



# INTERNATIONAL CATS CONTESTS

COMPETENCE & APTITUDE TESTING SERVICES



**GRADE 9 & 10 (ADOLESCENTS)**

*Time Allowed: 90 Mins.*

*Maximum Marks: 90*



**ICATS**  
**SCIENCE** Contest 2018  
**QUESTION BOOKLET**

# ICATS SCIENCE CONTEST 2018

## ADOLESCENTS (GRADE 9 & 10)

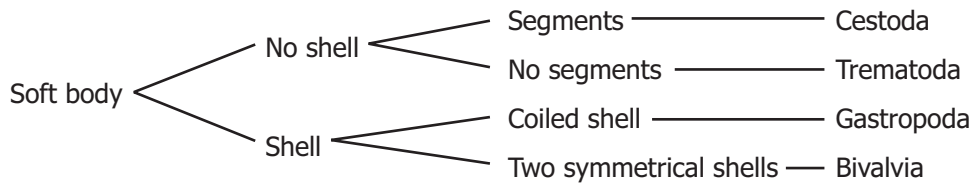
TIME ALLOWED : 90 MINUTES, MAXIMUM MARKS : 90

TOTAL QUESTIONS : 30 MCQS

### INSTRUCTIONS

1. DON'T START ATTEMPTING THE PAPER UNTIL INSTRUCTED BY THE INVIGILATORS.
2. INSTRUCTIONS FROM THE EXAMINATION INVIGILATOR 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.
14. FOR INFORMATION ABOUT UPCOMING CONTESTS OR PROVIDING VALUABLE FEEDBACK, PLEASE VISIT [WWW.CATSCONTESTS.ORG](http://WWW.CATSCONTESTS.ORG)
15. ANY ACADEMIC MISCONDUCT OR MALPRACTICE MUST BE REPORTED TO INTERNATIONAL CATS CONTESTS AT [INFO@CATSCONTESTS.ORG](mailto:INFO@CATSCONTESTS.ORG)

**Q1.** A classification key for an organism is shown below.



**To what class does the organism belong?**

- A** Cestoda      **B** Gastropoda      **C** Trematoda      **D** Bivalvia

**Q2.** The bobolink is a small blackbird that nests in fields of tall grass. It breeds in the summer across much of southern Canada and the northern United States. It migrates long distances, wintering in southern South America. The numbers of these birds are declining due to disruption of the areas where they live.

**In order to save these birds from extinction, the best course of action would be to**

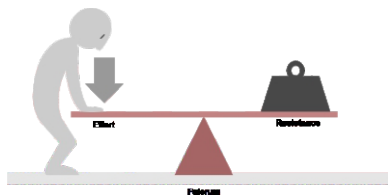
- A** prevent the birds from migrating to South America  
**B** encourage farmers to let their hay fields undergo succession  
**C** work to protect bobolink habitats in South and North America  
**D** capture all the bobolinks and keep them safe in zoos



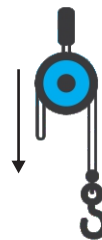
Q3.

The diagrams below represent four simple machines. The arrows in each diagram indicate the direction of the force being applied. Which machine is changing the direction of the force being applied?

A



B



C



D

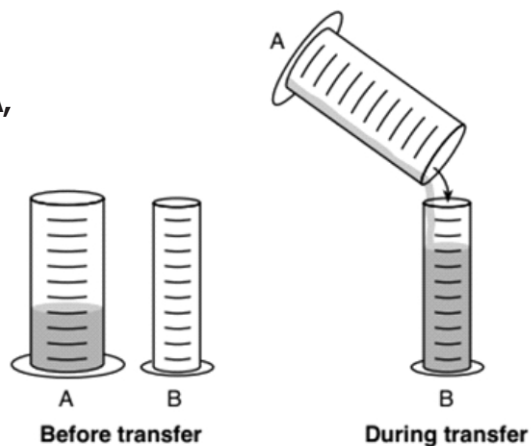


Q4.

The diagrams below represent two cylinders. One hundred milliliters of a liquid was completely transferred from cylinder A to cylinder B.

