down a ramp**
- **A swing moving back and forth**
- **A car traveling at a constant speed of 15 m/s**
- **A bird landing on a branch**

Which objects in the list experience an unbalanced force?

A The book, the ball, and the car

B The ball, the car, and the bird

C The can, the swing, and the bird

D The book, the ball, the can, and the swing

Q19. **A clerk at a hardware store performed the activities in the list.**

Activities:

1. Pushed a 300 N box for 5 m across a floor using 110 N of force
2. Lifted a 490 N box of tools from the floor to a shelf 1.5 m high
3. Held a 50 N clay pot for 4 minutes for a customer while the customer did more shopping

Which statement best describes the amount of work performed for the three activities?

A Activity 3 required more work than Activity 1, but Activity 3 did not require more work than Activity 2.

B Activity 1 required the same amount of work as Activity 3.

C Activity 2 required the most work.

D Activity 1 was the only activity that required work.

Q20. **Black walnut trees produce a nontoxic chemical that becomes highly toxic when it is exposed to air or soil. How does this chemical help black walnut trees compete with plants growing nearby?**

A By attracting herbivores to the other plants

B By suppressing the growth of the other plants

C By increasing the photosynthesis rates in the other plants

D By limiting the amount of water available to the other plants

Q21. **Clouds are formed when millions of drops of water become suspended in the air. Which of the following is a step in the process of cloud formation?**

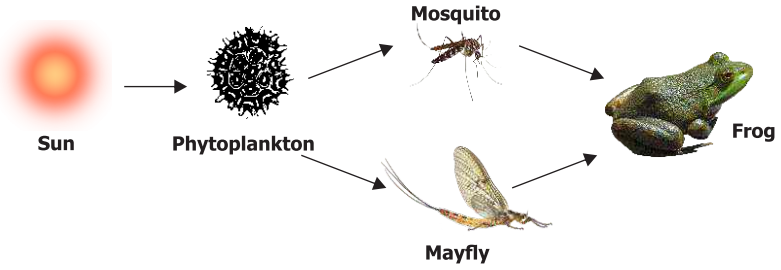
A Expansion of cold air

B Formation of Carbon dioxide

C Condensation of water vapor

D Breakdown of atmospheric ozone

Q22. **Some people created a water pond on their property. The following diagram shows the food web for this pond.**



The owners of the property sprayed insecticide that destroyed the mosquito eggs. How will this affect the flow of energy in the food web?

A Without mosquitoes available as a food source, less energy will be available to the frogs.

B Without mosquitoes available as a food source, less energy will be available to the phytoplankton.

C Without competition from mosquitoes, more energy will be available to the frogs.

D Without competition from mosquitoes, other insects will move into the pond area to prey pon the frogs.

Q23.

Unknown Liquids Data

Sample	Indicator	Color Change	Identification
Unknown 1	Litmus Paper	Red	Acid
Unknown 2	Litmus Paper	Pink	Acid
Unknown 3	Litmus Paper	Pink	Acid
Unknown 4	Litmus Paper	Blue	Base

Students conducted an investigation to determine if unknown liquids were acids or bases. What was the independent variable in this investigation?

A Sample

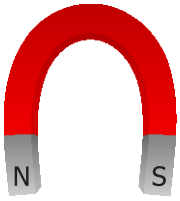
B Indicator

C Color change

D Identification

Q24. **Which magnet below would provide the best example for the magnetic poles and magnetic fields of Earth?**

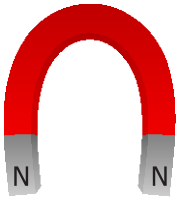
A



B

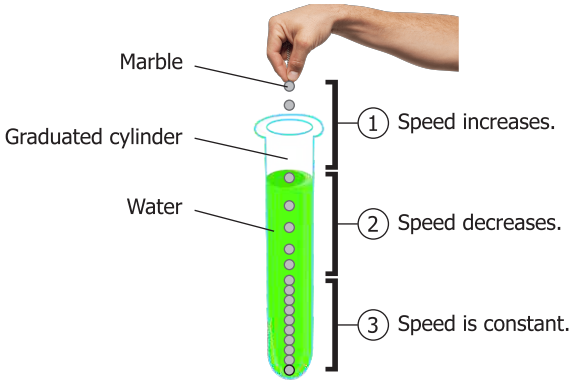
C

D



Q25. **A student used a video camera to record another student dropping a marble through water in a graduated cylinder. The students watched the video in slow motion and made the observations shown below.**

Marble Drop Experiment



During which part or parts of the marble's fall did the marble experience unbalanced forces?

A Part 1 only

B Parts 1 and 2 only

C Part 3 only

D Parts 2 and 3 only

Q26. **Which combination of substances is a compound?**

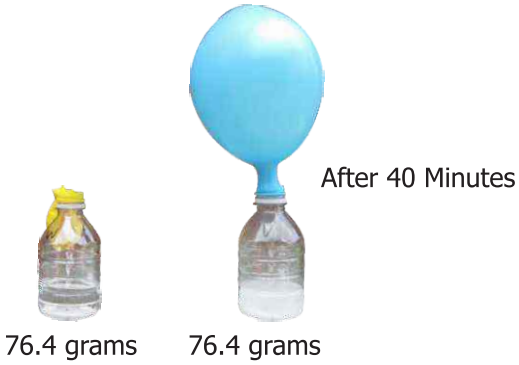
A salt and water stirred in a glass

B food coloring in frosting

C peanut butter and jelly sandwich

D sulfur dioxide and water forming acid rain

Q27. **A student adds 5 grams of baking soda to 50 grams of vinegar in a container and quickly attaches a balloon to the top of the bottle. The student's investigation is shown below.**



What occurred in this investigation?

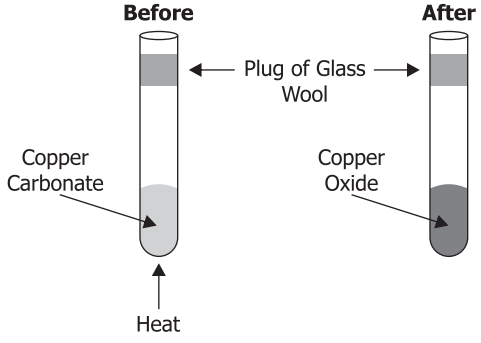
A The reaction produces heat, which causes the plastic of the balloon to soften and change shape.

B The reaction in the container produces gas, which causes the balloon to inflate.

C The outside air pressure pushes on the container and forces air inside the balloon.

D The air molecules from the container move into the balloon and form a solid substance.

Q28. **Copper carbonate being heated in a test tube is shown in the diagram below.**



Which statement <u>best</u> describes what happened in this experiment?

A Copper carbonate reacted with the glass wool, causing a physical change.

B Copper carbonate decomposed when heated, causing a chemical change.

C Copper oxide reated with the glass wool, causing a physical change.

D Copper oxide decomposed when heated, causing a chemical change.

Q29. **The table below shows data used to calculate the speed of 4 identical toy car moving down a ramp.**

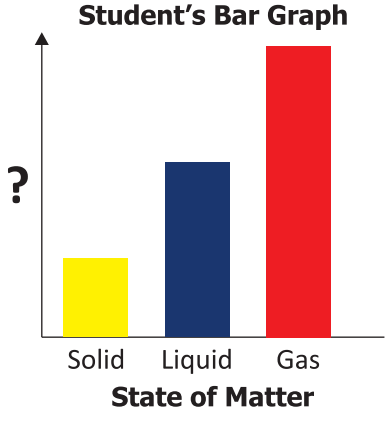
Table of Toy Car Trials

Car Color	Trial 1 Time (seconds)	Trial 2 Time (seconds)	Distance (centimeters)	Timer
Red	31	39	300	Student 1
Blue	30	33	300	Student 2
Yellow	37	40	300	Student 3
Green	33	28	300	Student 4

Which part of the experiment is <u>most likely</u> the source of error in this investigation?

A Car Color **B** Car Type **C** Distance **D** Timer

Q30. **A student created this bar graph to show how the physical state of matter is related to another factor.**



Which of these is the most appropriate label for the graph's vertical axis?

A weight **B** shape

C speed of particle **D** electrical charge

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Answer Sheet

INSTRUCTIONS

- This is a generic answer sheet to be used by participants of all grades. Students of Grade 1-2 will fill in circles of first 20 questions, Grade 3-4 will fill in circles of 25 questions and Grade 5-10 will fill in circles of 30 questions.
- Please recheck your Name, Father Name, Grade and School written below, the same would appear at your certificate.
- Use of lead pencil is not allowed.
- Use only Black / Blue ink to fill in the circles.

ICATS Science Contest 2017
Grade 7-8

Choose only ONE of the FOUR proposed answers (A, B, C or D) and fill in the circle with your answer.

Example of correctly filled table of answers.

(A) (B) (●C) (D) Correct Filling Answer **"C"**

(A) (B) (⊗) (D) wrong filling

(A) (B) (C) (D) wrong filling

(A) (B) (✓) (D) wrong filling

(A) (B) (●C) (D) wrong filling

Q	Answer	Q	Answer	Q	Answer
1	(A) (B) (●C) (D)	11	(A) (B) (●C) (D)	21	(A) (B) (●C) (D)
2	(A) (B) (C) (●D)	12	(●A) (B) (C) (D)	22	(●A) (B) (C) (D)
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5	(A) (B) (●C) (D)	15	(A) (●B) (C) (D)	25	(A) (●B) (C) (D)
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GRADE 7 & 8 (JUVENILES)

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ICATS SCIENCE Contest 2018
QUESTION BOOKLET

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Q1. **Which tool should the students use to accurately measure the volume of each rock given below.**

A

B

C

D

Q2. **A nuclear power plant has recently been built to generate electricity for a town located near several small lakes. Which is not a benefit of this nuclear power plant being built?**

A The cost of the electricity will decrease.

B The loss of habitat for local wildlife.

C The heating of homes will be easier.

D The nuclear power plant will provide jobs.

Q3. **Different types of water pollution and their effects are described in the table below.**

Descriptions of Water Pollution

Type	Effect
Raw Sewage	Illnesses such as typhoid and hepatitis can spread to humans
Phosphate and Nitrate	Increases algae, then decaying algae uses up oxygen in water
Poison	Stored in the bodies of fish and builds up in organisms that eat fish
Oil	Becomes stuck on bird feathers
Thermal (heat)	Causes water to be less able to contain oxygen; causes bacteria to grow

Based on the table, which of the followings results from both phosphate and nitrate pollution and thermal (heat) pollution in water?

A Diseases are carried through the water.

B Materials contaminate the bodies of birds.

C Growth of algae rapidly increases.

D Levels of oxygen in the water decrease.

Q4. **A company is designing a dam with a floodgate to keep houses safe during the rainy season. The company is reviewing several possible designs that have worked in the past and is trying to develop a plan for implementing one design. Which is the next step in this process?**

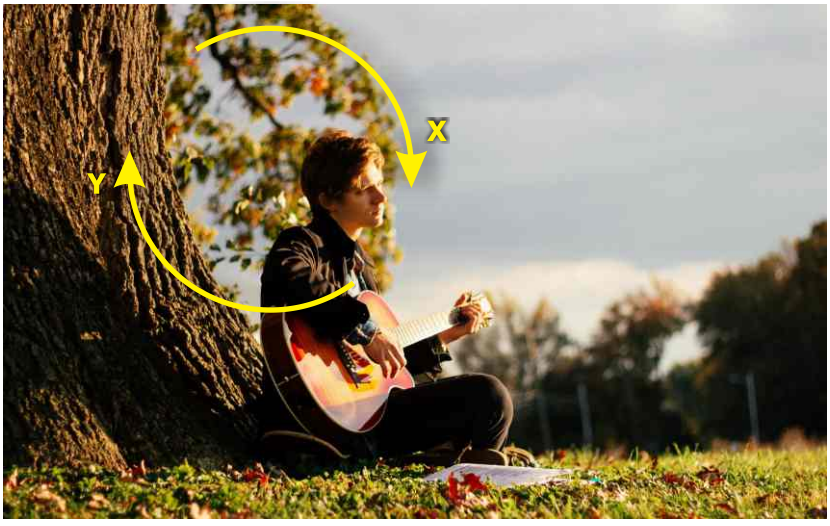
A pick several dams to use in a consumer survey

B test each dam model during a different flood season

C analyze the dam designs and pick one based on local needs

D redesign the past dams based on what the company feels will work best

Q5. **The picture shows an exchange of gases between plants and animals.**



What gas is most likely represented by the arrow labeled X?

A carbon dioxide **B** hydrogen **C** nitrogen **D** oxygen

Q6. **Medical researchers are developing a wireless blood pressure monitoring system for use in hospitals. This system allows nurses to measure a patient's blood pressure without awakening the patient. Which is the intended benefit of this technology?**

A Patients will not be disturbed.
B Patients will have to take fewer medications.
C Patients can experience pain relief.
D Patients can avoid having surgery.

