



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

QUESTION BOOKLET

**GRADE 9 & 10
ADOLESCENTS**

Time Allowed: 90 Mins.
Maximum Marks: 90

2023

**ICATS
SCIENCE
CONTEST**



ICATS SCIENCE CONTEST 2023

ADOLESCENTS (GRADE 9 & 10)

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, CALCULATORS 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. 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)
10. REGISTERED STUDENTS CAN PARTICIPATE IN THE CONTEST.
11. 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.
12. IF A PARTICIPANT DOES NOT UNDERSTAND A WORD OR PHRASE ON THE EXAM PAPER, NEITHER EXAMINER NOR INVIGILATOR IS PERMITTED TO ANSWER.
13. FOR INFORMATION ABOUT UPCOMING CONTESTS OR PROVIDING VALUABLE FEEDBACK, PLEASE VISIT WWW.CATSCONTESTS.ORG
14. ANY ACADEMIC MISCONDUCT OR MALPRACTICE MUST BE REPORTED TO INTERNATIONAL CATS CONTESTS AT INFO@CATSCONTESTS.ORG

Q1 Farwa has a steel wool pad for scrubbing some of her cookware. She notices that rust forms on the steel wool when she leaves it in the sink for too long. She wonders what factors affect how quickly steel wool rusts. So, she decides to design an experiment. She has the following supplies available:

- a package of four steel wool pads
- four glass jars with lids
- tap water
- salt water
- vinegar

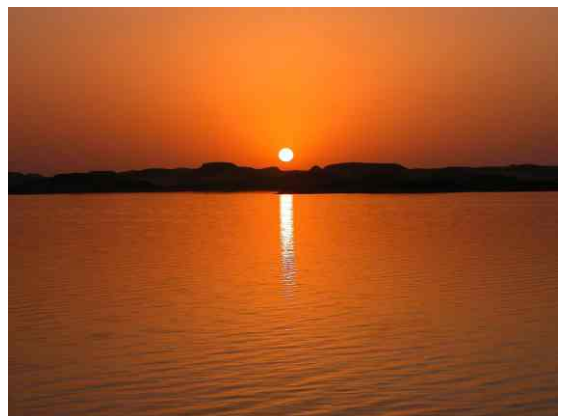
Using only these supplies, which question can Farwa investigate with an experiment?

- A** Does steel wool rust more quickly when it is kept in tap water or in salt water?
- B** Does steel wool rust more quickly when it is kept in salt water or in vinegar in a glass jar without lid?
- C** Does steel wool rust more quickly when stored in a steel jar with water or in a steel jar without water?
- D** Does steel wool rust more quickly when stored in a jar of water with a lid or in a jar of water without a lid?

Q2 The Sun sets over a lake. Some of the light waves bounce off the surface of the water. This makes the sunset appear mirrored on the lake's surface.

Which interaction occurs when the light waves bounce off the surface of the water?

- A** transmission
- B** absorption
- C** reflection
- D** None of these.



Q3

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



a pendulum made from a string and a ball

Alex built a pendulum, he hung a ten-inch string from a stand and attached a two-gram ball to the string. Alex lifted the ball, making sure to keep the string straight. He then released the ball and recorded the number of times the pendulum swung back and forth in ten seconds. Alex did this six times, lifting the ball to the same height each time. Alex repeated this process with a four-gram ball and an eight-gram ball.

Identify the question that Alex's experiment can best answer.

- A** Does the mass of the ball on the end of a pendulum affect the number of times it swings back and forth in ten seconds?
- B** Do balls with more mass cause a pendulum to swing back and forth for a longer amount of time than balls with less mass?
- C** Is the number of pendulum swings in ten seconds affected by the length of the pendulum's string?
- D** None of these.

Q4

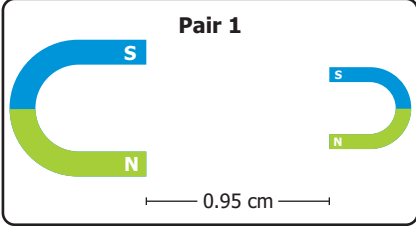
The doctor told his patient that his longest and strongest bone had fractured in the accident. Which of the following bones was the doctor talking about?

- A** Cranium
- B** Femur
- C** Tibia
- D** Radius

- Q5** The images below show four pairs of magnets. The magnets in different pairs do not affect each other. All the magnets shown are made of the same material, but some of them are different sizes.