Compared to the liquid that was in cylinder A, the liquid in cylinder B will have

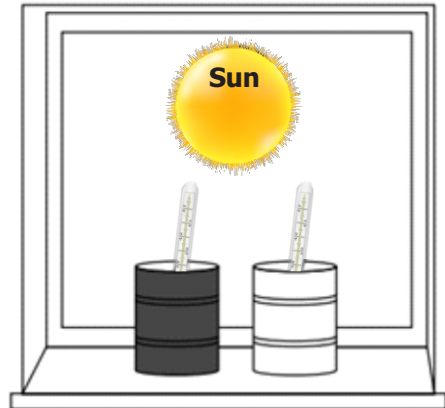
- A** less mass and more volume
- B** less mass and the same volume
- C** the same mass and more volume
- D** the same mass and the same volume



- Q5.** The diagram below represents two cans of water at the same temperature. One can is painted black and the other can is painted white. The cans are placed on a sunny windowsill, and a thermometer is placed in each can to measure the water temperature.

After four hours in the sunlight, the temperatures of the water in the cans will most likely be

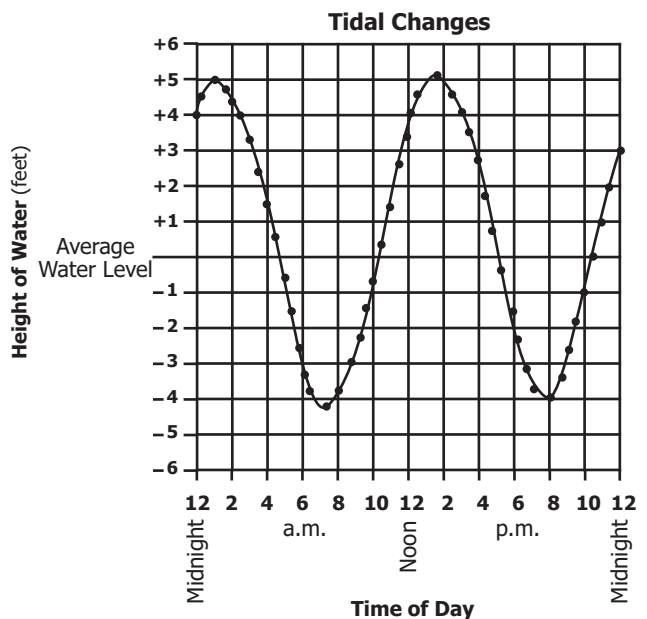
- A** the same as when the cans were placed there
- B** higher, with the same temperature in both cans
- C** higher in the white can than in the black can
- D** higher in the black can than in the white can



- Q6.** The graph below shows tidal changes at an ocean beach over a 24-hour time period.

What is the approximate time interval between the two high tides?

- A** 6 hours
- B** 9 hours
- C** 13 hours
- D** 24 hours



**Q7.** The label below shows the nutrition facts for a certain food.

How many servings of this food would a person need to eat to get approximately 8% of the recommended daily value of dietary fiber?

- A** 25
- B** 2
- C** 30
- D** 4

## Nutrition Facts

Serving Size 1/2 cup (30g)

Servings Per Container about 9

### Amount Per Serving

**Calories** 130    Calories from Fat 30

### % Daily Value\*

**Total Fat** 3g    5%

Saturated Fat 0.5g    3%

**Cholesterol** 0mg    0%

**Sodium** 300mg    13%

**Total Carbohydrate** 21g    7%

Dietary Fiber 1g    4%

Sugars 1g

**Protein** 4g

**Q8.** A glacier in Alaska has melted back a distance of 100 kilometers over the last 200 years. Four stages in this process are shown in diagrams A, B, C, and D below.

**A**



Grasses & Shrubs appears.

**B**



Evergreen trees are plentiful.

**C**



Glacial ice covers the area.

**D**



Rock and gravel are deposited.

In which order should the diagrams be placed to represent the ecological succession that has taken place in the area?

