



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

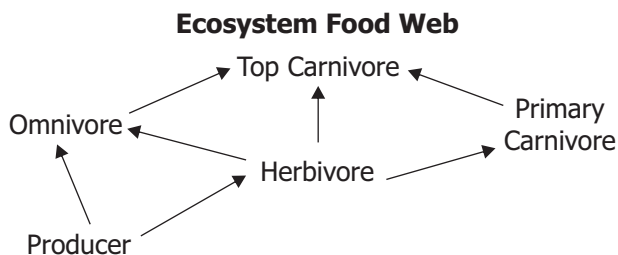
1. DON'T START ATTEMPTING THE PAPER UNTIL INSTRUCTED BY THE INVIGILATORS.
2. INSTRUCTIONS FROM THE EXAMINATION INVIGILATORS MUST BE CARRIED OUT PROMPTLY.
3. WRITE YOUR NAME, FATHER NAME, SCHOOL NAME, ADDRESS ETC AT THE BUBBLE SHEET (ANSWERSHEET) ONLY.
4. RECORD ALL ANSWERS ON THE BUBBLE SHEET ONLY. SELECT 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
15. ANY ACADEMIC MISCONDUCT OR MALPRACTICE MUST BE REPORTED TO INTERNATIONAL CATS CONTESTS AT INFO@CATSCONTESTS.ORG

- 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



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** $\text{Na} + \text{Cl}_2 \rightarrow \text{NaCl}$
B $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$
C $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
D $\text{AgNO}_3 + \text{MgCl}_2 \rightarrow \text{AgCl} + \text{MgNO}_3$

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

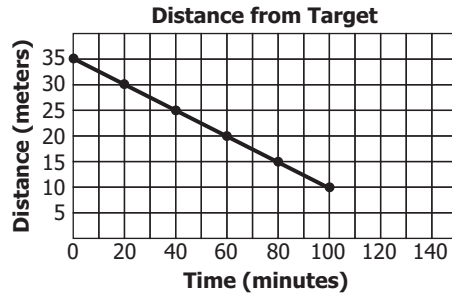
Device X



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.

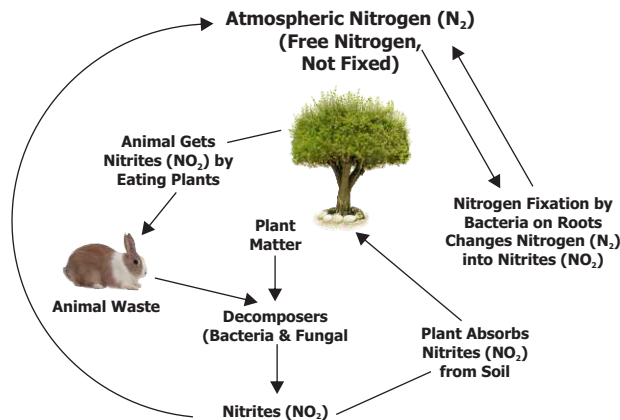
- Q6.** The following graph shows the distance of an object from its target every 20 minutes.



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 (CO₂).

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

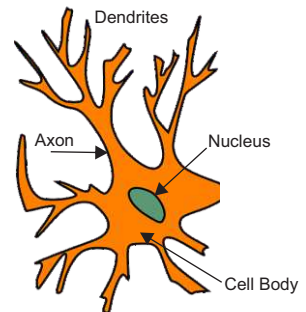
Which statement logically explains whether these methods are useful in decreasing global warming?

- A** These methods are not useful because they all release CO₂ 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 CO₂ 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?

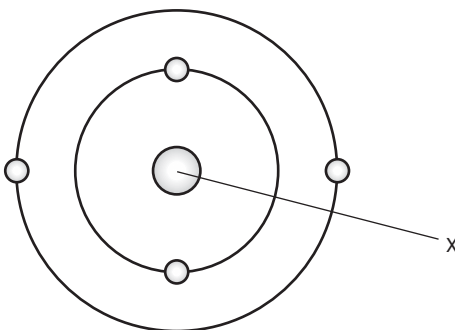
A Coal

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?

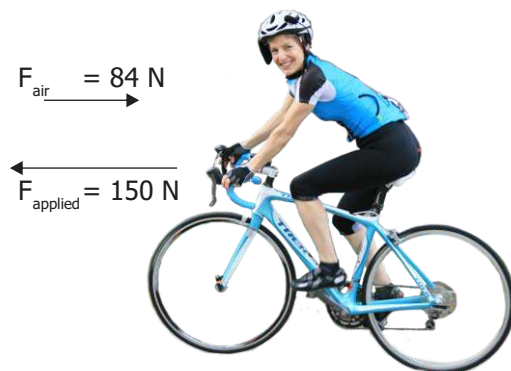
A It has mass but no charge.