Q7. **The table given below shows the percentage of individuals in a population of insects that is resistant to certain types of insecticides.**

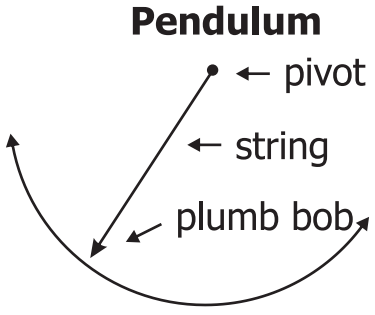
Insecticide Resistant Insect Populations

Population	Insecticide 1	Insecticide 2	Insecticide 3
1	12.8%	48.5%	1.8%
2	52.5%	2%	9.3%
3	28.6%	9.2%	34.8%
4	0%	0%	10.1%
5	2.8%	66.6%	3.5%
6	3.6%	78.5%	48.2%

Which two populations would be most affected by a widespread use of Insecticide 2?

A 2 and 4 **B** 1 and 6 **C** 3 and 5 **D** 4 and 6

Q8. **In which way should the students manipulate the variables to get valid results in this investigation?**



A use equal string lengths and different plumb bob masses
B use different string lengths and different plumb bob masses
C use equal string lengths and the same plumb bob shapes
D use different string lengths and different plumb bob shapes

Q9. **A meteorologist recorded high temperatures for five days at three locations on land. The data are shown in the table below.**

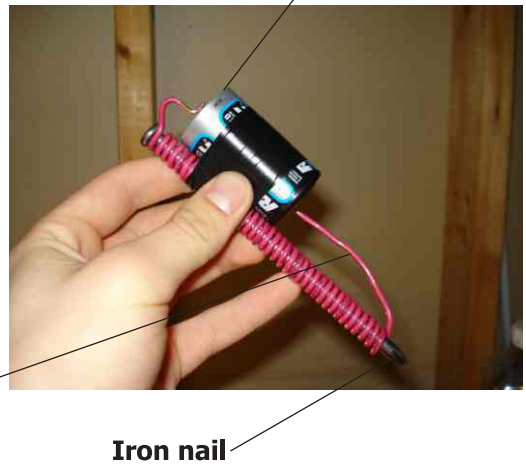
High Temperatures

Date	Temperature at the Beach (°C)	Temperature 25 km West of Beach (°C)	Temperature 50 km West of Beach (°C)
June 1	29.4	18.8	36.1
June 2	27.2	26.6	27.2
June 3	27.7	27.7	28.8
June 4	27.7	28.8	26.6
June 5	26.6	22.7	25.0

Which is the best conclusion based on these data?

A Areas at the beach have the coolest temperatures.
B Areas farther from the beach always have the warmest temperatures.
C Areas at the beach have the most stable temperatures.
D Areas farther from the beach always have the same weather as areas at the beach.

Q10. **The parts of an electromagnet are shown below.**



The strength of the magnet will be increased by

A using more nails.
B adding a switch.
C making more loops with the wire.
D placing the battery closer to the nail.

Q11. **Some researchers are developing a new fertilizer designed to improve the growth of plants in hot, dry climates. The fertilizer was applied to one hundred desert plants in a greenhouse. The average daytime temperature in the greenhouse was 90°F, and the humidity levels were low. Which is best for the researchers to do next?**

A compare plants that received fertilizer to similar plants that received none
B begin selling the fertilizer to gardeners living in hot, dry climates
C change the conditions in the greenhouse and retest the fertilizer
D test the fertilizer on plants that are adapted to cooler climates

Q12. **The table below shows the average rainfall amounts and number of grazing animals in an area over a 30-year period.**

Rainfall Data

	Millimeters of Rain	Number of Grazing Animals
1975	780	1500
1980	525	2000
1985	600	1500
1990	575	2500
1995	300	1500
2000	850	1000
2005	300	1500

Which is the best conclusion based on the data?

A The number of grazing animals increases approximately every 5 years.
B The number of grazing animals supported by rainfall cannot exceed 2000.
C The number of grazing animals is not affected by the amount of rainfall.
D The number of grazing animals increases after years of increased rainfall.

Q13. **Four changes are shown below. Which of these represents a chemical change?**

A A match is lit, creating a yellow-orange flame.
B A small piece of ice melts, changing from a solid to a liquid.
C A ball of clay sinks in water, and floats when reshaped.
D A pot of water is heated to boiling, and evaporation occurs.

Q14. **The procedure below is designed to test how water temperature affects the rate at which sugar dissolves.**

- **Measure 150 milliliters of water into each beaker.**
- **Heat water to three different temperatures.**
- **Put 5 grams of sugar into each of the beakers at the same time.**
- **Stir and record the time it takes for the sugar to completely dissolve.**

Which additional step will most improve the investigation?

A Use 200 milliliters of water in each beaker.
B Record the initial and final temperatures of the water.
C Stir at different rates for each beaker.
D Record the times when sugar is half dissolved.

Q15. **The table below shows researchers' data from an investigation designed to determine which sponge shape absorbs the greatest volume of water.**

Based on the data, the researchers stated that the irregular-shaped sponge absorbed the greatest volume of water. Researchers plan to market the irregular-shaped sponge as "super absorbent." What is wrong with the researchers' interpretation of the data?

Sponge Table

Sponge Shape	Mass of Wet Sponge
Round	5.50 grams
Square	5.70 grams
Irregular	6.00 grams
Oval	5.53 grams

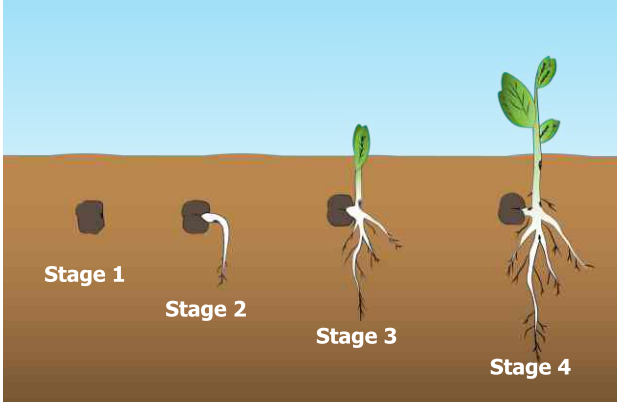
A The researchers should have tested the sponges in different types of liquids.

B The researchers should have tested more types of sponges.

C The researchers did not record the dry mass or volume of each sponge.

D The researchers did not freeze each sponge before massing it.

Q16. **The diagram below shows the stages of development of a plant.**



At which stage has germination begun?

A 1 **B** 2 **C** 3 **D** 4

Q17. **The table provides information about different worms.**

Worm Characteristics

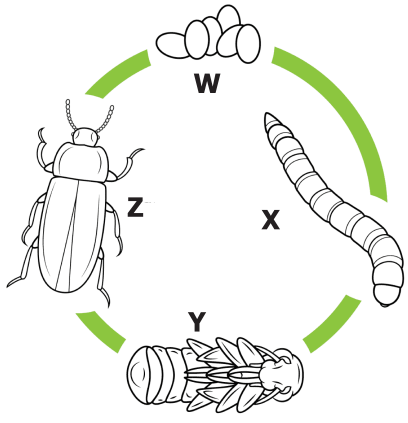
Type of Worm	Segmented	Bilateral Symmetry	Sexual Reproduction	Body Cavity	Example
Segmented worms	Yes	Yes	Yes	Yes	Earthworms and leeches
Flatworms	No	Yes	Yes	No	Planaria and tapeworms
Roundworms	No	Yes	Yes	Modified	Hookworms and Ascaris

Which is an example of a nonsegmented worm with no body cavity?

A Earthworms **B** leeches **C** Ascaris **D** tapeworms

Q18. **The diagram below shows the life cycle of a mealworm. The stages in its life cycle are labeled W, X, Y, and Z.**

Which stage is shown at Y?



A adult **B** egg **C** larva **D** pupa

Q19. **Which statement best describes wood and coal in terms of renewability and formation time?**

A Wood is nonrenewable and forms in a few years, unlike coal, which is renewable and takes millions of years to form.

B Wood is renewable and forms in a few years, unlike coal, which is nonrenewable and takes millions of years to form.

C Wood is nonrenewable and takes millions of years to form, unlike coal, which is renewable and forms in a few years.

D Wood is renewable and takes millions of years to form, unlike coal, which is nonrenewable and forms in a few years.

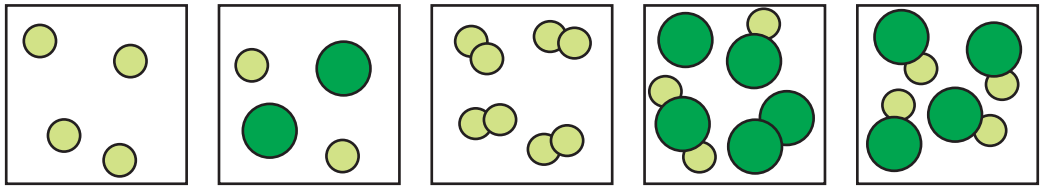
Q20. **A student observes that a gas is formed when chemical Y is added to chemical Z in the lab. The student's observation of a new product being formed is the common outcome of all**

A physical changes. **B** chemical changes. **C** mass changes. **D** phase changes.

Q21. **Which of the following is a way that people directly affect the environment?**

A playing soccer **B** dumping trash **C** attending a concert **D** going to school

Q22. **Five diagrams of atomic arrangements are shown below.**



Which of these best describes all five diagrams?

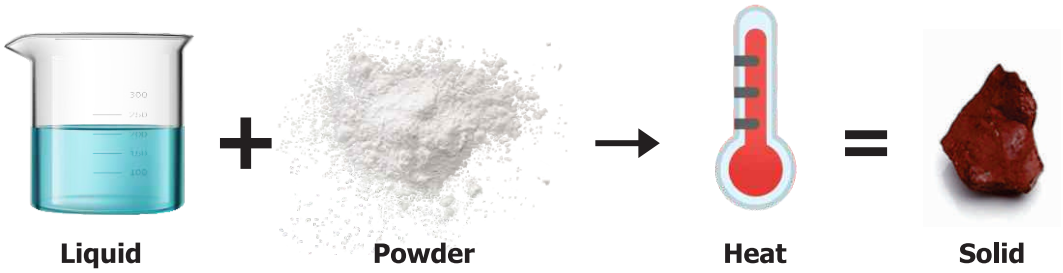
A All are compounds made of atoms.

B All have three types of atoms.

C All are composed of atoms.

D All have the same atomic symbol.

Q23. **A student performed a classroom investigation by mixing a purple liquid and a white powder.**
Diagrams of the setup and the resulting blue solid are shown below.



The student could best classify this reaction as a

A physical change.

B weight change.

C mass change.

D chemical change.

Q24. **Plastic waste is a major type of pollution. There are many types of plastic. The use of waste plastic in road surfaces is being investigated. Two things are done to the waste plastics before they can be used as part of a road surface:**

1. the plastics are sorted and the required type of plastic selected
2. the selected plastic is cut into tiny pieces.

Once the waste plastic has been sorted and cut into pieces, it is melted. The melted plastic can then be moulded into any shape needed. The plastic to be used in the road surface has been tested over a temperature range of -40 °C to +80 °C. Why was this range of temperature used to test the plastic?

A The range would cover most weather conditions.
B -40 °C is the coldest temperature possible.
C The range contains simple numbers, so calculations based on them are easier to carry out.
D The range does not need to exceed +80 °C as all solids turn to liquid at this temperature.

Q25. **In scientific studies the results of a test can be positive or negative.**

- A positive test shows that something is present.
- A negative test shows that something is absent.

However, mistakes can be made in tests that affect the result.

- A false positive is one where the result of the test is positive, but it really should be negative.
- A false negative is one where the result of the test is negative, but it really should be positive.

In 2007 a plastic bath toy was found on a beach in Devon in the UK. Some people claimed this was one of the toys that had been lost in the North Pacific Ocean. However, it was soon discovered that the toy was not from the cargo lost in that ocean.
How would the finding of the toy on the beach in Devon be best classified?

A positive **B** negative **C** false negative **D** false positive

Q26. **In 2006 nearly 30,000 plastic bath toys fell from a ship in the North Pacific Ocean. The toys were contained in plastic pack, with a cardboard backing. After a few hours the cardboard separated from the pack. This left the toys floating in the ocean.**

Note: The black cardboard is glued to the edge of the plastic covering the duck.

cardboard backing

edge of plastic glued to cardboard

plastic covering the bath toy

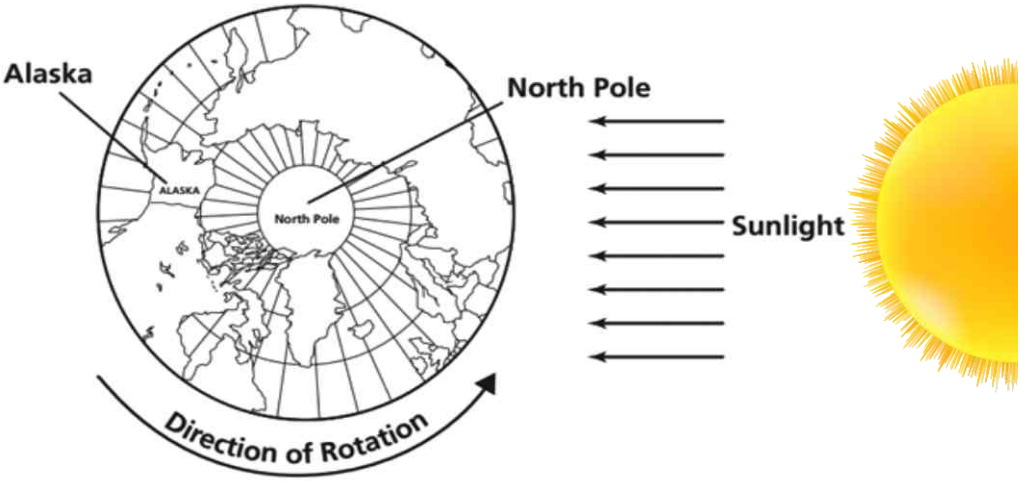
Eventually some of the plastic toys filled with water. However, even when full of water they floated on the surface of the sea.
What does this observation tell us about this plastic?