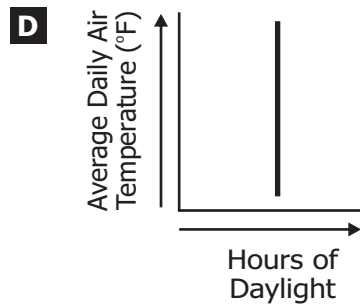
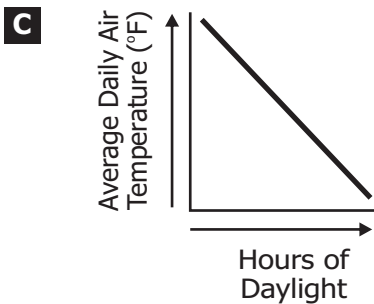
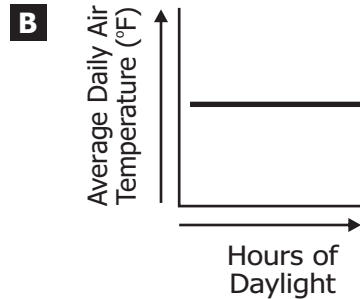
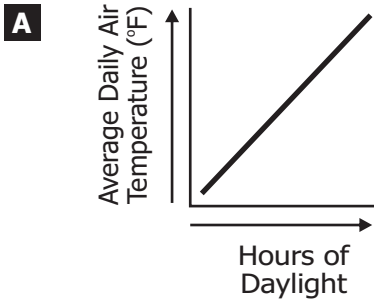
**A** C → D → A → B

**B** C → D → B → A

**C** D → C → B → A

**D** D → C → A → B

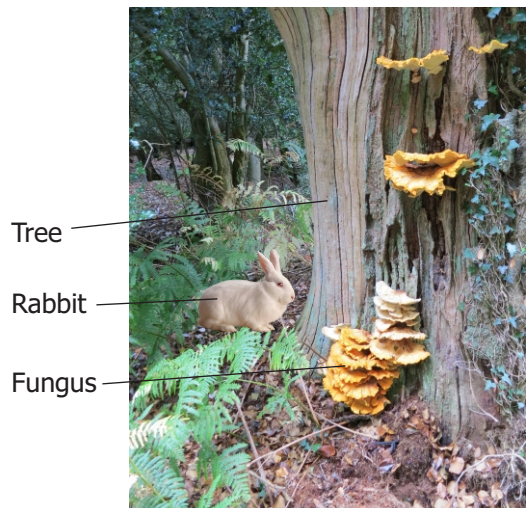
**Q9.** The average daily air temperature at a certain location increases when there is a seasonal increase in the number of daylight hours. Which graph best shows this change?



**Q10.** Three living organisms are labeled in the diagram below.

What do the rabbit, fungus, and tree have in common?

- A** They are all producers.
- B** They are all omnivores.
- C** They all belong to the same kingdom.
- D** They are all multicellular organisms



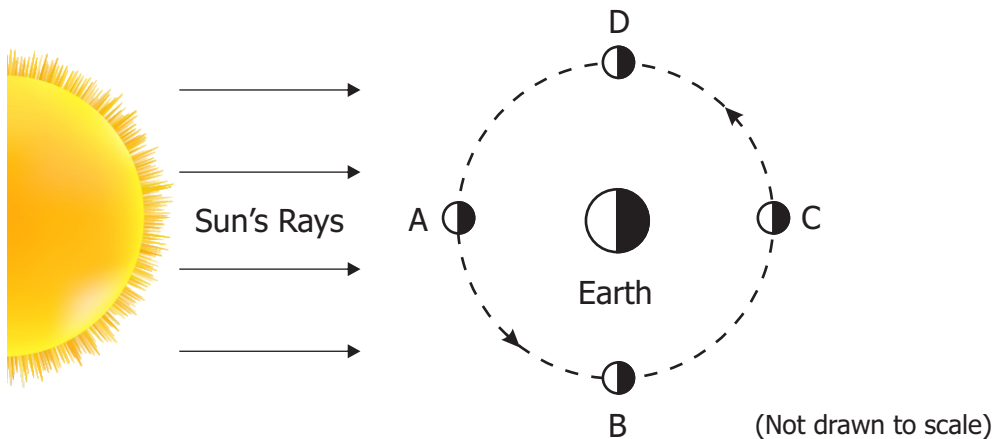
**Q11.** The diagram below represents strawberry in a food processor. When the processor is turned on, the blades will break the strawberry into smaller pieces.

