

TECHNOTHLON

Question paper for **Hauts Squad** (classes 11th-12th)

TEAM DETAILS:

Names of Candidates: 1. _____

2. _____

3. _____

Team Registration No: _____

Name of School: _____

Place: State _____

City _____

INSTRUCTIONS:

1. Candidates must **fill the Team Details** above before starting to attempt the questions.
2. This Question Paper consists of **6 parts** and carries a total of **100 Marks**.
3. **NO Question** contains negative marking.
4. Each section contains details on **how to attempt the question** of that section and the **marks that they carry**.
5. ALL ANSWERS must be written in the **answer space provided at the end of this booklet**. No extra space will be provided.
6. ALL ANSWERS must be **clear and legible**. In case of any ambiguity, the decision of the evaluator is final.
7. In case an answer has to be changed, **neatly cross out the initial answer** before writing the next one.

Comprehension

C-1) Two Arabian oil traders, Ali and Murtuza, were involved in the buying and selling of oil barrels over five trading days. At the beginning of the first day, oil barrels were priced at Rs 100 per barrel, while at the end of the fifth day, it was priced at Rs 110/ barrel. At the end of each day, the price of barrel either went up Rs 10, or else, it came down by Rs 10. Both Ali and Murtuza took buying and selling decisions at the end of each trading day. The beginning price of oil barrel on a given day was the same as the ending price of the previous day. Ali and Murtuza started with the same number of barrels and amount of cash, and had enough of both. Below are some additional facts about how Ali and Murtuza traded over the five trading days.

- ❖ Each day if the price of the barrel went up, Ali sold 10 oil barrels at the closing price. On the other hand, each day if the price went down, he bought 10 oil barrels at the closing price.
- ❖ If on any day, the closing price was above Rs 110, Murtuza sold 10 oil barrels, while if it was below Rs 90, he bought 10 oil barrels, all at the closing price.

Q1. If Ali sold 10 oil barrels on three consecutive days, while Murtuza sold 10 oil barrels only once during the five days, what was the price of one oil barrel at the end of day 3?

- | | | | | |
|----------|-----------|-----------|-----------|-----------|
| 1) Rs 90 | 2) Rs 100 | 3) Rs 110 | 4) Rs 120 | 5) Rs 130 |
|----------|-----------|-----------|-----------|-----------|

Q2. If Murtuza ended up with Rs 100 less cash than Ali at the end of day 5, what was the difference in the number of barrels possessed by Murtuza and Ali (at the end of day 5)?

1) Murtuza had 10 less oil barrels than Ali.

2) Murtuza had 10 more oil barrels than Ali.

3) Ali had 10 more oil barrels than Murtuza.

4) Ali had 20 more oil barrels than Murtuza.

5) Both had the same number of oil barrels.

Q3. If Ali ended up with Rs 1300 more cash than Murtuza at the end of day 5, what was the price of oil barrel at the day 4?

- | | | | | |
|----------|-----------|-----------|-----------|-------------------------|
| 1) Rs 90 | 2) Rs 100 | 3) Rs 110 | 4) Rs 120 | 5) Cannot be determined |
|----------|-----------|-----------|-----------|-------------------------|

Q4. What could have been the maximum possible increase in combined cash balance of Ali and Murtuza at the end of fifth day?

1) Rs 3700

2) Rs 4000

3) Rs 4700

4) Rs 5000

5) Rs 6000

Q5. If Murtuza ended up with 20 more oil barrels than Ali at the end of day 5, what was the price of oil barrel at the end of day 3?

1) Rs 90

2) Rs 100

3) Rs 110

4) Rs 120

5) Rs 130

C-2) It makes no sense. It is awkward, inefficient and confusing. We've been saying that for 124 years. But there it remains. Those keys made their first appearance on a rickety, clumsy device marketed as the "Type-Writer" in 1872. Today the keyboard is a universal fixture even on the most advanced, sophisticated computers and word processors electronic technology can produce.