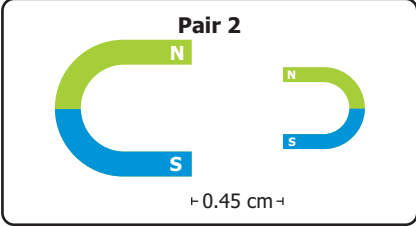
Think about the magnetic force between the magnets in each pair. Select the pair with the magnetic force of greatest magnitude.

A **Pair 1**



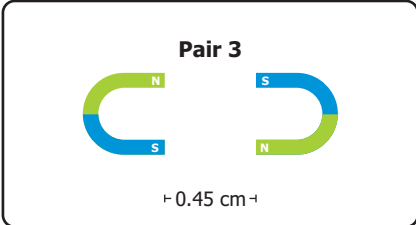
0.95 cm

C **Pair 2**



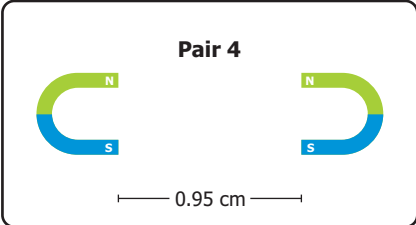
0.45 cm

B **Pair 3**



0.45 cm

D **Pair 4**



0.95 cm

- Q6** What is the temperature of the air on a warm, sunny day? Select the better estimate.

A 10°C **B** 10°F **C** 29°C **D** 29°F

- Q7** A 6-year-old girl shows exceptional sporting ability. Both of her parents are sportspersons, send her for coaching everyday and train her on weekends. Her capabilities are most likely to be the result of an interaction between:

A Health and training **C** Heredity and environment
B Discipline and nutrition **D** Growth and development

Q8

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.



inside a recording studio

Kayla, an audio technician in a recording studio, was in charge of making digital music files smaller. Smaller files take less time to download from the internet. But if a file's size is reduced too much, then the sound quality will not be as good as in the original file. So, Kayla selected one test song. She reduced one copy of the song to a small file size and left another copy the original size. Then, she listened to both copies on her professional-quality headphones.

Which of the following could Kayla's test show?

- A** whether the amount by which she reduced the file would change the way the song sounds?
- B** whether the original and reduced files would sound different from each other on normal quality headphones?
- C** how long it would take to download the original, full-size file?
- D** None of the above.

Q9

It is a hot summer day and you can't wait to go for a swim at the town beach. However, when you arrive at the beach, the gate is closed and a sign is posted stating that the beach is closed due to high bacteria levels.

Which of the following should you do?

- A** Leave and find a beach that is open for swimming.
- B** Grab your fishing pole then hop the gate and go fishing, but not enter the water.
- C** Hop the gate and wade in the water, but don't put your face under.
- D** None of the above.

Q10 Aluminum is used for making cooking utensils. Which of the following properties of aluminum are responsible for the same?

- (i) Good thermal conductivity
- (ii) Good electrical conductivity
- (iii) Ductility
- (iv) High melting point

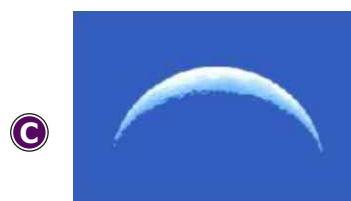
A (i) and (ii)

B (i) and (iii)

C (ii) and (iii)

D (i) and (iv)

Q11 The Moon was observed near the eastern horizon at the Equator just before sunrise. The shape of the Moon would have been closest to:



Q12 Your family owns a small, seasonal cabin with a private, spring-fed pond. Your family visits the camp for your annual spring cleanup to find that a beaver has dammed the spring and the water level of the pond has risen significantly. Beavers are a protected animal in your state. What should your family do?

A Break down the dam and hope the beaver doesn't return.

B Call the local conservation department / authority and see what they recommend.

C Set a beaver trap and remove the beaver.

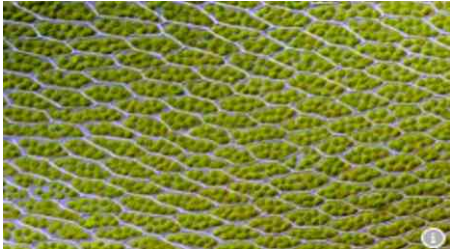
D None of the above.