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** 0.66 m/s^2 backward, because the force of the air slows the cyclist down
- B** 0.66 m/s^2 forward, because the applied force is greater than the force of the air
- C** 2.3 m/s^2 backward, because the forces are opposite and not equal
- D** 2.3 m/s^2 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	$\text{C}_2\text{H}_6\text{O}$
2	C_8H_{18}
3	$\text{CH}_3\text{CH}_2\text{Br}$
4	$\text{C}_4\text{H}_{10}\text{O}$

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

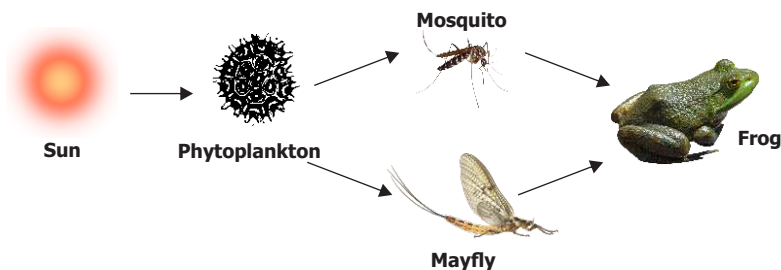
C By increasing the photosynthesis rates in the other plants

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 on the frogs.

Q23.

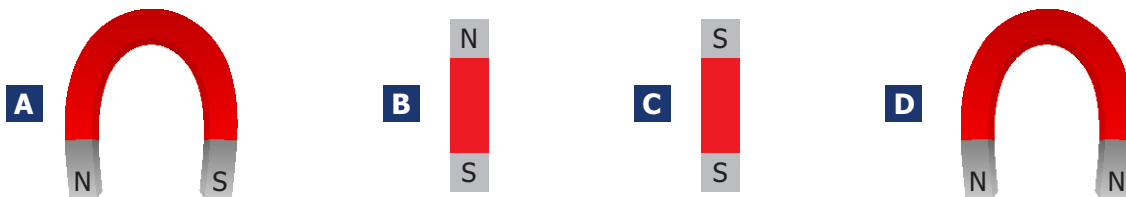
Unknown Liquids Data

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

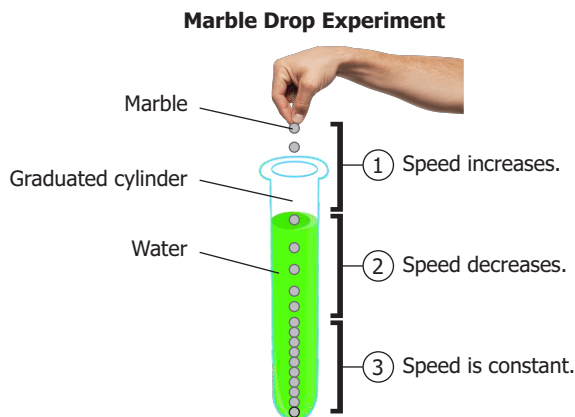
Students conducted an investigation to determine if unknown liquids were acids or bases. What was the independent variable in this investigation?

- 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?



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.



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?

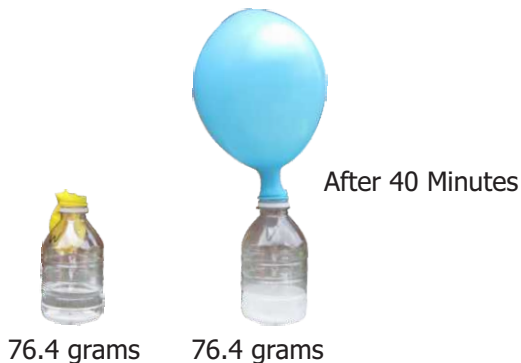
A salt and water stirred in a glass

B food coloring in frosting

C peanut butter and jelly sandwich

D sulfur dioxide and water forming acid rain

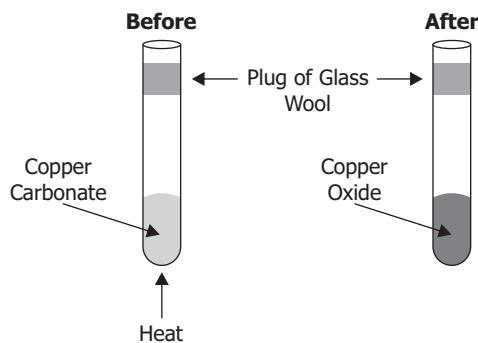
- Q27.** A student adds 5 grams of baking soda to 50 grams of vinegar in a container and quickly attaches a balloon to the top of the bottle. The student's investigation is shown below.



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 best 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 reacted 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.

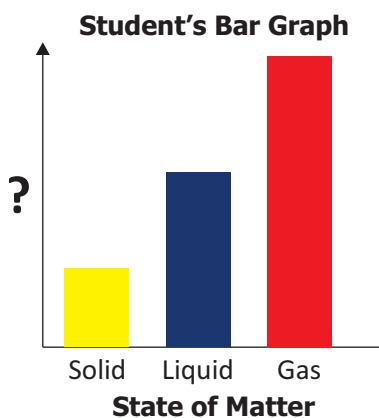
Table of Toy Car Trials

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 most likely 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