Which human digestive process is most similar to this activity?

- A** mechanical digestion
- B** chemical digestion
- C** solid waste elimination
- D** liquid waste elimination



**Q12.** The letters A, B, C, and D represent four positions of the Moon in its orbit around Earth. The nighttime sides of the Moon and Earth are shaded



Approximately how many weeks will it take the Moon to move from position B to position D?

- A** one
- B** two
- C** three
- D** four



Read the passage below and answer questions 13 to 15.

Acid drainage from old mine sites is an environmental problem. Ground water combines with sulfide minerals and oxygen in these old mines to form sulfuric acid. The sulfuric acid reacts with any metal ores left in the mine to form a new substance. The new substance made by these reactions enters the surface water to become an environmental hazard.

**Q13.** What property must this new substance possess?

- A** It is acidic.      **B** It is a liquid.      **C** It is soluble.      **D** It reacts with oxygen.
- 

**Q14.** Acid drainage also occurs naturally. What would be the main difference between acid drainage in mines and that which occurs naturally?

- A** The process in the mines requires less oxygen.  
**B** The natural process occurs much more slowly.  
**C** Sulfuric acid is only created from the rocks in mines.  
**D** Metals dissolve to different extents in mines compared to naturally.
- 

**Q15.** Acid drainage from mining can be treated before it is released into the environment.

Which form of treatment uses a chemical reaction?

- A** Adding caustic soda or lime to the water.  
**B** Covering waste rock from mines with plastic sheeting.  
**C** Sealing mine shafts to prevent movement of water in and out.  
**D** Storing mining waste underwater where oxygen levels are very low.

Read the passage below and answer questions 16 to 18.

All early observations of objects in space relied on visible light. As technology has evolved we have been able to 'look' into space in different ways. In AD 1054 Chinese astronomers saw a short-lived, bright light appear in the sky. The bright light is now thought to have been caused by a supernova. A supernova is an explosion of a star. This supernova created a structure we now know as the Crab Nebula. In 1968 repeating radio waves were discovered to be coming from the centre of the Crab Nebula. The object creating these radio waves is called the Crab Pulsar.

**Q16.** What does the discovery of the Crab Nebula and Crab Pulsar tell us about the nature of scientific knowledge?

- A** Scientific knowledge confirms what we already know to be true.
  - B** Current scientific knowledge can be used to explain past observations.
  - C** Current scientific knowledge always confirms the beliefs of pre-industrial societies.
  - D** Prior scientific knowledge only becomes relevant if it is confirmed by current research.
- 

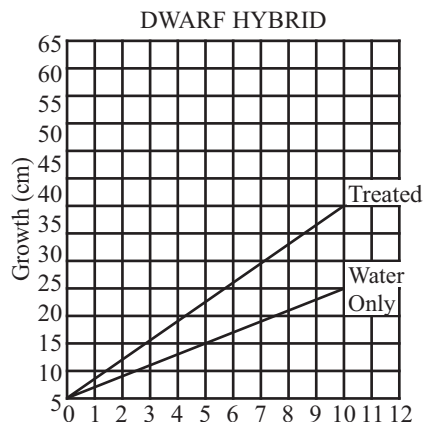
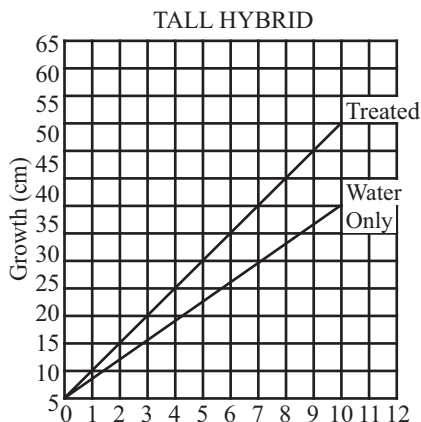
**Q17.** Light from very distant objects in the universe has changed by the time it reaches the Earth. This phenomenon is called the Red Shift. What causes the Red Shift?