Q13 Look at the images below and read the text. Then, answer the question.



a photograph of bryum moss

This image is a photograph of a plant called bryum moss. The photograph was taken with an ordinary camera. It shows what you would see if you looked at bryum moss closely.



a micrograph of bryum moss

This image also shows bryum moss. The image is a micrograph, which is a magnified picture taken with the aid of a microscope. The magnified image shows a section of the plant that is only 0.37 millimeters long!

The micrograph shows that the plant is made up of small, similarly shaped units. In this image, each unit looks like it has six sides and is surrounded by a white border. These units are called cells.

Which of the following statements is true?

- A Bryum moss plants are made up of tiny units called cells.
- B Each bryum moss cell is so small that it can be seen only with the help of a microscope.
- C The organism shown in the micrograph is made up of cells, but the organism in the photograph is not.
- D Both (a) and (b).

Q14 A dam causes water temperature to become _____.

- A colder and not evaporate.
- B colder and evaporate faster.
- C warmer and not evaporate.
- D warmer and evaporate faster.

Q15 An amputation removes a specific body part. However, after an amputation, the rest of a person's body can also be affected. Some scientists study these effects on the body.

Before Walter Reed Army Medical Center closed in 2011, some scientists there studied members of the U.S. Armed Forces who had limbs amputated. The following passage describes the experience of patients after their amputations, including one service member who had both legs amputated.

As part of routine treatment efforts [after their amputations], the patients are asked to describe their experience with phantom sensation and phantom pain... [One] service member... described the feeling of heavy legs, asserting that the feeling was similar to weights attached to his calf muscles. He also described that is felt as though his combat boots were on too tightly.

Source: Weeks, S.R., Anderson-Barnes, V.C., & Tsao, J.W. "Phantom limb pain: theories and therapies." In the neurologist, Copyright 2010 by Lippincott Williams & Wilkins, Inc.

Which statement best summarizes the service member's experience?

- A** He felt heaviness and tightness in his legs and feet after he had both legs amputated.
- B** He wore combat boots that were too tight, which injured his legs.
- C** His legs were hard to lift and his boots did not fit well after he was injured in the war.
- D** None of the above.



Q16 An abandoned railroad bed runs through the woods, in sight of your house. The town has proposed turning the railroad bed into a rail trail that can be used for walking and biking, but not motorized vehicles.

Which is a reason for you to support the rail trail?

- A** You do not want strangers walking and riding so close to your home.
- B** There are better ways your town should spend money than on creating a rail trail.
- C** It is a good use of the space and a great way for people to exercise.
- D** None of the above.

Q17 Read the passage. Then answer the question.



A Myrmica ant caring of an Alcon blue caterpillar

Alcon blue butterflies spend the first part of their lives as caterpillars that live with Myrmica ants. When a caterpillar lives with the ants, it mimics, or pretends to be, an ant. The caterpillar can mimic the ants by copying their smell. The caterpillar can also make noises that make it sound like a queen ant. Queen ants receive more food and better protection than any other ants in the nest.

So, when the caterpillar mimics an ant, the ants feed and protect the caterpillar instead of other ants in the nest.

Which type of relationship is formed when an Alcon blue caterpillar lives in a Myrmica ant nest?

- A** commensal **B** mutualistic **C** parasitic **D** none of these

Q18 When heat is constantly supplied by a burner to boiling water, then the temperature of the water during vaporization _____.

- A** rises very slowly **C** first rises and then becomes constant
B rises rapidly until steam is produced **D** does not rise at all

Q19 Cholera is an infectious, fatal disease caused by the bacterium which lives and multiplies in the small intestine. The disease sometimes occurs in epidemic form. Which of the following is not a reason for the spread of the disease?

- A** Breeding of the flies on the garbage heaps **C** Drinking the contaminated water
B Use of spices in food **D** Consuming the contaminated food

Q20 The stages in experimental research are given below:

- (A) Selection of the setting.
- (B) Operationalisation of variables.
- (C) Administration of the experiment.
- (D) Selection of the experimental design.
- (E) Analysis and interpretation of results.

Choose the correct sequence of stages in experimental research from the options given below:

A (A), (B), (D), (E), (C)

C (A), (D), (B), (C), (E)

B (B), (D), (C), (A), (E)

D (D), (A), (B), (C), (E)

Q21 Infectious diseases are the diseases that can spread from infected person to the healthy person. Which of the following can make you ill if you come in contact with an infected person?