A The plastic must contain air bubbles.
B The plastic was not a natural material.
C The plastic has a lower density than sea water.
D The plastic contains chemicals that react in sea water.

Q27. **Blue crabs can be found in the coastal waters of New Jersey. Which of these explains why the crab's outer shell helps it survive in its habitat?**

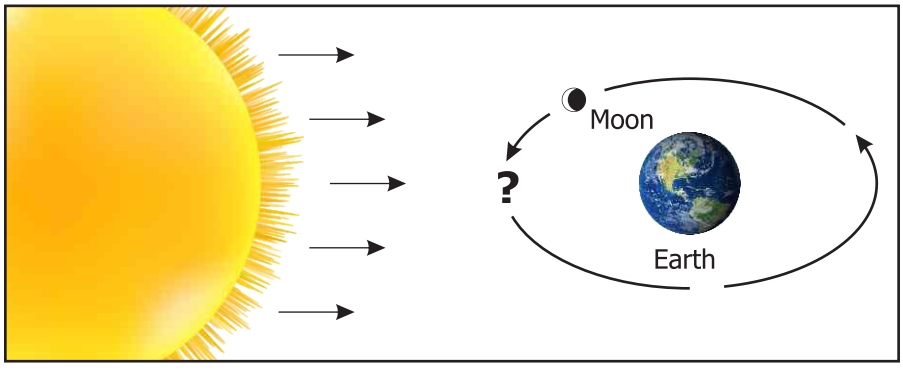
A The shell keeps the crab warm.
B The shell helps the crab catch food.
C The shell protects the crab from predators.
D The shell allows the crab to get oxygen.

Q28. **The picture below shows a satellite view of Earth from directly above the North Pole during the summer. What time of day would it be in Alaska?**



A midday **B** night **C** sunset **D** sunrise

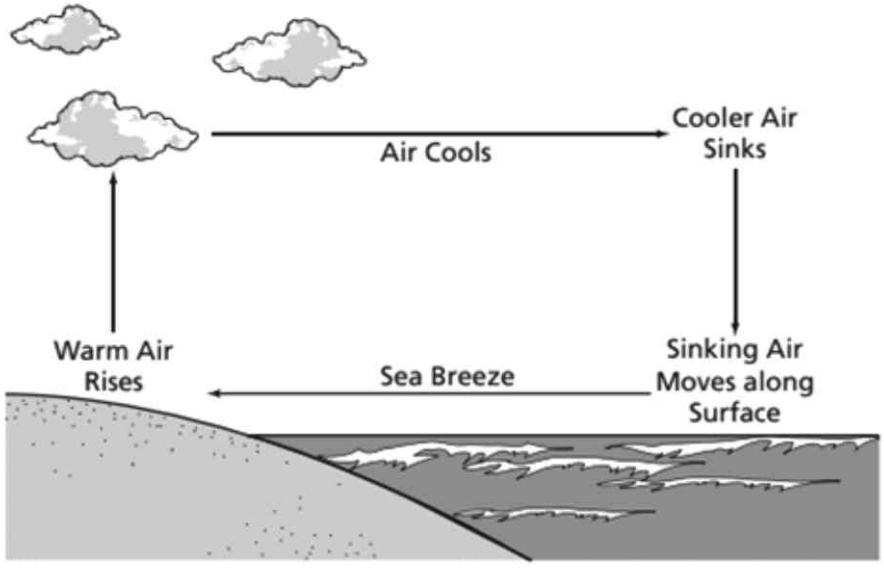
Q29. **The diagram shows a waning crescent moon.**



Which moon phase will happen next?

A new moon **B** waning gibbous **C** full moon **D** last quarter

Q30. **The drawing below shows a sea breeze.**



When is this type of wind pattern most likely to occur?

A during the day when the land heats faster than the surface of the sea

B during the night when the surface of the sea cools faster than the land

C during the day when the sea is as warm as the land

D during the night when the air above land is warmer than the air above the sea

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ICATS English Linguistics Contest 2018
National Toppers

Student Name	Father Name	Grade	School	City
FIMAAN TASSADDUQUE	ROSHAAN TASSADDUQUE	1	KOHINOOR GRAMMAR SCHOOL	FAISALABAD
MUSA NOOR	NOOR NABI	1	FOUNDATION MONTESSORI SCHOOL	BAHAWALPUR
ZAINA KHAN	MUNAWAR AHMED	1	BEACONHOUSE SCHOOL SYSTEM (BKI F-7/4)	ISLAMABAD
MALIK-AL-ASHTER	KHAN MURTAZA	2	MSB INSTITUTE-SHABBIRABAD	KARACHI
JAWAD ALI	MUHAMMAD ASSAD	2	JOINT STAFF PUBLIC SCHOOL AND COLLEGE CHAKLALA	RAWALPINDI
M. ASAD HUSSAIN	SYED M. ASIF HUSSAIN	2	USMAN PUBLIC SCHOOL SYSTEM (CAMPUS XVI)	KARACHI
HIJAB FATIMA	IRFAN QADIR	3	BEACONHOUSE ALLAMA IQBAL TOWN CAMPUS	LAHORE
ZAINEB NADEEM	NADEEM AFZAL	4	KOHSAR CHILDREN'S ACADEMY	MANSEHRA
MARIA FAISAL	FAISAL SALEEM	5	THE CITY SCHOOL GIRLS BRANCH SATELLITE TOWN	RAWALPINDI
IBRAHIM SALMAN	SALMAN RASOOL	6	LAHORE GRAMMAR SCHOOL FAISAL TOWN BRANCH	LAHORE
KHADIJA IMRAN	IMRAN MAGRANI	7	D. A PUBLIC SCHOOL (O/A LEVELS) SEAVIEW	KARACHI
LAIBA MASOOD	MASOOD ABBAS	8	USMAN PUBLIC SCHOOL SYSTEM (CAMPUS 1)	KARACHI
EMAAN IFTIKHAR	IFTIKHAR AHMAD	9	BEACONHOUSE SCHOOL SYSTEM PTC GIRLS BRANCH	GUJRANWALA
AYESHA NADEEM	MUHAMMAD NADEEM	10	USMAN PUBLIC SCHOOL SYSTEM (CAMPUS VIII)	KARACHI

ICATS Mathematics Contest 2018
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Student Name	Father Name	Grade	School	City
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MIAN AZAAN MAQBOOL	DANISH MAQBOOL	2	ARMY PUBLIC SCHOOL GARRISON JUNIOR	LAHORE
SHAHEER AFZAL	JAVED AFZAL MARWAT	3	ARMY PUBLIC SCHOOL (TODDLERS ACADEMY)	PESHAWAR
MUHAMMAD AHMED	ASMAT ALI	4	ARMY BURN HALL SCHOOL AND COLLEGE (FOR GIRLS)	ABBOTTABAD
M. MURTAZA ZAIDI	BABER ALI	5	BEACONHOUSE ALLAMA IQBAL TOWN CAMPUS	LAHORE
RAJA SAAD ALI	RAJA AAMIR	6	HITEC SCHOOL & COLLEGE FOR BOYS CANTT	TAXILA
ZAID BIN HAROON	M. HAROON RAFIQUE	7	THE SCIENCE SCHOOL	RAWALPINDI
WALEED AHMED	M. ATIQ	8	KIPS SENIOR BOYS CAMPUS JOHAR TOWN	LAHORE
M. RAYAN ABID	M. ABID MUNEER	9	SIR SYED SCHOOL AND COLLEGE (CAMPUS IV)	WAH CANTT
IMTIAZ KHAN	DADA KHAN	10	AGA KHAN HIGHER SECONDARY SCHOOL	GILGIT

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Answer Sheet

INSTRUCTIONS

- This is a generic answer sheet to be used by participants of all grades. Students of Grade 1-2 will fill in circles of first 20 questions, Grade 3-4 will fill in circles of 25 questions and Grade 5-10 will fill in circles of 30 questions.
- Please recheck your Name, Father Name, Grade and School written below, the same would appear at your certificate.
- Use of lead pencil is not allowed.
- Use only Black / Blue ink to fill in the circles.

ICATS Science Contest 2018
Grade 7-8

Choose only ONE of the FOUR proposed answers (A, B, C or D) and fill in the circle with your answer.

Example of correctly filled table of answers.

(A) (B) (C) (D) Correct Filling Answer **"C"**

(A) (B) (C) (D) wrong filling

(A) (B) (C) (D) wrong filling

(A) (B) (C) (D) wrong filling

(A) (B) (C) (D) wrong filling

Q	Answer	Q	Answer	Q	Answer
1	A	11	A	21	B
2	B	12	D	22	C
3	D	13	A	23	D
4	C	14	B	24	A
5	D	15	C	25	D
6	A	16	B	26	C
7	A	17	D	27	C
8	A	18	D	28	B
9	C	19	B	29	A
10	C	20	B	30	A

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QUESTION BOOKLET

ICATS SCIENCE CONTEST 2019

GRADE 7 & 8 (JUVENILES)

Time Allowed: 90 Mins
Maximum Marks: 90

ICATS SCIENCE CONTEST 2019
JUVENILES (GRADE 7 & 8)

TIME ALLOWED : 90 MINUTES
MAXIMUM MARKS : 90
TOTAL QUESTIONS : 30 MCQS

INSTRUCTIONS

1. DON'T START ATTEMPTING THE PAPER UNTIL INSTRUCTED BY THE INVIGILATORS.
2. INSTRUCTIONS FROM THE EXAMINATION INVIGILATORS MUST BE CARRIED OUT PROMPTLY.
3. CAREFULLY RECHECK YOUR NAME, FATHER NAME, SCHOOL NAME, ADDRESS ETC AT THE BUBBLE SHEET / ANSWER SHEET.
4. RECORD ALL ANSWERS ON THE BUBBLE SHEET ONLY. SELECT BEST ANSWER FROM THE FOUR GIVEN OPTIONS AND MARK ONLY ONE OPTION IN EACH QUESTION.
5. USE BLUE / BLACK INK TO FILL UP THE CIRCLES FOR YOUR ANSWERS ON THE BUBBLE SHEET. USE OF LEAD PENCIL IS NOT ALLOWED.
6. USE OF ANY HELPING MATERIAL INCLUDING CELL PHONES AND ELECTRONIC DEVICES IS STRICTLY PROHIBITED.
7. EVERY CORRECT ANSWER EARNS THREE POINTS. THERE WOULD BE NEGATIVE MARKING. ONE POINT WOULD BE DEDUCTED FOR EVERY INCORRECT ANSWER.
8. CANDIDATES MAY NOT LEAVE THE EXAMINATION ROOM UNESCORTED FOR ANY REASON, AND THIS INCLUDES USING THE WASHROOM.
9. NO MATERIALS OR ELECTRONIC DEVICES SHALL BE BROUGHT INTO THE ROOM.
10. THERE ARE FIVE CATEGORIES OF THE CONTEST AS UNDER:
    - A. TODDLERS (GRADE 1 & 2)
    - B. KIDS (GRADE 3 & 4)
    - C. JUNIORS (GRADE 5 & 6)
    - D. JUVENILES (GRADE 7 & 8)
    - E. ADOLESCENTS (GRADE 9 & 10 / O-LEVELS)
11. ONLY REGISTERED STUDENTS CAN PARTICIPATE IN THE CONTEST.
12. NO CANDIDATE SHALL TAKE OUT OF THE HALL ANY ANSWER BOOK(S) OR PART OF AN ANSWER BOOK, WHETHER USED OR UNUSED, OR OTHER SUPPLIED MATERIAL.
13. IF A PARTICIPANT DOES NOT UNDERSTAND A WORD OR PHRASE ON THE EXAM PAPER, NEITHER EXAMINER NOR INVIGILATOR IS PERMITTED TO ANSWER.
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Q1. **Jillani conducted an experiment that compared effects of different sounds on growth of bean plants. He planted bean seeds of same type and size in three containers using same type of soil in each container. He placed containers in the locations shown below.**

Bean Seedling Locations and Sounds

Container	Location and Sounds
1	bedroom with 4 hours of pop music per day
2	living room with 4 hours of television per day
3	empty room with no sound

Jillani gave each plant the same amount of water at the same time each day. After two weeks, Jillani observed that the plant in the living room was the largest and had the most leaves. Jillani concluded that bean plants grow the fastest when exposed to television sounds. Which is the greatest error that Jillani made in his experimental design?

A | Jillani did not control other variables that might affect plant growth.

B | Jillani did not control for the variables of soil type or amount of water.