The standard keyboard was not designed with ease of typing in mind. Rather, it was designed to keep early typewriters from jamming. 130 years later, in the age of computers, people are still using this awkward, inefficient keyboard layout. Lets refer this as 'x'. Few know that there is a much faster, easier, more efficient, and more comfortable alternative: the Dvorak (pronounced "duh VOR ak") keyboard. Unlike 'x', the Dvorak keyboard was scientifically designed for increased speed and accuracy. It is estimated to be 12 to 20 times more efficient than 'x'. Dvorak is great for beginning and experienced typists alike. It's the layout used by some of the world's fastest typists.

a. What is 'x'. It is the most common name used for the type of keyboard you use which is same as that shown here?

b. The proper way of typing used by professional typists helps them achieve a very high degree of type-rate. This is also the reason why indents are provided on two of the alphabets, 'F' and 'J' which is the position of the index finger while typing. However, there are some words that can be typed entirely using just the right hand or *just the left hand*. Can you find a word (of more than 4 letters) of each type?

- c. Give a word (containing more than 7 letters) that can be typed entirely using the top row of the 'x' keyboard; it has been speculated that this may have been a factor in the choice of keys for ease of demonstration, although this is unlikely. One such word is already present in this section.
- d. The first typewriter had its letters on the end of rods called "typebars." The typebars hung in a circle. The roller which held the paper sat over this circle, and when a key was pressed, a typebar would swing up to hit the paper from underneath. If two typebars were near each other in the circle, they would tend to clash into each other when typed in succession. So, the possible solution was to take the most common letter pairs and make sure their typebars hung at safe distances. Now, if you used this current configuration of the keyboard to type this question, how many times would you jam your typewriter?

C-3) THE HUBBLE TELESCOPE

Does the name hubble ring any bells? The Hubble telescope is named in honour of the American astronomer Edwin Powell Hubble. The Hubble Space Telescope (HST) is a space telescope that was carried into orbit by the Space Shuttle Discovery in April 1990. Although not the first space telescope, the Hubble is one of the largest and most versatile, and is well known as both a vital research tool and a public relations boon for astronomy.

Commands are uplinked and information down linked from the Hubble telescope through the Tracking and Data Relay Satellite System (TDRSS) which is geosynchronous. A geosynchronous satellite is a satellite whose orbital track on the Earth repeats regularly over points on the Earth over time, i.e. the satellite's time period is the same as that of the earth.

Though this telescope is very famous and gave phenomenal insight to the far reaches of space, it had its fair share of problems. Within weeks of the launch of the telescope, the images returned showed that there was a serious problem with the optical system. The best image quality obtained was drastically lower than expected. Analysis of the flawed images showed that the cause of the problem was that the primary mirror had been ground to the wrong shape.

Hubble orbits the Earth in the extremely tenuous upper atmosphere, and over time its orbit. If it is not re-boosted by a shuttle or other means, it will re-enter the Earth's atmosphere sometime between 2010 and 2032, with the exact date depending on how active the Sun is and its impact on the upper atmosphere.

Q1. What was the need for a telescope in space?

- a) It is closer to the heavenly bodies and hence ensures a better image.
- b) The atmospheric disturbances would be greatly reduced in space.
- c) A telescope in space would have 360 degree viewing capability and be able to focus on objects which we can't be focused from the earth
- d) A telescope in space would not require any maintenance as there is no friction and chance of components getting damaged is negligible.

Q2. What could the scientists do to rectify the lenses in the telescope?

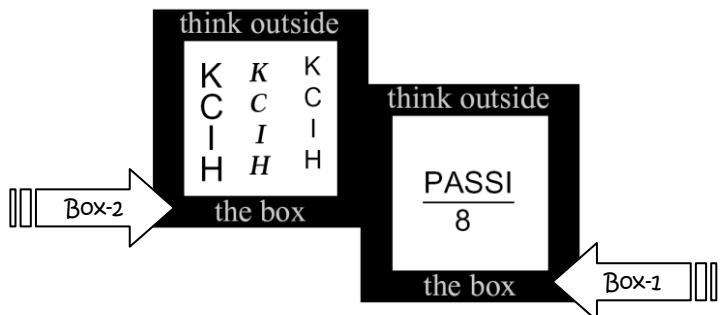
- a) Replace the old lenses with new lenses.
- b) Bring the satellite down to the earth and making necessary corrections.
- c) Making repairs in space would be a costly affair so launching a new satellite would make more sense.
- d) Use spectacles for the telescope (insert a correcting lens in front of the telescope lens)

Q3. What could be the possible reason for the decay of orbit of the telescope?