- A** All objects in the universe are very hot.
- B** The objects producing the light are moving away from Earth at high speeds.
- C** Red light travels faster than other coloured light so more red light reaches Earth.
- D** Any blue light from distant objects is absorbed in the atmosphere before it reaches Earth.

**Q18.** Why does the radiation from very distant objects help us understand the formation of the early universe?

- A** Objects near the edge of the observable universe were formed before those closer to the centre.
- B** Objects must be very old before they can produce measurable amounts of radiation.
- C** Radiation from very distant objects that reaches the Earth today was formed very early in the history of the universe.
- D** Any radiation that reaches the Earth today from very distant objects must be very powerful, so the radiation must have come from the Big Bang.

**Q19.** In an experiment to study the effect of a new fertilizer on the growth of tall hybrid corn and dwarf hybrid corn, from immediately after germination to 10 days of growth, the data below were obtained. Other growing conditions such as water and sunlight were the same for both groups.



Which of the following is the most reasonable conclusion that can be drawn from the data above?

- A** The new fertilizer influences the growth of both corn varieties tested
- B** The new fertilizer causes faster growth rate for both varieties than do other fertilizers
- C** The new fertilizer improves the root system of the tall hybrid to a greater extent than it does that of the dwarf hybrid
- D** The new fertilizer is effective in producing faster growth for both varieties for the first 10 days only.

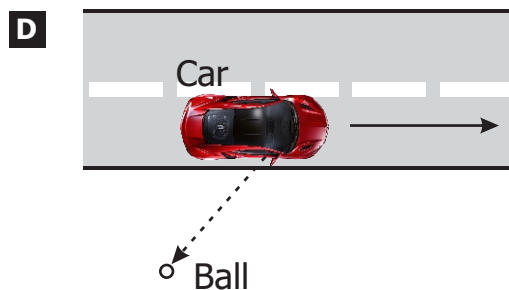
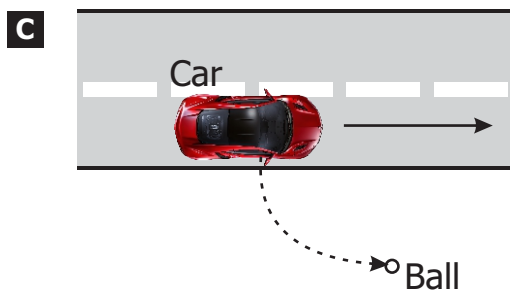
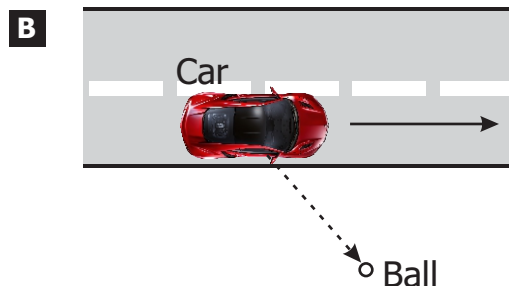
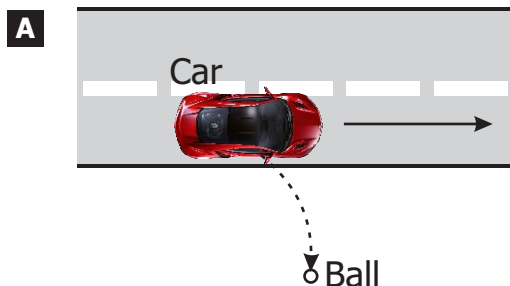
**Q20.** The paper ball kept near the mouth of a plastic bottle will be pushed out because

- A** the air pressure inside the bottle is same as that at the mouth
  - B** the air pressure inside the bottle is more than that at the mouth
  - C** the air pressure inside the bottle is less than that at the mouth
  - D** the pressure inside and outside the bottle same
- 

**Q21.** A student investigated how the mass of a plastic disk affected its motion. The student pushed five similar plastic disks, each with a different mass, across a wooden floor. The student recorded the distance each disk traveled. The investigation was repeated five times. The student concluded there was no relationship between mass and distance traveled. Which of these best describes an error in the investigation?