C | Jillani did not plant the beans from seeds.

D | Jillani did not use enough different types of music.

Q2. **The chart shows whether different objects will scratch rocks.**

Hardness

Rock	Is Scratched By			
	Fingernail (2.2)	Penny (3.0)	Glass (5.5)	Quartz (7.0)
W	no	no	yes	yes
X	no	no	no	no
Y	no	no	no	yes
Z	yes	yes	yes	yes

Which list shows these rocks in order from the hardest to the softest?

A | XWYZ

B | XYWZ

C | ZYWX

D | ZWYX

Read the information given below and answer the questions 3 through 8.

Petroleum, or crude oil, is refined by separating it into different by-products. This process is called fractional distillation, whereby the crude oil is heated and each different product is distilled, or drawn off, at different stages. Each product is distilled at certain temperature ranges and collected in separate receivers. Petroleum refining is carried out in a boiler and a fractionating tower. The crude oil is super-heated in the boiler to about 600◦ C, which vaporizes the crude oil. The vapors then rise in the tower to certain levels where they cool and condense, according to their chemical structure. When the vapor reaches a height in the tower where the temperature in the column is equal to the boiling point of the substance, the vapor turns into liquid (condenses), collects in troughs, and flows into various tanks for storage, as shown in Figure 1. Table 1 below summarizes the characteristics of the by-products obtained from the fractional distillation of petroleum.

Table 1

Petroleum by-product	Condensation temperature (°C)
Petroleum gas	20-40
Gasoline	40-70
Kerosene	100-120
Gas oil	120-200
Lubricating oil stocks	200-300
Residue	600

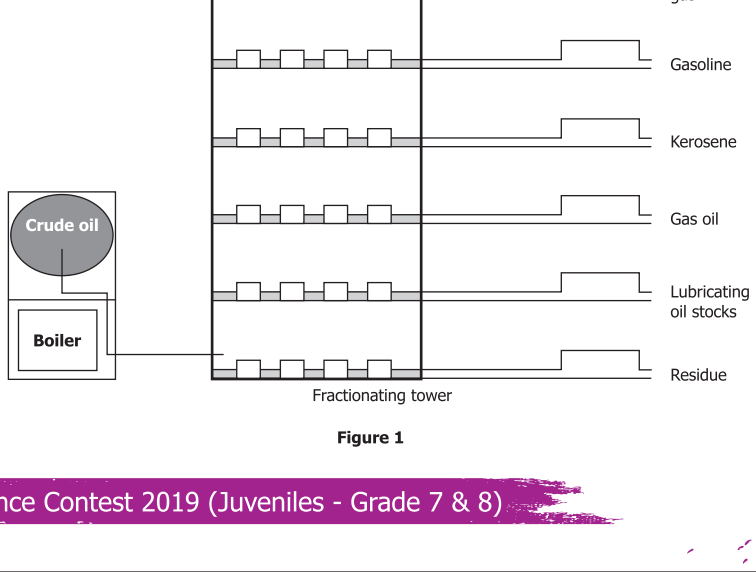


Figure 1

Q3. **According to the passage, the temperature at which gasoline condenses is most likely:**

A | less than 0°C. **B** | less than 40°C. **C** | greater than 20°C. **D** | greater than 70°C.

Q4. **According to the passage, which by-product formed in the fractionating tower condenses first?**

A | Petroleum gas **B** | Kerosene **C** | Gas oil **D** | Residue

Q5. **According to Figure 1, fractional distillation uses which of the following as a raw material?**

A | Gasoline **B** | Residue **C** | Crude oil **D** | Gas oil

Q6. **Given that naptha, another by-product of petroleum distillation, has a condensation point of approximately 90°C, between which two petroleum by-products would this substance be found in a fractionating tower?**

A | Gasoline and Kerosene

B | Lubricating oil stocks and Gas oil

C | Kerosene and Gas oil

D | Residue and Lubricating oil stocks

Q7. **According to the passage, at what temperature is most of the crude oil vaporized?**

A | 600°C

B | 300°C

C | 100°C

D | 20°C

Q8. **According to the passage, as the vapor rises in the fractionating tower:**

A | the condensation temperature increases only.

B | the condensation temperature decreases only.

C | the condensation temperature increases quickly, then slowly decreases.

D | the condensation temperature remains stable at 600°C.

Read the information given below and answer the questions 9 through 15.

While digging in a remote site in Africa, paleontologists discovered a collection of fossilized dinosaur bones. The bones were dated back to the Jurassic period, and have been confirmed to be from a dinosaur known as a velociraptor. Two paleontologists discuss the finding.

Paleontologist 1

Once the well-preserved bones are assembled it is clear that they are velociraptor bones from the Jurassic period. The bones are long in the arms, indicating that the velociraptor was definitely capable of flight. You can see that there are cuts within the arm/wing bones of this dinosaur, indicating that it was caught while in flight. Perhaps it was attempting an escape from a more predatory dinosaur, such as tyrannosaurus rex. It is obvious from the body structure of the velociraptor that it was an effective hunter and predator. It was most likely quick to swoop in on its prey and was more than able to carry the prey away on its own. The form and function of the velociraptor has been misunderstood until this important discovery. The condition of these bones offers a clear picture of the way in which the velociraptor lived.

Paleontologist 2

Indeed, the velociraptor bones are in excellent condition. The long arm bones are indicative of the dinosaur's ability to scavenge prey and fend off larger predators. The cuts within the arm bones show that the velociraptor often stole its meals—the marks resemble defense wounds, perhaps from forcing other would-be scavengers away from the free meal. The structure of the velociraptor's feet indicates that it was a fast runner and was able to maneuver well through the high trees and undergrowth. This would certainly have allowed the velociraptor to quickly escape predators and possibly arrive at a kill-site before other larger dinosaurs, such as tyrannosaurus rex, descended upon the leftovers. The bones that were discovered answer many questions about the velociraptor, but they also bring up many new issues to consider.

Q9. **Paleontologist 1's viewpoint contains the basic assumption that the velociraptor must have been:**

A | unknown until the discovery of these bones

B | an ineffective hunter

C | previously mischaracterized

D | unable to escape large predators

Q10. **Paleontologist 1 would most likely state that the cuts on the velociraptor bones were the result of:**

A | failed attempts to fly

B | fending off a competing scavenger

C | an attack by a larger predator

D | mistakes made in assembling the bones

Q11. **Suppose that the fossilized remains of another dinosaur species with long arm bones were discovered, and scientists determined that this dinosaur lived at the same time as the velociraptor. According to the passage, Paleontologist 2 would most likely conclude that:**

A | the new dinosaur could fly

B | the new dinosaur could be a scavenger

C | the new dinosaur could not escape from predators

D | the new dinosaur could swoop in on its prey

Q12. **Paleontologist 2's viewpoint regarding the velociraptor as a scavenger was based on the dinosaur's:**

A | strong musculature

B | excellent condition

C | long arm bones

D | ability to fly

Q13. **Paleontologist 1 would most likely support which of the following statements about the lifestyle of the velociraptor?**

A | The velociraptor was a predatory dinosaur capable of flight, and is only now being understood.

B | The velociraptor was a dinosaur who scavenged other dinosaurs' kills.

C | The velociraptor was a fast runner that could easily out-maneuver its predators in order to survive.

D | The velociraptor was hunted by many other dinosaurs during its time on Earth.

Q14. **Assuming all are true, both paleontologists would most likely agree with which of the following facts concerning the velociraptor?**

A | It was threatened by larger dinosaurs, such as tyrannosaurus rex.

B | It was unable to sustain flight.

C | It was not built for speed, and therefore, could not easily fend for itself.

D | It was not an effective hunter.

Q15. **Both Paleontologists 1 and 2 would most likely agree with which of the following statements about the discovery of the velociraptor bones? The bones:**

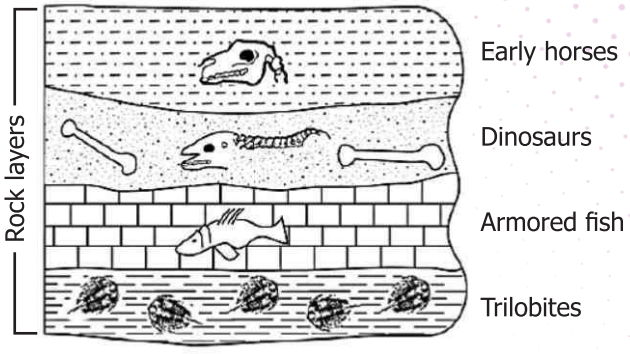
A | did not clarify any assumptions about the velociraptor

B | provided some useful information regarding the velociraptor

C | could not be assembled properly due to the poor condition in which they were found

D | completely altered both paleontologist's viewpoints regarding the velociraptor

Q16. **The cross section below shows fossils and the rock layers in which they are found. Crustal movement has not displaced the rock layers.**



(not drawn to scale)

Which fossil is considered the oldest in the cross section shown?

A | armored fish	**B** | dinosaurs	**C** | early horses	**D** | trilobites

Q17. **The map below shows the four major time zones in the continental United States.**

If it is 9 am in the Eastern Time Zone, what time is it in the Pacific Time Zone?

A | 3:00 am	**B** | 6:00 am	**C** | 6:00 pm	**D** | 9:00 pm

Q18. **The length of a year is equivalent to the time it takes for one**

A | rotation of Earth

B | rotation of the Sun

C | revolution of Earth around the Sun

D | revolution of the Sun around Earth

Q19. **The diagram below shows a spinning water sprinkler. Water comes through a hose and is sprayed by the sprinkler.**

Which principle best explains why the sprinkler spins?

A | Every action has an equal and opposite reaction.

B | Solid substances are usually more dense than liquid substances.

C | Energy is released when water condenses.

D | Most substances expand when heated and contract when cooled.

Q20. **The diagram below shows a hammer being used by a person to remove a nail from a piece of wood.**

The hammer is being used as which type of simple machine?

A | wheel and axle

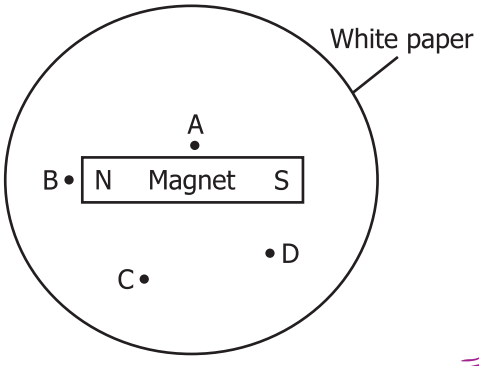
B | inclined plane

C | lever

D | pulley

Q21. **The diagram below shows a bar magnet resting on top of a piece of white paper. The north and south poles of the magnet are labeled N and S. Points A, B, C, and D represent four locations around the magnet.**

If iron filings were sprinkled evenly across the entire paper circle, at which location would the greatest concentration of iron filings be found after 30 seconds?



A | A

B | B

C | C

D | D

Q22. **Scurvy is a disease that sailors often got on long voyages. It was discovered that scurvy could be prevented by eating oranges and lemons. This suggests that scurvy is a disease caused by**

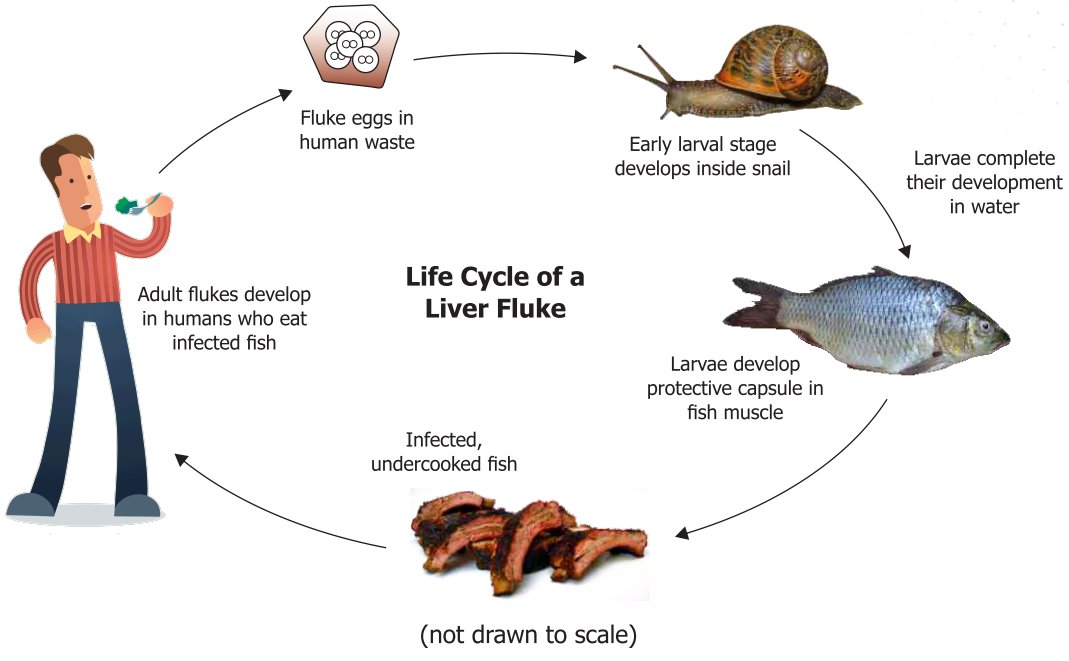
A | exposure to sea air

B | a nutritional deficiency

C | a microorganism

D | lack of exercise

Q23. **The diagram below shows the life cycle of a liver fluke.**



(not drawn to scale)

This diagram shows that the liver fluke

A | depends on other organisms for survival

B | dies when it enters the fish

C | completes its life cycle in the snail

D | survives at very high temperatures

Q24. **Which statement provides evidence that evolution is still occurring at the present time?**

A | The extinction rate of species has decreased in the last 50 years.