A Genetic abnormality

C High blood pressure

B Blood cancer

D Sneezing and coughing

Q22 The danger signals installed at the top of tall buildings are red in colour. These can be easily seen from a distance because among all other colours, the red light _____.

A is scattered the most by smoke or fog.

C is absorbed the most by smoke or fog.

B is scattered the least by smoke or fog.

D moves fastest in air.

Q23 We can distinguish between a man's voice and a woman's voice of the same loudness even without seeing them. This is due to a characteristic of sound which measures the shrillness of sounds. Can you choose the correct unit of the quantity on which this characteristic of sound depends?

A hertz

B meter/second

C meter

D unitless

- Q24** The passage below describes an experiment. Read the passage and answer the following question.



Ten groups of chemistry students combined three solutions that, when mixed, chemically reacted and turned blue. Before mixing, five groups of students heated the solutions to 25°C, and five other groups heated the solutions to 50°C. The students recorded how many seconds it took for the mixtures to turn blue. Then, the groups shared their results, and the class compared the time it took for the mixtures to turn blue at 25°C and at 50°C.

Identify the question that the students' experiment can best answer.

- A** Does the mixture's color change faster when the solutions are mixed at 25°C or 50°C?
- B** Does the mixture of solutions release more gas when they are mixed at 25°C compared to 50°C?
- C** Both of the above.
- D** None of the above.

- Q25** Assertion and Reason are given below. Choose the correct option:

Assertion (A): About 70 percent of earth's volume is water.

Reason (R): Water is easily available for all the population living on the Earth.

- A** Both A and R are true and R is the correct explanation of A.
- B** Both A and R are true but R is not the correct explanation of A.
- C** A is true but R is false.
- D** A is false but R is true.

- Q26** Select the most important factor for the site selection of a thermal power plant.

- A** Distance from the populated area
- B** Availability of fuel
- C** Availability of water
- D** Cost of plant

- Q27** The passage below describes an experiment. Read the passage and answer the following question.



Grayson used a dropper to put equal-sized drops of pure water, one at a time, onto a penny. The drops stayed together and formed a dome on the penny's surface. Grayson recorded the number of drops he could add before the water spilled over the edge of the penny. Then, he rinsed and dried the penny, and repeated the test using water mixed with hand soap. He repeated these trials on nine additional pennies. Grayson compared the average number of pure water drops to the average number of water drops mixed with hand soap that he could add to a penny before the water spilled over.

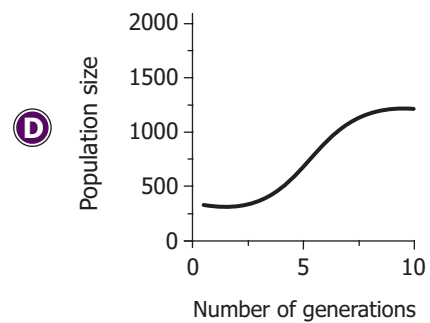
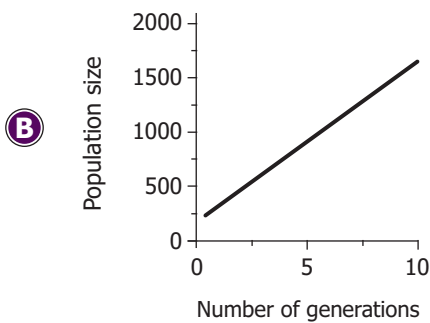
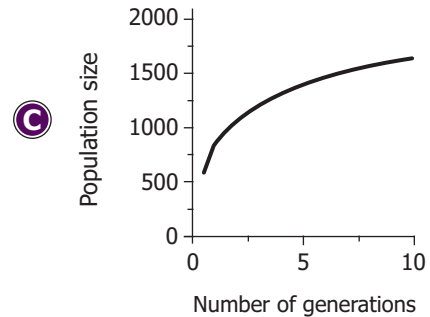
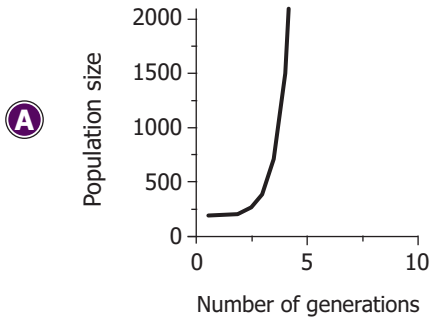
Identify the question that Grayson's experiment can best answer.