- a) Earth's magnetic field interferes with the set path of the telescope
- b) The solar flares cause huge disturbances and often destroy vital orbit stabilising components in the telescope.
- c) Force of gravity exerted by the earth causes the orbital decay.
- d) The drag in the higher reaches of the atmosphere causes the telescope to lose energy and thereby orbital decay.

Q4. How much time, will a geosynchronous satellite take to make one complete rotation around the earth? (Assume radius of the earth to be 6400kms and the height of satellite to be 35,000kms also assume earth to be perfectly spherical)

- a) 24 hours
- b) 12 hours
- c) 6 hours
- d) Infinite



Play with Numbers

1. While working on poison samples, a researcher mixed two samples together in an empty cough syrup bottle. After he had left, his clumsy assistant came, and placed the bottle in the cough syrup rack which contained many identical bottles. When the researcher came, he had to find the bottle out of 1000 identical bottles from the rack. It is very important to find out that particular bottle, because the cough syrup was his own invention and the rack was all the stock he had. The poison is such that, it takes a month to give an effect. The researcher is forced to try the syrup on his laboratory mice. What is the minimum number of mice, who shall have to drink the syrup to identify the poison bottle? The cough syrup bottles are to be ready in five months time so that they can enter the market in five weeks time.

2. Hundred persons were put in a jail and were instructed not to talk to each other. After one week, few of them developed a strange mark on their forehead. It was visible to others, but there was no way a person having the mark could be sure that he himself possessed the mark, as there were no mirror in the jail. It was advised in the evening that the persons having the marks should leave the jail in the morning, once they are sure about it. The doctor had given medicines to others so that no fresh case should occur. The very first morning no one left. No one left in the second, third, fourth and the fifth morning. In the sixth morning it was observed that all the persons, with marks, had left the place.
- How many persons had the mark? If there had been 50 prisoners instead of 100. What would be your answer then?

3. Two mathematician graduates bump into each other while shopping at Vishal's. They haven't seen each other in over 20 years.

The first graduate says to the second: "How have you been?"

The second replies: "Great! I got married and I have three daughters now."

First: "Really? How old are they?"

Second: "Well, the product of their ages is 72, and the sum of their ages is the same as the number on that building over there..."

First: "Right, ok... Oh wait... Hmm, I still don't know."

Second: "Oh sorry, the oldest one just started to play the piano."

First: "Wonderful! My oldest child is the same age!"

1:07:30 PM

How old was the first graduate's child?

4. Mr. and Mrs. Srivastava threw a dinner party, and invited four other couples: *the Shobhanes*, *the Patnis*, *the Mukherjees*, and *the Umbarkars*. When all the guests had arrived, there were ten people in the house. Some of these people had met before and some hadn't. All the people who had never met before shook hands. Then Mr. Srivastava asked every guest and his own wife how many hands each of them had shook. To his surprise every person gave a different answer. How many hands did Mrs. Srivastava shake?
5. You have a rod of length L , and n ants are placed at positions $t_1, t_2, t_3, \dots, t_n = L$ which are at equal intervals from the left end of the rod. All ants can move with the same speed. Ants may begin to move in any direction, but if two ants collide they will reverse directions. What is the maximum time required for all ants to fall off the rod?

6. How would you use four zeroes along with any mathematical operation to make a total of 120?

7. The figure aside is an anti-magic square, where none of the horizontal, vertical or corner-to-corner lines totals 34. It is possible, however, by moving the position of just four of the numbers to convert this into a true magic square, where each horizontal, vertical and corner-to-corner line adds up to 34.
- Can you make the necessary corrections?

4	14	8	1
9	16	6	12
5	11	10	15
7	2	3	13

Data Interpretation

Q1) A student is assigned the task of allocating rooms to 7 IITians on the second floor. The rooms are numbered 201 to 207. The adjacent rooms have vents connecting them which allow sound and smoke to flow easily. Anil and Ravi are steady fast friends and want adjacent rooms. Hari and Anil are preparing for their CAT examination and require silence through out the day. Nair, being the senior most has to be allocated room 205 as its balcony has the best view. He is also allergic to tobacco smoke. Raman, Raj and Arvind have unfortunately picked up the habit of smoking. Raman and Raj are rock music lovers and possess stereo systems. Raj does not want a corner room and Hari does not wish to occupy room 204 for personal reasons.