B | Many bird species and some butterfly species make annual migrations.

C | New varieties of plant species appear more frequently in regions undergoing climatic change.

D | Through cloning, the genetic makeup of organisms can be predicted.

Q25. **The walking catfish is a species of fish that walks on land using its pectoral fins. During drought conditions, when there is little water in its habitat, the walking catfish can use its pectoral fins to get to areas with water.**

Which of these will MOST LIKELY happen to a population of walking catfish over time if all nearby aquatic environments dry up permanently?

A | Walking catfish with small pectoral fins are more likely to survive a trip to distant areas of water. The population is likely to evolve to have smaller pectoral fins.

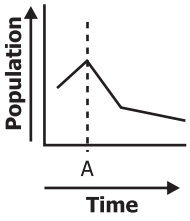
B | Walking catfish with large pectoral fins are more likely to survive a trip to distant areas of water. The population is likely to evolve to have larger pectoral fins.

C | Walking catfish with large pectoral fins and those with small pectoral fins are equally likely to survive a trip to distant areas of water. Both types survive, so evolution is unlikely to occur.

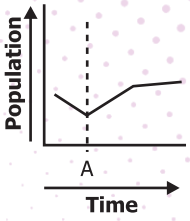
D | Walking catfish with large pectoral fins and those with small pectoral fins are equally likely to not survive the trip to distant areas of water. Both types of catfish will then become extinct.

Q26. **Which graph shows what most likely would happen to the population of a certain animal if a new predator were introduced at time A?**

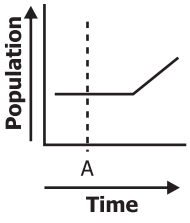
A



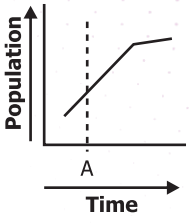
C



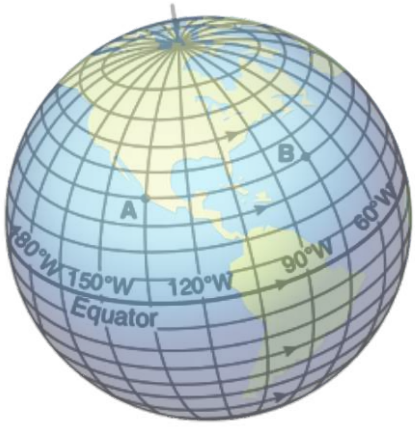
B



D



Q27. **The diagram below represents a portion of Earth's latitude/longitude system. A and B are locations on Earth's surface. The arrows show the direction of Earth's rotation.**



If it is noon at location A, then at location B it is

A | morning

B | noon

C | afternoon

D | midnight

Q28. **Which group would most likely have the greatest survival success during a long period of environmental changes?**

A | a small population of rabbits living in a field of grass

B | a large population of red ants living in a forest

C | an endangered population of polar bears living near an iceberg

D | one species of bird that nests only in sugar maple trees

Base your answers to questions 29 and 30 on the passage below and on your knowledge of science.

Corals come in about 1,500 known species—from soft swaying fans to stony varieties with hard skeletons that form reef bases. They are made up of polyps, tiny animals that live in colonies and feed at night on microscopic plants and creatures. The coral's surface is the living part, with color infused by single-celled algae called zooxanthellae that live in polyp tissue. The algae act like solar panels, passing energy to the coral as they photosynthesize while feeding on the coral's waste. Extremely sensitive, corals survive in a narrow range of temperature, sunlight and salinity. An uncommonly severe El Niño (an anomalous warming of sea-surface temperatures) in 1998 raised ocean temperatures and changed currents, causing bleaching that devastated reefs worldwide. Scientists say parts of the Indian Ocean lost up to 90 percent of corals. The bleaching struck reefs around the Persian Gulf, East Africa, Southeast Asia and the Caribbean. Some recovered. Many died.

Q29. **The relationship between the polyps and the zooxanthellae can best be described as**

A | negative for both

B | neutral for both

C | positive for both

D | negative for one and positive for the other

Q30. **The passage contains information concerning**

A | limiting factors	**B** | reproductive methods	**C** | bacteria	**D** | competition

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AYESHA SIDDIQUI	M. ASHRAF UL KABIR SIDDIQUI	4	THE CITY SCHOOL GULSHAN JUNIOR CAMPUS	KARACHI
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FIZZA RIZVI	ALI ABBAS RIZVI	8	HABIB GIRLS SCHOOL	KARACHI
LAMISAH BEHRAM KHAN	BEHRAM BASHIR KHAN	9	LAHORE GRAMMAR SCHOOL	ISLAMABAD
FAIZ UL HASSAN GILANI	GHULAM UL HUSSAIN GILANI	10	THE CITY SCHOOL TOWN SENIOR SECTION	PESHAWAR

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DURYAB ZAHRA	MUHAMMAD RASHID	1	BEACONHOUSE HAFIZABAD	HAFIZABAD
ABDUL RASHEED	ABDUL WAHEED	2	ARMY PUBLIC SHOOL & COLLEGE SYSTEM SADDAR CAMPUS	KARACHI
BURHANUDDIN	M. ALI ASGHER SAMIWALA	2	MSB EDUCATIONAL INSTITUTE	KARACHI
M. HUMMAS	M. SHAKIL	3	DEFENCE HOUSING AUTHORITY COLLEGE AND SCHOOL SYSTEM	KARACHI
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MAHAD ABID	M. HARIS UMER	5	THE CITY SCHOOL CHENAB CAMPUS	FAISALABAD
UROOJ AJMAL	AJMAL IBRAHIM	6	KIPS SCHOOL	LAHORE
MUHAMMAD SALAMAT	SADAT MEHMOOD	7	GARRISON ACADEMY TUFAIL SHAHEED CAMPUS (SENIOR)	LAHORE
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Answer Sheet

INSTRUCTIONS

- This is a generic answer sheet to be used by participants of all grades. Students of Grade 1-2 will fill in circles of first 20 questions, Grade 3-4 will fill in circles of 25 questions and Grade 5-10 will fill in circles of 30 questions.
- Please recheck your Name, Father Name, Grade and School written below, the same would appear at your certificate.
- Use of lead pencil is not allowed.
- Use only Black / Blue ink to fill in the circles.

ICATS Science Contest 2019
Grade 7-8

Choose only ONE of the FOUR proposed answers (A, B, C or D) and fill in the circle with your answer.

Example of correctly filled table of answers.

(A) (B) (C) (D) Correct Filling Answer **"C"**

(A) (B) (C) (D) wrong filling

(A) (B) (C) (D) wrong filling

(A) (B) (C) (D) wrong filling

(A) (B) (C) (D) wrong filling

Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1	B	11	B	21	B
2	D	12	C	22	B
3	C	13	A	23	A
4	D	14	A	24	C
5	C	15	B	25	B
6	A	16	D	26	A
7	A	17	B	27	C
8	B	18	C	28	B
9	C	19	A	29	C
10	C	20	C	30	A

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Question Booklet

GRADE 7 & 8
JUVENILES

Time Allowed: 90 Mins.
Maximum Marks: 90

ICATS SCIENCE CONTEST 2021

JUVENILES (GRADE 7 & 8)

TIME ALLOWED : 90 MINUTES **MAXIMUM MARKS : 90** **TOTAL QUESTIONS : 30 MCQS**

INSTRUCTIONS

1. DON'T START ATTEMPTING THE PAPER UNTIL INSTRUCTED BY THE INVIGILATORS.
2. INSTRUCTIONS FROM THE EXAMINATION INVIGILATORS MUST BE CARRIED OUT PROMPTLY.
3. CAREFULLY RECHECK YOUR NAME, FATHER NAME, SCHOOL NAME, ADDRESS ETC AT THE BUBBLE SHEET / ANSWER SHEET.
4. RECORD ALL ANSWERS ON THE BUBBLE SHEET ONLY. SELECT BEST ANSWER FROM THE FOUR GIVEN OPTIONS AND MARK ONLY ONE OPTION IN EACH QUESTION.
5. USE BLUE / BLACK INK TO FILL UP THE CIRCLES FOR YOUR ANSWERS ON THE BUBBLE SHEET. USE OF LEAD PENCIL IS NOT ALLOWED.
6. USE OF ANY HELPING MATERIAL INCLUDING CELL PHONES AND ELECTRONIC DEVICES IS STRICTLY PROHIBITED.
7. EVERY CORRECT ANSWER EARNS THREE POINTS. THERE WOULD BE NEGATIVE MARKING. ONE POINT WOULD BE DEDUCTED FOR EVERY INCORRECT ANSWER.
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10. THERE ARE FIVE CATEGORIES OF THE CONTEST AS UNDER:
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    - C. JUNIORS (GRADE 5 & 6)
    - D. JUVENILES (GRADE 7 & 8)
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12. NO CANDIDATE SHALL TAKE OUT OF THE HALL ANY ANSWER BOOK(S) OR PART OF AN ANSWER BOOK, WHETHER USED OR UNUSED, OR OTHER SUPPLIED MATERIAL.
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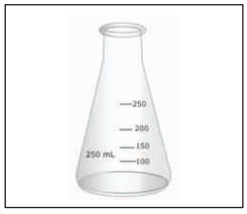
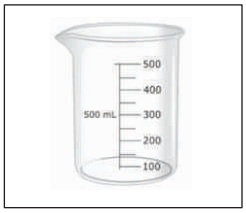
Q1. **Emi is asking Erlenmeyer flask from her assistant in the laboratory. What is she asking for?**

A



B

C



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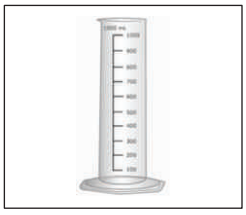


Q2. **The passage below describes an experiment. Read the passage and then follow the instructions below.**

Jeffery divided 40 unripe bananas evenly among eight paper bags and sealed the bags. He poked 20 small holes in four of the bags and left the other four without holes. He kept the bags at room temperature for three days. Then, Jeffrey opened the bags and counted the number of brown spots on each banana. He compared the average number of brown spots on bananas from bags with holes to the average number of brown spots on bananas from bags without holes.

Identify the question the Jeffrey's experiment can best answer.

A | Do bananas develop more brown spots when they are kept at room temperature compared to in a cold refrigerator?

B | Do bananas develop more brown spots if they are kept in bags with holes compared to bags without holes?

C | Both of the above.

D | None of the above.

Q3. **Olivia is outside with her friend on a sunny day. Olivia is wearing a light-colored shirt, and she notices that she feels colder than her friend, who is wearing a dark shirt. She wonders what factors affect how fabric warms an object. So, she decides to design an experiment. She has the following supplies available:**

- **a black cotton shirt**
- **a white cotton shirt**
- **two identical empty glass jars**
- **two thermometers**

Using only these supplies, which question can Olivia investigate with an experiment?

A | When placed in the sun, does a glass jar wrapped in cotton heat up more than a glass jar wrapped in wool?

B | When wrapped in a cotton shirt and placed in the sun, does a large jar or a small jar heat up more?

C | When placed in the sun, does a glass jar wrapped in a black cotton shirt heat up more than a glass jar wrapped in a white cotton shirt?

D | All of the above.

Q4. **What do these two changes have in common?**

- **firing a clay pot in hot kiln**
- **a banana getting ripe on the counter**

A | Both are only physical changes.

B | Both are caused by heating.

C | Both are chemical changes.

D | Both are caused by cooling.

Q5. **People can use the engineering-design process to develop solutions to problems. One step in the process is testing if a potential solution meets the requirements of the design.**

The passage below describes how the engineering-design process was used to test a solution to a problem. Read the passage. Then answer the question below.

Ian was an engineer at a water treatment plant. At the plant, an expensive filter was used to remove disease-causing bacteria from the water. But over time, the filter would become clogged with bacteria. If the filter became clogged, the water would not move through quickly enough. Ian had to decide when the filter was too clogged and needed to be replaced. So, during his inspection, Ian checked the filter by measuring how quickly water moved through it.

Which of the following could Ian's test show?

A | whether the filter was clogged

B | the amount of bacteria in the water before it was filtered

C | whether an inexpensive filter would become clogged more often

D | all of the above

Q6. **An explorer walks into a lab in a science building. She has a compass in her hand and finds that the south pole of her compass points toward the room's East wall when she is nearer that wall and toward the west wall when she is nearer that wall. You could explain this if magnetized metal had been installed in the East and West walls with North poles pointing into the room. If no magnetic material was installed in the North or South walls of the room, she would expect that**

A | the south pole of the compass would tend to point toward those walls.

B | the north pole of the compass would tend to point toward those walls.