- A** The student performed too few trials.
- B** The student should have used disks that were the same mass.
- C** The student should have pushed the disks across different surfaces.
- D** The student failed to control the amount of force applied.

**Q22.** A ball is thrown out of the passenger window of a car moving to the right (ignore air resistance). If the ball is thrown out perpendicular to the velocity of the car, which of the following best depicts the path the ball takes, as viewed from above?



**Q23.** At the present time, the temperature of the universe (i.e., the microwave radiation background) is about 3 K. When the temperature was 12 K, typical objects in the universe, such as galaxies, were

- A** one-quarter as distant as they are today
- B** one-half as distant as they are today
- C** separated by about the same distances as they are today
- D** two times as distant as they are today

**Q24.** If the four lenses shown below are made of the same material, which lens has the shortest positive focal length?

**A****B****C****D**

**Q25.** Emperor penguins lay eggs during cold winter weather. Each male parent holds his egg on his feet to keep it warm with his body. It takes two months for the egg to hatch.

What would most likely happen if many eggs were not kept warm enough to hatch?

- A** Winter air temperatures would rise.
- B** Eggs would take less time to hatch.
- C** Emperor penguin populations would decrease.
- D** Emperor penguins would all become females.



- Q26.** The diagram below represents the Sun, Earth, and the Moon as viewed from space. Letter X is a location on Earth's surface.



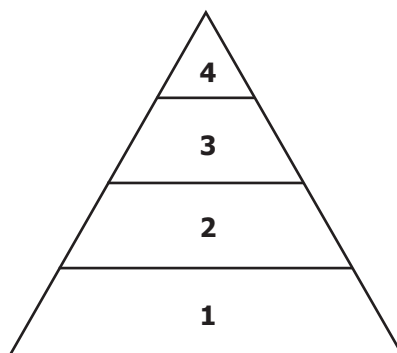
(Not drawn to scale)

Which diagram best represents the phase of the Moon as viewed from X?



- Q27.** A student received a numbered energy pyramid next to a list of organisms. The student needed to replace the numbers on the pyramid with organisms from the list. Which number on the pyramid should be replaced with butterflies?

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



Energy Pyramid

Butterflies
Wolves
Flowers
Birds

List of  
Organisms

**Q28.** How is natural selection in the evolution of long necks in giraffes best explained?

- A** Shorter-necked giraffes were killed by long-necked giraffes.
  - B** Giraffe necks grew longer because of the bone structure of the animals.
  - C** Giraffes with longer necks survived because they were better suited to the environment.
  - D** Long-necked giraffes mated only with other long-necked giraffes.
- 

**Q29.** A radio station is broadcasting at 3750 khz (kilohertz). This station would be found in which radio band?

- A** 20 meter
  - B** 40 meter
  - C** 80 meter
  - D** 160 meter
- 

**Q30.** The following are the names of man-made structures in the United States. Identify and name the type of structure. Hungry Horse, Yellowtail, Dworshak, Don Pedro, Cougar, Glen Canyon, Grand Coulee and Hoover.

- A** Skyscrapers
- B** Bridges
- C** Roads
- D** Dams



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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 National Toppers

Student Name	Father Name	Grade	School	City
AMAN ALI AHMAD	MUHAMMAD WASIM	1	LAHORE GRAMMAR SCHOOL (LANDMARK PROJECT)	LAHORE
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 MUNEEER	9	SIR SYED SCHOOL AND COLLEGE (CAMPUS IV)	WAH CANTT
IMTIAZ KHAN	DADA KHAN	10	AGA KHAN HIGHER SECONDARY SCHOOL	GILGIT

Compete  
if you are the best