1. Ideally which room should Ravi occupy?
 - a) 201
 - b) 203
 - c) 206
 - d) 207
2. Who should occupy the room furthest from Raj?
 - a) Arvind
 - b) Ram
 - c) Ravi
 - d) Hari
3. The ideal room for Hari is
 - a) 202
 - b) 203
 - c) 204
 - d) 206
4. In case of which event would a student apply for a change of room?
 - a) Arvind starts smoking
 - b) Hari develops bronchitis
 - c) Nair purchases a stereo system
 - d) Arvind develops tobacco allergy

Q2) There are six jars containing coffee, arsenic, sugar, snuff, tea and salt. But they are all mislabelled so that no jar contains what its label says. This is how the labels are placed on the jars.

Coffee	Arsenic	Sugar
Snuff	Tea	Salt

The jar containing snuff is right above the one containing salt and the sugar is immediately to the right of coffee. Now if you can determine the real position of the jars then try out the following questions:

1. To the left of tea we have the jar containing
 - a) snuff
 - b) salt
 - c) arsenic
 - d) sugar
2. Arsenic is situated
 - a) to right of sugar
 - b) below tea
 - c) above sugar
 - d) to left of snuff

PRACTICAL OBSERVATIONS

1. A straight road on the highway is
 - a) Flat
 - b) Deepest near the divider and rises as it reaches the footpath
 - c) Deepest near the footpath and rises as it reaches the divider
 - d) Depends whether the road is uphill or downhill.
2. Birds generally fly in which formation?
 - a) \wedge
 - b) \backslash
 - c) $|$
 - d) \diamond
3. As the revving (acceleration) of the scooter is increased, the intensity of its headlight:
 - a) Increases
 - b) Decreases
 - c) Remains constant
 - d) May increase or decrease
4. In order to take a turn, the inner and outer wheels (depending on the direction of turn) of a car have to cover unequal distances, since the circumference of the inner circle is different from that of the outer one. What is the device which takes care of this difference in wheel rotation?
 - a) Cruise Control
 - b) Differential
 - c) Anti-skid system
 - d) Pretensioners

5. Why is the colour of ice white!

- a) Due to dissolved salts in water
- b) Due to trapped air bubbles in water
- c) Because water is white in colour
- d) Due to a combination of polarization and capillary-effect.

6. While riding a cycle friction acts

- a) Forwards on rear wheel and forwards on fore wheel
- b) Backwards on rear wheel and backwards on fore wheel
- c) Forwards on rear wheel and backwards on fore wheel
- d) Backwards on rear wheel and forwards on fore wheel

7. While walking in the road your foot applies force in which direction

- a) Backward
- b) Forward
- c) Backward and down
- d) Forward and up

8. Deodorant contains:

- a) Aldehyde
- b) Ketone
- c) Alcohol
- d) All of the above

9. The Re. 1 currency note of India has the signature of:

- a) Governor
- b) Secretary of finance
- c) Minister of finance
- d) None

10. Where is all the data of the World Wide Web stored?

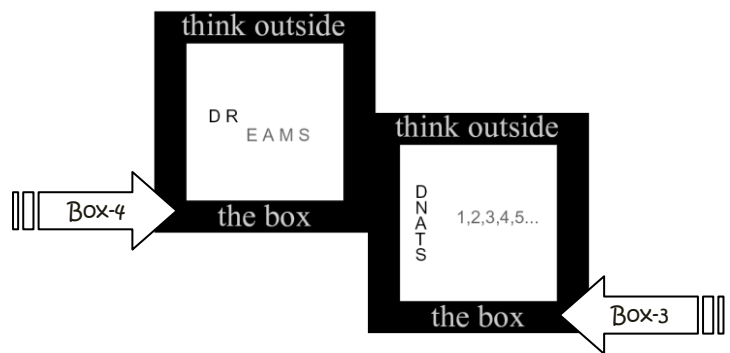
- a) In one mega super computer
- b) In several super computers kept at one place
- c) In several computers all over the world
- d) It is a virtual data not physically present anywhere

11. If you dial 112 on your cell phone,

- a) It will connect even without network
- b) It will connect without sim card
- c) It will get dialled even if keypad is locked
- d) All of the above

12. A fridge is kept with its door open in a closed room. After 5 minutes.

- a) Temperature of the room is greater than initial.
- b) Temperature of the room is less than initial.
- c) Temperature of the room is same than initial.
- d) Depends on the make of the fridge.