C | the compass needle would not point in any particular direction.

D | the north pole of the compass needle would tend to point toward the centers of those walls, but the south pole would tend to point toward the sides of those walls.

Q7. **Livy, who works for a solar power company, was designing solar panels for houses. She wanted each individual solar panel to meet two requirements:**

- **Requirement 1: The solar panel had to be no larger than 1.65 square meters.**
- **Requirement 2: The solar panel had to generate more than 200 watt-hours of energy in direct sunlight.**

Livy designed and tested three solar panel prototypes. Her results are shown below.

Design	Area (m^2)	Energy generated in direct sunlight (Wh)
A	1.66	180
B	1.65	265
C	1.61	200

Which design met the both requirements?

A | design A B | design B C | design C D | none of these

Q8. **Limestones are very rich in:**

A | calcium B | calcium carbonate C | carbonate D | magnesium carbonate

Q9. **What is the volume of a bottle of hot sauce? Select the best estimate.**

A | 2 fluid ounces B | 2 gallons C | 2 cups D | 2 liters

Q10. **The passage below describes how the engineering-design process was used to test a solution to a problem. Read the passage. Then answer the question below.**

Lexi was creating a costume that would light up with white and green lights. She wanted to use as many lights as possible. The lights would be powered by a battery pack, so she needed to know how many lights she could connect to the battery pack. If she connected too many lights to the battery pack, then all the lights would be dim. So, Lexi connected white lights one by one until they started to dim. Then, she counted how many white lights she had connected.

Which of the following could Lexi's test show?

A | how many white lights she could attach to a battery pack without causing the lights to dim

B | how long a battery pack would last before the lights dimmed

C | if a battery pack could power more green lights than white lights

D | All of the above

Q11. **Cyan, yellow and magenta are:**

A | primary colors

B | secondary colors

C | white colors

D | tertiary colors

Q12. **Diseases which are caused by micro-organisms are called:**

A | contagious

B | infectious

C | venereal

D | incurable

Q13. **A medicine which contains dead or weakened germs used to prevent infectious disease is called a/an:**

A | antiseptic | B | antibiotics | C | antibodies | D | vaccine

Q14. **Water in freezing form may break the rocks into pieces by force of:**

A | reduction | B | expansion | C | evaporation | D | condensation

Q15. **Vitamin E is important for:**

A | protecting cells | B | vital tissues protection | C | both a and b | D | development of bones

Q16. **This is a piece of pumice. Do you see the hollow gaps in this piece of rock? The gaps come from air and water bubbles that became trapped while the rock was forming.**
Pumice is usually formed near volcanoes. Sometimes, the lava in a volcano can cool very quickly. Pumice forms when the lava traps air and water bubbles as it cools.

What type of rock is pumice?

A | metamorphic
B | igneous
C | sedimentary
D | None of the above

Q17. **Mr. Ali is pushing a heavy table but finding it very difficult. The force of friction can be reduced by the help of**

A | ball bearing B | lubricants C | cushion surfaces D | all of them

Q18. **Your teacher writes on a board with marker without slipping on floor. This is due to the presence of**

A | gravity B | friction C | pull D | push

Q19. **The dead sea is full of**

A | sand B | salt C | minerals D | shells

Q20. **Wind is beneficial resource of energy as it doesn't cause**

A | pollution B | echo C | noise D | sound

Q21. **A dangerous activity which results in many deaths due to gas explosion in caves is**

A | coal mining | B | climbing mountain | C | extracting oil | D | hydropower generation

Q22. **Which one of the following is the smallest bird?**

A | bee humming bird | B | penguin | C | ostrich | D | all of these

Q23.

Jane was designing small aircraft called drone to pick up items from warehouse shelves. He knew that the drones' propeller blades would get damaged if they bumped into anything while flying through the warehouse. So, Jane wanted to add blade guards to protect the propeller blades. The guards had to be sturdy so they would not break in a crash. But he thought that if the guards weighed too much, the drones would not fly well.

So, Jane put guards made of lightweight metal on one drone. Then he observed how well the drone flew with the guards.

Which of the following could Jane's test show?

A | how much the drone weighted with blade guards?

B | if the blade guards would break in a crash.

C | if adding the blade guards made the drone fly poorly

D | None of the above

Q24. **Read the text about an object in motion**

- **Preston rode his motorcycle from the bottom of a hill to the top of the hill.**

Complete the statement. Assume that the motorcycle's mass did not change. The gravitational potential energy stored between the motorcycle and Earth _____ as Preston rode up the hill.

A | increased	**B** | decreased	**C** | stayed the same	**D** | first increased then decreased

Q25.

The tallest sand dunes in North America are in Colorado. In this desert region, the top few inches of sand are usually dry, but the lower layers remain moist year-round.

Ord's kangaroo rats spend their entire lives in these dunes. They collect seeds from grasses and prairie sunflowers, and then bury the seeds in the moist layers of sand. Later, the rats come back to eat their buried seeds. The seeds absorb enough moisture from the sand that the kangaroo rats never need to drink water!

Which of the following best describes a community in the Great Sand Dunes?

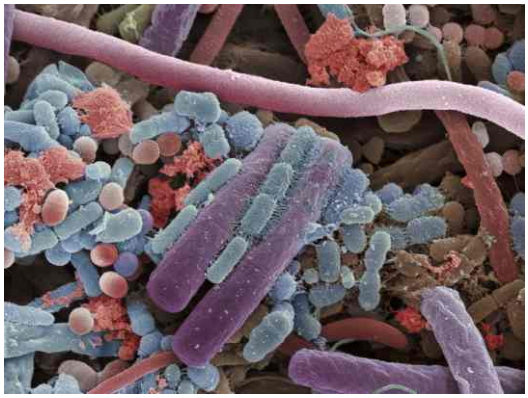
A | the grasses and the prairie sunflowers

B | the Ord's kangaroo rats

C | the grasses, the water and the sand dunes

D | All of the above

Q26. **Read the passage. Then answer the question below.**



The human body is home to trillions of microscopic bacteria, viruses, fungi and parasites. These microscopic organisms are a normal part of healthy human bodies. Many of these microscopic organisms help our bodies stay healthy, but some can cause disease.

Distinct groups of microscopic organisms live in different parts of our bodies. For example, the bacteria species *E. coli* is found in human intestines. Golden staph is a species of bacteria that lives on our skin. Our mouths contain many species of bacteria, including types of Streptococcus.

Which of the following best describes a population in the human body?

A | the different microscopic organisms in the mouth

B | the bacteria, the fungi and the viruses on the skin

C | *E. coli* bacteria in the intestines

D | All of the above

Q27. **A food chain is a model that shows how the matter eaten by organisms moves through an ecosystem. Below is a food chain from the River Frome, a freshwater ecosystem in England.**

Use the information in the food chain to fill in the blank below.

Matter first enters this food chain when the _____ makes its own food using photosynthesis.

A

macroalgae

B

midge larva

C

brown trout

D

great cormorant

Q28. **Read the passage. Then answer the question below.**

In a tide pool in California, California mussels live up high on the rocks. They are only submerged during high tide, when the water level is the highest.

Giant green anemones and ochre sea stars live lower in the tide pool. They are submerged during high tide but exposed to air during low tide, when most water drains out of the tide pool.

Species such as red octopuses and fluffy sculpin fish must stay underwater at all times. So, they swim in parts of the tide pool that are underwater even at low tide.

Which of the following best describes an ecosystem in a California tide pool?

A | the rocks, the salt water and the California mussels

B | the giant green anemones, the ochre sea stars and the red octopuses

C | a school of fluffy sculpins

D | All of the above

Q29. **Hannah has a garden that is sometimes visited by deer. She notices that the deer eat some plants in her garden more than others. She wonders what factors affect which plants the deer eat. So, she decides to design an experiment. She has the following supplies available:**

- **a garlic spray used to keep garden pests away**
- **four tomato plants**
- **four bean plants**

Using only these supplies, which question can Hannah investigate with an experiment?

A | Do the deer eat fewer leaves from bean plants sprayed with garlic spray than from unsprayed bean plants?

B | Do the deer eat more leaves from tomato plants or from squash plants?

C | Do the deer eat fewer leaves from bean plants sprayed with coffee spray than from unsprayed bean plants?

D | All of the above

Q30. **According the following text, what evidence of a volcanic eruption did the captain observe?**

Before sunrise on November 14, 1963, the crew of the fishing boat Isleifur II had just finished putting their lines in the ocean off the southern coast of Iceland. As the crew waited to have breakfast, a strong smell of sulfur drifted over the boat. At first, crew members thought that the cook had burned the eggs or that something was wrong with the boat's engine. But when the sun started to rise, the crew saw black smoke billowing from the water a few kilometers away.

The captain of the Isleifur II assumed the smoke was coming from a boat that was on fire, so he sailed closer to try to help. As the Isleifur II approached the smoke, the surface of the sea grew rough. The captain and crew saw flashes of lightning in the column of smoke and glowing pieces of molten rock shooting up out of the water. The captain realized this was not a burning boat. It was a volcano erupting under the water!

The erupting undersea volcano seen by the sailors on the Isleifur II

1. He heard a report on the radio warning about a volcanic eruption.
2. He smelled sulfur and then realized it was not coming from his boat.
3. He saw pieces of molten rock shooting out of the water.
4. He knew his crew had finished putting their fishing lines in the ocean.

A | 1 & 2 **B** | 2 & 3 **C** | 3 & 4 **D** | 1 to 4

National Toppers ICATS ART Contest 2021

Student Name	Father Name	Grade	School
TEHREEM SHIRAZ	SYED SHIRAZ ALAM	1	CANTT. PUBLIC HIGH SCHOOL & GIRLS COLLEGE (HYDERABAD)
MUHAMMAD AHMED KHAN	UZAIR AHMAD KHAN	2	ARMY PUBLIC SCHOOL (JUNIOR)
RAMISHA SAHAR	RAJA ISHAQ ASAD	3	FATIMA FERTILIZER SCHOOL
ZARLISH MOMINAH	TAYYAB SIDDIQUE	4	ARMY PUBLIC SCHOOL (DEFENCE COMPLEX ISLAMABAD)
DARSAMIN RAFIQUE	AZHAR RAFIQUE	5	NOVA CITY SCHOOL
AAFEEN KHALIL	KHALIL FAZIL	6	ISLAMABAD COLLEGE OF ARTS AND SCIENCES
HOORIA NOUMAN	NOUMAN ILYAS	7	KOSHAR CHILDREN'S ACADEMY
FATIMA RIZWAN	RIZWAN LIAQAT	8	LAHORE GRAMMAR SCHOOL
DUA ZAIN	M. ZAIN	9	HIRA FOUNDATION SCHOOL
WAJIHA SHAKEEL	SHAKEEL SIDDIQ	10	THE INTELLECT SCHOOL

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National Toppers ICATS Creative Writing Contest 2021

Student Name	Father Name	Grade	School
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M ABDULLAH	IKHTIYAR AHMED	2	FAUJI FOUNDATION SCHOOL (JAND)
ALISHBA HAMEED	ABDUL HAMEED	3	ST. GREGORY'S HIGH SCHOOL
SHAHMEER	AMEER HUSSAIN	4	LAHORE GRAMMAR SCHOOL (VALENCIA TOWN)
ESHAAL ALEEM	ALEEM AHMED KHAN	5	THE CITY SCHOOL (GULSHAN JUNIOR CAMPUS)
MUHMMAD YAHYA	IFTIKHAR MANZOOR	6	INTERNATIONAL ISLAMIC UNIVERSITY ISLAMABAD SCHOOL
SYEDA SABA ZAWAR	SYED ZAWAR	7	THE CITY SCHOOL (JHELUM CAMPUS)
EMAN AMNA	AFTAB	8	HAYAT SCHOOL & COLLEGE
ALIZHA NOOR ARSHAD	MRS. FOZIA ARSHAD	9	THE INTERNATIONAL SCHOOL OF CHOUEIFAT
MANAAM RAZA	RAZA UL MOHSIN	10	LAHORE GRAMMAR SCHOOL (1A1 SENIOR)

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Answer Sheet

INSTRUCTIONS

- This is a generic answer sheet to be used by participants of all grades. Students of Grade 1-2 will fill in circles of first 20 questions, Grade 3-4 will fill in circles of 25 questions and Grade 5-10 will fill in circles of 30 questions.
- Please recheck your Name, Father Name, Grade and School written below, the same would appear at your certificate. Make all corrections on the Attendance Sheet only.
- Use of lead pencil is not allowed. Use only Black / Blue ink to fill in the circles.

ICATS Science Contest 2021
Grade 7-8

Choose only ONE of the FOUR proposed answers (A, B, C or D) and fill in the circle with your answer.