- A** Can pennies hold more drops of pure water or water mixed with hand soap?
- B** Can pennies hold more drops of water mixed with dish soap or water mixed with hand soap?
- C** Which penny can hold more drops of pure water or water mixed with hand soap?
- D** None of the above.

- Q28** Among the following choose the correct option which includes acts related to the three R's strategy which can be useful for conserving our natural resources?

- A** Recycle, regenerate, reuse
- B** Reduce, regenerate, reuse
- C** Reduce, reuse, redistribute
- D** Reduce, recycle, reuse

- Q29** Consider a hypothetical population, where all members have access to abundant food and they are free to reproduce at their physiological capacity. Which one of the following curves best represents the population growth expected under such conditions?



- Q30** Engineers must understand the difference between requirements and constraints. Let's say a team of engineers is asked to design a pair of kids' tennis shoes for less than \$20. They determine that the only way to manufacture shoes for this price is to use recycled materials. What is the team's constraint?

- A** The shoes must be designed for kids.
- B** The shoes must be made out of recycled materials.
- C** The shoes must cost less than \$20 to manufacture.
- D** All of the above.

National Toppers
ICATS
Art Contest
2023

Student Name	Father Name	Grade	School
ZOHA SUALEH	MIR M. SHAH SUALEH	1	FUTURE WORLD SCHOOL
SHAZIL ASAF	ASAF JAVED	1	ARMY PUBLIC SCHOOL & COLLEGE FOR BOYS
MUHAMMAD WALEE KHAN	FAHEEM ASHRAF	2	NUST CREATIVE LEARNING SCHOOL & COLLEGE
RAYYAN IRFAN	DR. MUHAMMAD YOUSAF	3	DHA JUNIOR SCHOOL
ANABIYA	HUSSAIN ABID	3	APS&C PMA
MAHNOOR	GHULAM MUSTAFA	4	AES SCHOOL FOR GIRLS
MEERAB KHAN	ADNAN ASIF KHAN	5	LAHORE GRAMMAR SCHOOL (JUNIOR SECTION)
MAHEEN MUNIR	MUNIR KHAN	6	FAUJI FOUNDATION SCHOOL
TALHA ALI KHAN	SADAQAT ALI	7	JOINT STAFF PUBLIC SCHOOL & COLLEGE
AREESHA MOBEEN	MOBEEN TAHIR	8	LAHORE GRAMMAR SCHOOL
ASMA NAEEM	NAEEM AMIN	9	ALLAMA IQBAL PUBLIC GIRLS HIGH SCHOOL
SUMERA KHAN	IMRAN KHAN	10	AES SCHOOL FOR GIRLS

Congratulations

National Toppers
ICATS
Creative Writing
Contest
2023

Student Name	Father Name	Grade	School
FAARIS ALI QURESHI	DANYAL QURESHI	1	LAHORE GRAMMAR SCHOOL
KHADIIJA AHSAN	AHSAN MAJEED	2	LAHORE GRAMMAR SCHOOL
ZAYYAN MUSTAFA	QAMAR MUSTAFA	3	ARMY PUBLIC SCHOOL (BOYS & GIRLS)
SIBTAIN ALI KHAN	FAWAD ALI PATHAN	4	PAK-TURK MAARIF INT'L SCHOOLS & COLLEGES
SAARIM THARANI	IMRAN NOORALI THARANI	5	AGA KHAN SCHOOL GARDEN
M. AHMED JADOON	ELLI RAZA JADOON	6	THE CITY SCHOOL (RAVI CAMPUS)
ARISHA MAZHAR	MAZHAR ALI	7	KOHSAR CHILDREN'S ACADEMY
VERDAH SAHAR USMAN	USMAN TARIQ SHEIKH	7	LAHORE GRAMMAR SCHOOL
SALEHA SHAHID	SHAHID WAHEED	8	THE CITY SCHOOL (PESHAWAR CAMPUS)
HALEEMA USMAN	USMAN AHMED	8	TNS BEACONHOUSE
UMAIMA AIMEN	MUBASHIR MUSTAFA	9	RANGERS PUBLIC SCHOOL
RANIA ZAKIA MALIK	TAHIR NAEEM MALIK	10	ISLAMABAD COLLEGE OF ARTS AND SCIENCES

Congratulations

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