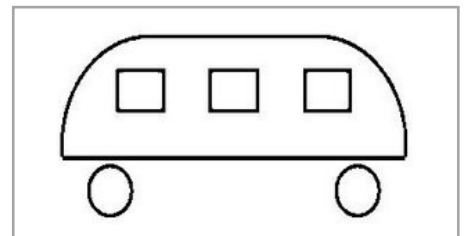


ARBIT

Q1) Bertram Thomas, the famous explorer wishes to cross the Kalahari Desert. It is a 6 day march across the absolutely barren desert and one man can carry only four days worth of food and water for a single person. Assuming no one has to sacrifice their life, how many assistants should he set out with?

Q2) An eagle, an elephant and a walleye each have two. A tiger, a moose, a bear, a turtle and a snake have one. Humans, birds, cats and dogs don't have any. What is this?

Q3) In which direction is this bus going, left or right (it is not in reverse neither is it stationary)?



Q4) Translate the following into the common phrases they are?

1. Superfluous chronological dispatch institutes riddance of valued effects.
2. There's no value to be derived from demanding attention by loud screeches over fallen white liquid derived from the lactic glands of a female bovine.
3. An excess of culinary experts impairs the quality of a thin derivative of meat.
4. A body of persons abiding in a domicile of silica combined with metallic oxides should not carelessly project small geological specimens.

Q5) When asked for the time Rohan replies "The big hand and the little hand are exactly midway between 1 and 2, lying on top of each other". What is the time?

$$\sim \pi^2$$

Q6) A man built a rectangular house, each side having a southern view. He spotted a bear. What colour was the bear?

Q7) It was a dark stormy night and a couple were in a car racing madly through a foreign city. The car broke down and the husband had to go get help from someone who spoke his language. He was afraid to leave his wife alone in the car so he pulled up the windows and locked the car before leaving. When he came back, the car was in the same state as he had left it but his wife was dead, there was blood on the floor and there was a stranger in the car. Who was the stranger?

Q8) Bruce, the head dog at the North Pole, had three sons. The eldest was named mo, the middle one curly. What is the third dog's name.

Answer: _____ is the eldest son. _____ is the second born son. is the youngest son.

Q9) A pregnant lady named her children: Dominique, Regis, Michelle, Fawn, Sophie and Lara. What will she name her next child?

- a) Jessica b) Katie c) Tilly

Q10) Name an eight letter word that has kst in the middle, in the beginning, and at the end.

Q11) Not far from Madrid, there is a large wooden barn. The barn is completely empty except for a dead man hanging from the middle of the central rafter. The rope around his neck is ten feet long and his feet are three feet off the ground. The nearest wall is 20 feet away from the man. There is a puddle of water nearby. It is not possible to climb up the walls or along the rafters. Upon analysing the crime scene Nujra, the famous detective comes to the conclusion that the man committed suicide. What he observed is given below. Select the relevant clue which helped him reach his conclusion:

- a) There is a puddle of water nearby
b) There are pins scattered on the floor
c) There is a haystack 2 feet high near the wall
d) A small oven in the corner of the room.

Q12) Brad stared through the dirty soot-smeared window on the 62nd floor of the office tower. Overcome with depression he slid the window open and jumped through it. It was a sheer drop outside the building to the ground. Miraculously after he landed he was completely unhurt. Since there was nothing to cushion his fall or slow his descent, how could he have survived the fall?

Q13) Using a 5 letter anagram fill up the blanks:

A farmer with hundreds of _ _ _ _ _ , deeply _ _ _ _ _ about the amount of rainfall, and _ _ _ _ _ around with watering the ground because it is dry enough to _ _ _ _ _ him about the possibility of crop failure.

Q 14) A woman gave natural birth to two sons who were born on the same hour of the same day of the same month of the same year. But they were not twins and she had no access to a time machine. How could this be?