Example of correctly filled answer. (A) (B) (C) (D) Correct Filling Answer **"C"**

Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1	B	11	B	21	A
2	B	12	B	22	B
3	C	13	D	23	C
4	A	14	B	24	A
5	A	15	C	25	A
6	B	16	B	26	C
7	B	17	D	27	A
8	B	18	B	28	A
9	C	19	B	29	A
10	A	20	A	30	B

ICATS SCIENCE CONTEST

2022

QUESTION BOOKLET

GRADE 7 & 8 JUVENILES

Time Allowed: 90 Mins.
Maximum Marks: 90

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ICATS SCIENCE CONTEST 2022

JUVENILES (GRADE 7 & 8)

TIME ALLOWED : 90 MINUTES, MAXIMUM MARKS : 90
TOTAL QUESTIONS : 30 MCQS

INSTRUCTIONS

1. DON'T START ATTEMPTING THE PAPER UNTIL INSTRUCTED BY THE INVIGILATORS.
2. INSTRUCTIONS FROM THE EXAMINATION INVIGILATORS MUST BE CARRIED OUT PROMPTLY.
3. CAREFULLY RECHECK YOUR NAME, FATHER NAME, SCHOOL NAME, ADDRESS ETC AT THE BUBBLE SHEET / ANSWER SHEET.
4. RECORD ALL ANSWERS ON THE BUBBLE SHEET ONLY. SELECT BEST ANSWER FROM THE FOUR GIVEN OPTIONS AND MARK ONLY ONE OPTION IN EACH QUESTION.
5. USE BLUE / BLACK INK TO FILL UP THE CIRCLES FOR YOUR ANSWERS ON THE BUBBLE SHEET. USE OF LEAD PENCIL IS NOT ALLOWED.
6. USE OF ANY HELPING MATERIAL INCLUDING CELL PHONES AND ELECTRONIC DEVICES IS STRICTLY PROHIBITED.
7. EVERY CORRECT ANSWER EARNS THREE POINTS. THERE WOULD BE NEGATIVE MARKING. ONE POINT WOULD BE DEDUCTED FOR EVERY INCORRECT ANSWER.
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9. NO MATERIALS OR ELECTRONIC DEVICES SHALL BE BROUGHT INTO THE ROOM.
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C. JUNIORS (GRADE 5 & 6)

D. JUVENILES (GRADE 7 & 8)

E. ADOLESCENTS (GRADE 9 & 10 / O-LEVELS)

11. REGISTERED STUDENTS CAN PARTICIPATE IN THE CONTEST.
12. NO CANDIDATE SHALL TAKE OUT OF THE HALL ANY ANSWER BOOK(S) OR PART OF AN ANSWER BOOK, WHETHER USED OR UNUSED, OR OTHER SUPPLIED MATERIAL.
13. IF A PARTICIPANT DOES NOT UNDERSTAND A WORD OR PHRASE ON THE EXAM PAPER, NEITHER EXAMINER NOR INVIGILATOR IS PERMITTED TO ANSWER.
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Use the information below to answer questions 1 and 2.

As some students are planting flowers, they notice several earthworms in the soil. One student wonders if earthworms are beneficial to the growth of plants. The student decides to test this by performing an investigation. The student plants identical flowering plants in two containers with potting soil. The treatment for the plants is the same, except that six earthworms are added to one container. Figure 1 shows the plants after 65 days of growth.

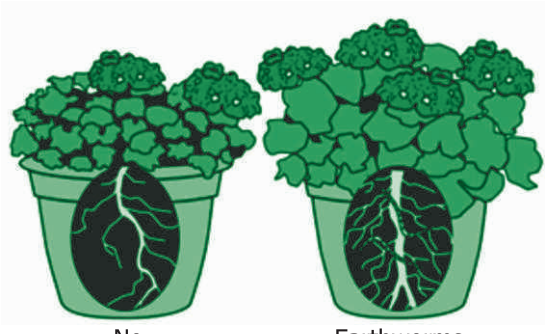


Figure 1. Plants after 65 Days

The plant in the pot with earthworms appears to be healthier. The student describes it as having larger leaves, a thicker stem, a more upright stem, more root hairs, and longer roots than the plant in the container without the earthworms

Q1. Based on the investigation, the student group decides to add a large number of earthworms to their flower garden. Which statement best explains whether these data are being applied correctly?

A The garden is a less stable system, and the results can be easily duplicated.

B The garden is a more stable system, and the results cannot be easily duplicated.

C The variables are similar, and you can expect the same results in the potted plant and the flower garden without collecting more data.

D The variables are different, so you cannot expect the same results in the potted plant and the flower garden without collecting more data.

Q2. **Based on the observations regarding matter and energy flow in the containers, the student describes the role of the earthworm in the ecosystem created in the investigation. Which description best explains the role of earthworms in the ecosystem?**

A consumers, because they eat organisms that would compete with plants for beneficial nutrients

B producers, because they use energy from the Sun to produce nutrients that are needed by plants

C decomposers, because they break down substances in the soil that provide nutrients for plants

D scavengers, because they can survive in soils that have very few nutrients and still remain healthy

Use the information below to answer questions 3 through 7.

Bat activity can be affected by artificial lighting. Because bats often rest during the day and hunt at night, they use their sense of hearing to help locate prey in the dark. A hunting bat emits high-pitched sound waves that reflect off insects. The external structure of the bat's ear, which is composed of cartilage, funnels the reflected sound waves to the inner ear. The bat's brain then identifies the location of an insect based on the amount of time it takes for the reflected sound waves to reach the bat's ears.

A group of researchers set up a study using white, green, and red lights in an otherwise dark natural habitat. The researchers measured the activity of two types of bats by recording the number of times a bat passed by. The researchers took measurements for five days in both early summer and late summer for four years. Their results are shown in the graph.

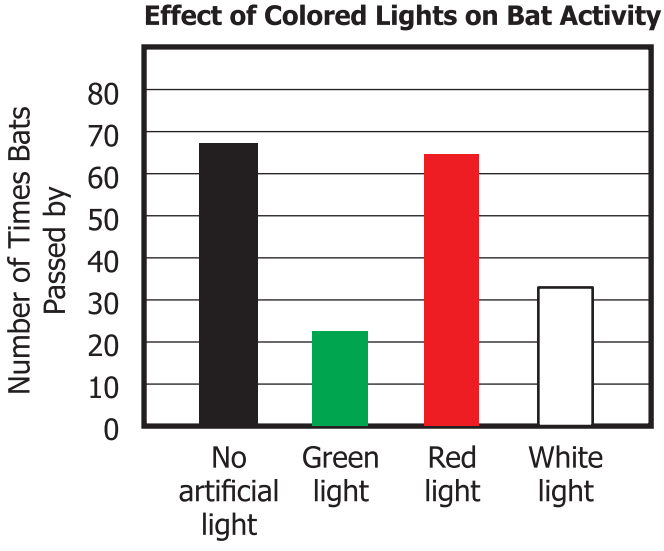


Figure 1.

Based on the information about bats, two students construct claims about the body systems a bat uses when it hunts.

Student 1: A bat's nervous system tells the bat where its prey is located. Then the bat's muscular system allows the bat to fly and catch the prey.

Student 2: A bat uses its respiratory system to produce sounds. Then the bat's nervous system tells the bat where the prey is located.

Q3. Which question can best be answered by analyzing the data in Figure 1?

A Why are bats not attracted by green light?
B Can bats distinguish a green grasshopper from a red ant at night?
C Are bats likely to be affected by green lights and red lights shining together?
D What color light should be used to observe bat activity without affecting their behavior?

Q4. The independent variable in this investigation is _____ .

A Type of bat
B Observed activity
C Color of light
D None of these.

Q5. The investigation provided evidence that the bats' _____ is reacting to a stimulus and affecting the behavior of the bats.

A Muscular system
B Nervous system
C Circulatory system
D All of these.

Q6. Which statement best compares the claims of the two students?

A Student 2's claim explains how ears send information to the brain, and Student 1's claim explains how the brain sends messages to the muscles for immediate action.

B Student 2's claim explains how the brain is not needed to process information, and Student 1's claim explains how muscle memory is used to capture prey.

C Student 1's claim explains how the brain stores memories, and Student 2's claim explains how these memories are used to locate prey.

D Student 1's claim explains how the brain reacts to sounds, and Student 2's claim explains how these sounds are stored as memories.

Q7. Which of the following is not an example of an irreversible change?

A A log of wood has been burned on the fire.

B A fruit smoothie has been frozen to make lollies.

C A mixture of flour, water and yeast has been baked into bread.

D A bicycle left out in the rain begins to rust.

Q8. Which star is nearest to Earth?

A Pole star

B Orion

C Cassiopeia

D Sun

Q9. **If I am 13 years old, I have gone round the sun ___ times.**

A Never gone round the sun
B 13
C 26
D Shall go round the sun when I shall be 15

Q10. **If Saturn is thrown into an ocean,**

A it will float.
B it will sink.
C it will dissolve.
D it will soak all water.

Q11. **Where is the lightning rod attached to protect the building from lightning?**

A On the top of the building
B On the bottom of the building
C In the middle of the building
D Anywhere

Q12. **Tsunami means**

A earthquake
B floods
C earthquake under the sea
D eruption of volcano in a sea

Q13. **The type of pollution which is likely to affect Taj Mahal in Agra to a greater extent is**

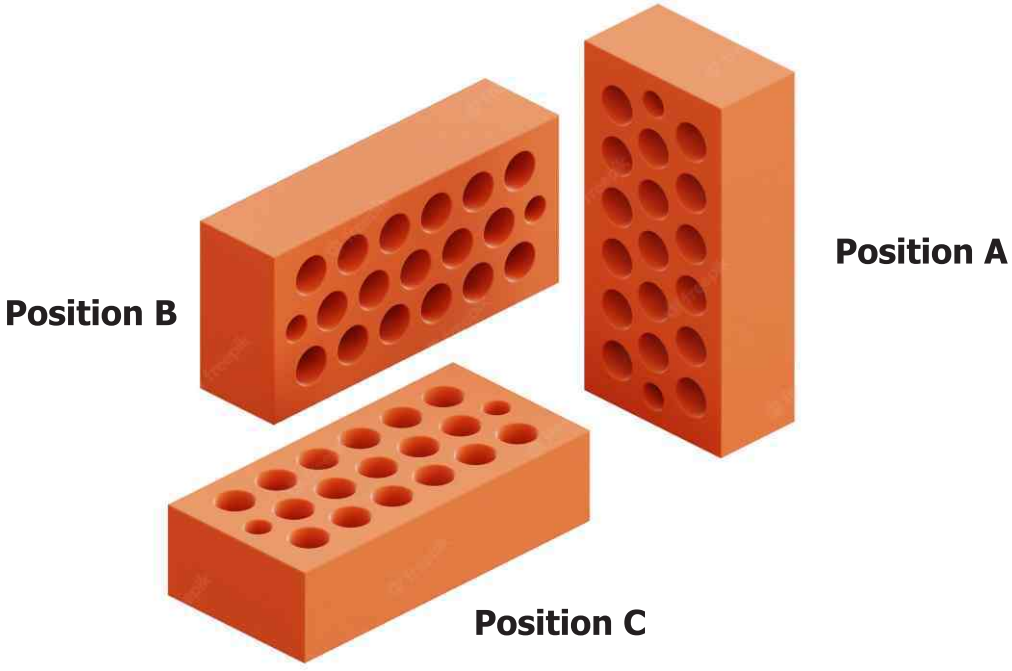
A Air pollution

B Soil pollution

C Water pollution

D Noise pollution

Q14. **A brick is kept in three different ways on a table as shown in given figure.**



The pressure exerted by the brick on the table will be

A Maximum in position A

B Maximum in position C

C Maximum in position B

D Equal in all cases

Use the information below to answer questions 15 and 16.
Figure 1 shows embryo development for four organisms.

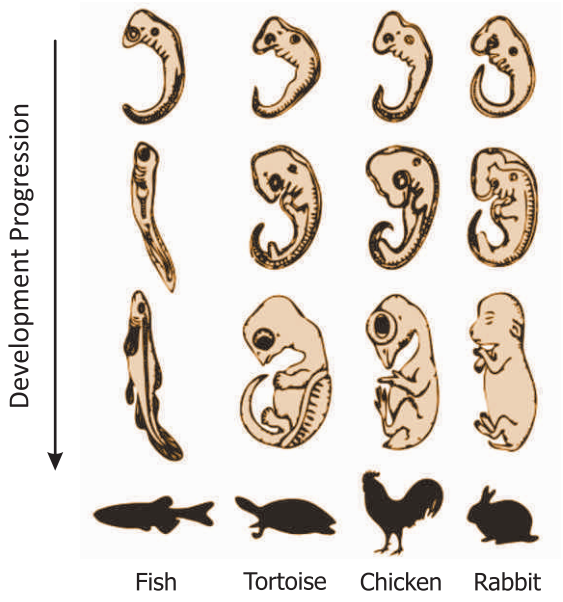


Figure 1. Embryo Development

Q15. Which statement can best be supported by Figure 1?

A Chickens are more closely related to tortoises than rabbits are.
B Rabbits, chickens, tortoises, and fish are equally related to each other.
C Fish do not share a common ancestor with other vertebrates.
D Fish and chickens are the least closely related.

Q16. Which question can best be answered by the data in Figure 1?

A How long does it take different organisms to develop into adults?
B Do diverse organisms follow a similar progression of development?
C Do modern organisms follow the same development progression as ancient organisms?
D Which characteristics at each developmental stage increase an organism's chance of survival?

Q17. **Some researchers are developing a new fertilizer designed to improve the growth of plants in hot, dry climates. The fertilizer was applied to one hundred desert plants in a greenhouse. The average daytime temperature in the greenhouse was 90°F, and the humidity levels were low. Which is best for the researchers to do next?**

A Compare plants that received fertilizer to similar plants that received none.

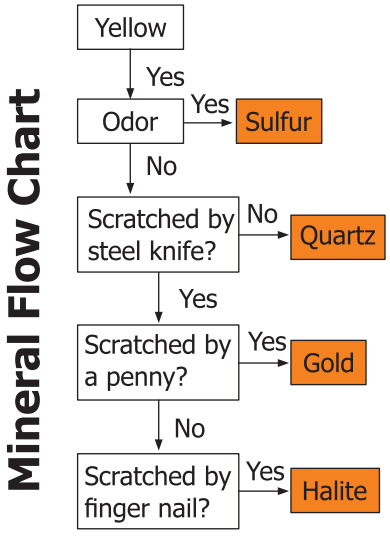
B Begin selling the fertilizer to gardeners living in hot, dry climates.

C Change the conditions in the greenhouse and retest the fertilizer.

D Test the fertilizer on plants that are adapted to cooler climates.

Q18. **A student wanted to identify a mineral based on the flow chart below. The mineral was yellow and odorless. The student scratched the mineral with a steel knife and a penny, but not with a fingernail.**

Based on this flow chart, which mineral could the student have been observing?



A Sulfur

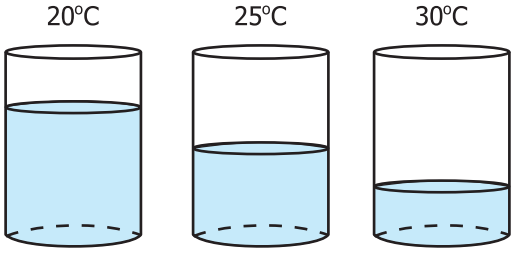
B Quartz

C Gold

D Halite

Q19. **A student filled three identical cups with equal amount of water. The student placed each cup in a room with a different air temperature. After a few days, the student compared the amounts of water remaining in each cup.**

Water Comparison Investigation



What cause-and-effect relationship does this investigation support?

A As evaporation decreases, air temperature decreases.

B As evaporation increases, air temperature increases.

C At higher air temperatures, more water evaporates.

D At higher air temperatures, less water evaporates.

Q20. **Some students investigated plant growth by growing two sets of the same type of plant. One set was grown indoors and the other set was grown outdoors. They recorded data in the table below.**

Indoor vs. Outdoor Plant Growth

	Indoor Plants Height (cm)			Outdoor Plants Height (cm)		
	Plant 1	Plant 2	Plant 3	Plant 4	Plant 5	Plant 6
Week 1	18.0	14.3	16.6	15.0	16.2	14.7
Week 2	22.1	16.5	18.2	16.5	17.3	15.9
Week 3	24.4	19.0	20.5	17.2	19.1	17.0
Week 4	26.3	22.1	23.6	19.1	20.6	19.4

The students concluded that the plants grown indoors grew faster because they received better quality light than the plants grown outdoors. Which is the most likely reason this conclusion may be flawed?

A The students measured the plants at different times.

B The students should have grown different types of plants.

C The growth of the plants in each set was affected by more than one factor.

D The outdoor plants grew faster than the indoor plants.

Q21. **Some information about the planets is given below.**

Planetary Information

	Mercury	Earth	Mars	Jupiter	Saturn	Neptune
Approximate distance from the Sun (in millions of kilometers)	58	150	228	778	1,427	4,497
Mass of Planet (Earth = 1)	0.1	1	0.1	317.9	95.2	17.1
Number of Observed Moons	0	1	2	62	60	13

Which conclusion is best supported by the data in the table?

A The farther the planets are from the sun, the more moons they have.

B The mass of the three farthest planets increases with their distance from the sun.

C The greater the mass of the planets, the more moons they have.

D The three planets with the smallest mass have the fewest number of moons.

Q22. **A student is trying to determine if the composition of ice cubes affects the melting point. Which will be the best investigation to use?**

A Freeze pure water in 3 identical ice cube trays, and then place each tray on a table in different rooms.

B Freeze pure water, sugar water, and salt water in 3 identical ice cube trays, and then place the trays side by side on the same table.

C Freeze pure water in 3 different-sized ice cube trays, and then place each tray on a different table in the same room.

D Freeze pure water, sugar water, and salt water in 3 different-sized ice cube trays, and then place the trays side by side on the same table.

Q23. **The locations of Nashville, TN, and Wilmington, NC, are shown on the map.**

How does the climate of Wilmington most likely compare to the climate of Nashville?

A Wilmington has hotter summers because it is farther east.

B Nashville has more rain because it is farther west.

C Wilmington has milder winters because it is closer to the ocean.

D Nashville has the same climate because it has the same distance from the equator.

Q24. **An animal called a sea anemone uses stinging cells to capture prey.**

Although this animal looks like a flower, it must get energy from which source?

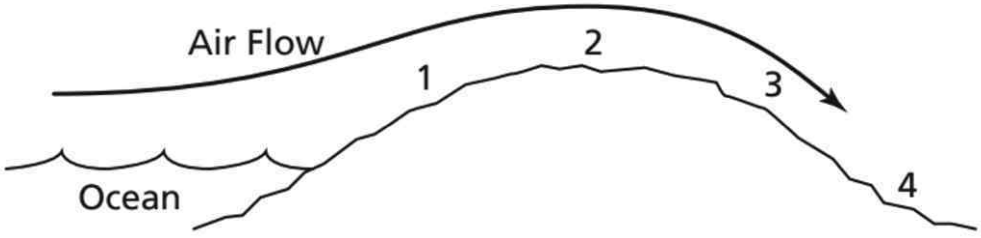
A Soil

B Sunlight

C Ocean water

D Other organisms

Q25. **The picture shows air flow over a mountain.**



Which numbered region most likely has the highest summer temperatures?

A 1 **B** 2 **C** 3 **D** 4

Q26. **Different types of water pollution and their effects are described in the table below.**

Descriptions of Water Pollution

Type	Effect
Raw Sewage	Illnesses such as typhoid and hepatitis can spread to humans
Phosphate and Nitrate	Increases algae, then decaying algae uses up oxygen in water
Poison	Stored in the bodies of fish and builds up in organisms that eat fish
Oil	Becomes stuck on bird feathers
Thermal (heat)	Causes water to be less able to contain oxygen; causes bacteria to grow

Based on the table, which results from both phosphate and nitrate pollution and thermal (heat) pollution in water?

A Diseases are carried through the water.
B Materials contaminate the bodies of birds.
C Growth of algae rapidly increases.
D Levels of oxygen in the water decrease.

Q27. **Omar went to a magic show. The magician rubbed a balloon on her hair and then held the balloon against a wall. When the magician released the balloon, Omar was amazed to see that it stuck to the wall! He wonders what factors affect how well balloons stick to different surfaces. So, he decides to design an experiment. He has the following supplies available:**

- the hair on his own head
- a cotton blanket
- a wooden door
- five rubber balloons

Using only these supplies, which question can Omar investigate with an experiment?

A Do rubber balloons stick to a cotton blanket or a wooden door longer after being rubbed on his hair?

B Do rubber balloons or foil balloons stick to the wooden door longer after being rubbed on his hair?

C Do rubber balloons stick to a wooden door or a metal door longer after being rubbed on his hair?

D None of above.

Q28. **Marcy wants to grow sunflowers in her backyard garden. She notices that some sunflowers grow much taller than others. She is curious about what factors affect how sunflowers grow. So, she decides to design an experiment. She has the following supplies available:**

- Seeds from one type of sunflower
- Soil
- One wooden planter box in the sun
- One wooden planter box in the shade
- One plastic planter box in the sun
- Water

Using only these supplies, which question can Marcy investigate with an experiment?

A Do sunflowers grow taller if they are planted in planter boxes or in pots?

B Do sunflowers grow bigger in sunny planter boxes or in shady planter boxes?

C Which type of sunflower grows more leaves?

D All of the above.

Q29. **Natalie is sledding with her friends. She notices that some of them go faster down the sledding hill. She wonders what factors affect sledding speed. So, she decides to design an experiment. She has the following supplies available:**

- Access to a small snow-covered hill at the park
- A small plastic sled
- A large plastic sled
- A rubber inner tube sled
- A stopwatch

Using only these supplies, which question can Natalie investigate with an experiment?

A Does a rubber inner tube sled go faster down a small hill or down a big hill?

B Does a plastic sled or a wooden sled go down a hill faster?

C Does a rubber inner tube sled or a plastic sled go faster down a hill?

D All of the above.

Q30. **A tugboat tows ships out of a harbor. The tugboat starts pulling the ships when they are stopped at a dock.**

Masses of ships	
Name	Mass (kg)
Bright Start	1,119
Gardenia	1,222
Margate	2,252
Premier	2,046

The ships have the same acceleration as they begin to move away from the dock. Order the names of the ships to show the size of the force the tugboat applies to each ship.

A Bright start, Gardenia, Margate, Premier

B Margate, Gardenia, Premier, Bright start

C Margate, premier, gardenia, Bright start

D Premier, Gardenia, Bright star, Margate

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Student Name	Father Name	Grade	School
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HAIDER ALI	ALI MUSHTAQ	2	ARMY PUBLIC SCHOOL & COLLEGE
MUHAMMAD YOUSAF	KAMRAN ASHRAF	3	KOHSAR CHILDREN'S ACADEMY
MUHAMMAD ZAID	M. SOHAIB NIZAMI	4	GENERATIONS SCHOOL
HANIA ABID	MRS. ASMA LATIF	5	FATIMA FERTILIZER SCHOOL
RUQAIYAH ALI ASGHER	ALI ASGHER KHAMBATWALA	5	MSB EDUCATIONAL INSTITUTE
RAMISHA ALI	ABID ALI MUGHAL	6	GOVT. QUEEN MARY GRADUATECOLLEGE
SYEDA FATIMA SURIYA	SYED TAHIR HUSSAIN	7	BEACONHOUSE SCHOOL SYSTEM
MANAL ARSHAD	MUHAMMAD ARSHAD	8	HABIB GIRLS SCHOOL
MARYAM SHAHID	SHAHID IQBAL	9	BAHRIA COLLEGE
AREEBA KHAN	DURAIZ KHAN	10	PRESENTATION CONVENT HIGH SCHOOL

ICATS Creative Writing Contest 2022
National Toppers

Student Name	Father Name	Grade	School
HASSAN WASEEM	M. WASEEM	1	PAKISTAN INT'L PUBLIC SCHOOL
M. AFNAN SUFDER	SUFDER HUSSAIN	2	ARMY PUBLIC SCHOOL AND COLLEGE SYSTEM
FATIMA NOOR	BILAL YOUSAF	3	LAHORE GRAMMAR SCHOOL
M. ABDULLAH HASSAN	RIZWAN AHMAD	3	LAHORE GRAMMAR SCHOOL
SHANZAY ADNAN	ADNAN FAROOQ	3	ARMY PUBLIC SCHOOL
PRATIK PARKASH	PARKASH LAL	4	THE CITY SCHOOL
DANIYAL SHAHZAD	SHAHZAD ASLAM	5	LAHORE GRAMMAR SCHOOL
HASSAN ALI	IMRAN ALI SHAH	6	ARMY PUBLIC SCHOOL & COLLEGE
MAIDA SOHAIL	SOHAIL AKRAM	7	BEACONHOUSE SCHOOL SYSTEM
ATIYA ATIF	MUHAMMAD ATIF NAZAR	8	ROOTS IVY INTERNATIONAL SCHOOL
AYESHA HAFEEZ	CH. GHULAM HAFEEZ	8	ISLAMABAD COLLEGE OF ARTS & SCIENCES
PARTHAM KUMAR	DOULAT RAM	9	AGA KHAN HIGHER SECONDARY SCHOOL
AMNA HUSNAIN	SYED ALI ZAFAR	10	AES SCHOOL FOR GIRLS
RASIKH JAVED	M JAVED	10	BAHRIA FOUNDATION COLLEGE

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INTERNATIONAL
CATS CONTESTS
COMPETENCE & APTITUDE TESTING SERVICES
FASTEST GROWING CONTESTS IN PAKISTAN

Answer Sheet

INSTRUCTIONS

- This is a generic answer sheet to be used by participants of all grades. Students of Grade 1-2 will fill in circles of first 20 questions, Grade 3-4 will fill in circles of 25 questions and Grade 5-10 will fill in circles of 30 questions.
- Please recheck your Name, Father Name, Grade and School written below, the same would appear at your certificate. Make all corrections on the Attendance Sheet only.
- Use of lead pencil is not allowed. Use only Black / Blue ink to fill in the circles.

ICATS Science Contest 2022
Grade 7-8

Choose only ONE of the FOUR proposed answers (A, B, C or D) and fill in the circle with your answer.

Example of correctly filled answer. (A) (B) (C) (D) Correct Filling Answer **"C"**

Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1	D	11	A	21	D
2	C	12	C	22	B
3	D	13	A	23	C
4	C	14	A	24	D
5	B	15	A	25	D
6	A	16	B	26	D
7	B	17	A	27	A
8	D	18	C	28	B
9	B	19	C	29	C
10	A	20	C	30	C