

CAT 2016 based paper

Section I – Verbal Ability

1. Arrange the sentences A, B, C and D to form a logical sequence between sentences 1 and 6.

1. Amount of published information available varies widely by industry.

A. Unfortunately for the researcher, many industries do not meet these criteria, and there may be little published information available.

B. Generally, the problem the researcher will face in using published data for analysing an economically meaningful industry is that they are too broad or too arranged to fit the industry.

C. However, it is always possible to gain some important information about an industry from published sources and these sources should be aggressively pursued.

D. Larger the industry, the older it is, and the slower the rate of technological change, better is the available published information. 6. If a researcher starts a searching for data with this reality in mind, the uselessness of broad data will be better recognized and the tendency to give up will be avoided.

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2. Arrange the sentences A, B, C and D to form a logical sequence between sentences 1 and 6.

1. The main source of power in industrial undertaking is electricity.

A. Electricity from water also requires enormous river valley projects involving huge expenditure.

B. In contrast, electricity from atomic power stations will result in a tremendous saving in expenditure.

C. Besides, the mineral resources of the world required for generation of electricity are being rapidly depleted.

D. But the production of electricity needs huge quantities of coal.

6. The installation of atomic plants will help in meeting the shortage of these resources.

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3. Arrange the sentences A, B, C and D to form a logical sequence between sentences 1 and 6.

1. Intensity of competition in an industry is neither a matter of coincidence nor bad luck.

A. The collective strength of these forces determines the ultimate profit potential in the industry where profit potential is measured in terms of long run returns on invested capital.

B. Rather, competition in an industry is rooted in its underlying economic structure and goes well beyond the behavior of current competitors.

C. Not all industries have the same potential.

D. The state of competition in an industry depends on five basic competitive forces.

6. They differ fundamentally in their ultimate profit potential as the collective strength of the forces differ.

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4. Arrange the sentences A, B, C and D to form a logical sequence between sentences 1 and 6.

1. The New Economic Policy comprises the various policy measures and changes introduced since July 1991. A. There is a common thread running through all these measures.

B. The objective is simple to improve the efficiency of the system.

C. The regulator mechanism involving multitude of controls has fragmented the capacity and reduced competition even in the private sector.

D. The thrust of the new policy is towards creating a more competitive environment as a means to improving the productivity and efficiency of the economy.

6. This is to be achieved by removing the banners and restrictions on the entry and growth of firms.

(a) DCAB (b) ABCD (c) BDAC (d) CDBA

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5. A number of sentences are given below which, when properly sequenced, form a coherent paragraph, Each sentence is labelled with a letter. However, One of the statement is illogically placed. Choose the illogically placed out of sentences from among the five given choices so that remaining four can construct a coherent paragraph.

A. It is turning off the tap.

B. And with no consensus of the exit policy, the government is damned if it supports loss making units and damned if it doesn't.

C. The private sector did the same in the past because securing legal sanction for closure was virtually impossible.

D. After years of funding the losses of public sector companies, the government is doing the unthinkable.

E. Private sector and public sector companies act in a similar fashion when in crisis.

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6. A number of sentences are given below which, when properly sequenced, form a coherent paragraph, Each sentence is labelled with a letter. However, One of the statement is illogically placed. Choose the illogically placed out of sentences from among the five given choices so that remaining four can construct a coherent paragraph.

A. Trade protocols were signed, the dollar as the medium of exchange was ignored, trade was denominated in rupees and the exchange rate between the two countries was to be fixed outside the ambit of free markets.

B. A young India, some years after independence fashioning her foreign policy of nonalignment, found it prudent to stay close to the former Soviet Union.

C. Therefore it lead to the escalation of cold war between Soviet Union and the U.S.A.

D. Once upon a time there was a super power named Soviet Union that attracted nations apprehensive of the global aspirations of the other superpower, the U.S.A.

E. One way of doing this was to evolve a bilateral relations in trade that could be called upon provide a buffer against the arm-twisting by the U.S.A.

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7. A number of sentences are given below which, when properly sequenced, form a coherent paragraph, Each sentence is labelled with a letter. However, One of the statement is illogically placed. Choose the illogically placed out of sentences from among the five given choices so that remaining four can construct a coherent paragraph.

A. I had heard that sort of thing before.

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- B. He said that his generation was the first to believe that it had no future.
- C. A young American made earthling stopped by my house the other day to talk about some book of mine he had read.
- D. He was the son of a Boston man who had died an alcoholic vagrant.
- E. Alcohol had a devastating effect on this Boston based American family

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8. Evidence has been presented that the unconscious mind, still viewed by many psychological scientists as the shadow of a "real" conscious mind, is identifiably more deliberate, action oriented and complex than its conscious counterpart. Furthermore researchers have proven that the mind is incredibly efficient at extracting meaning from stimuli of which one is not consciously aware. The claims above are made on conclusive experimentations in which test subjects who were allowed to sleep during a decision making process made more optimal decisions when compared to the subjects who were given the exact same amount of information but were not allowed to sleep, leading researchers to believe that rationality comes on the way of making a rational decision. Researchers explain that while the conscious mind can only follow strict rules, unconscious mind can handle and integrate a larger amount of information, explaining why it can make better decisions. Even more surprising than this unconscious mind's ability is that the mental processes that drive such decision making are necessarily minimal and unsophisticated and do not require humongous amount of calories to make us arrive at the best decision whereas using conscious mind for complex decisions burns up a lot of energy, setting in fatigue, forcing the conscious mind to give up and leading to subconscious decisions. Overall, researchers agree that there is no need to have sleepless night pondering over a complex issue to resolve it when it can actually be solved more efficiently by snoring the night away.

The purpose of the passage is to:

- A. highlight the differences among psychologists regarding the importance of the unconscious mind in making complex decisions.
- B. contrast and compare the workings of the rationality with that of deliberate, action-oriented and complex decision making processes.
- C. prove by citing results of experiments that one decision-making process is better than the other.
- D. show that unconscious mind is not that undependable as previously thought.
- E. ascertain that using conscious and unconscious minds together yield second-to-none judgments.

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9. French cuisine is highly regarded all over the world. Yet in Paris there are more American restaurants selling burgers and fries (which many people now class as junk food) than there are in any other European capital city. Obviously the French are very fond of junk food, and are not too proud to eat it.

Which of the following, if true, would most weaken the author's contention?

- A. There are also a larger number of Lebanese restaurants in Paris than there are in other European capital cities
- B. French Cordon Bleu cuisine is very expensive
- C. The number of French tourists eating in New York burger restaurants is very low
- D. Junk food is actually has high nutritional value when eaten in moderation
- E. There are an unusually large number of American tourists in Paris who eat at burger joints

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10. In research designed to investigate the possibility of animals developing friendship with other, unrelated, members of their species, a group of 29 chimpanzees were reared together for 15 years. At the end of that time the chimps were presented with two options for obtaining food: press a lever and feed themselves, or press another identical lever and feed themselves, and at the same time deliver food to the chimp next door. (The chimps were able to see each other). The researchers found that the chimps were no more likely to choose the lever that fed a neighbour. The researchers concluded that the chimps had no concept of friendship. However, one critic has suggested that the animals were in an artificial environment from which little can be concluded, and that, at the least, the test ought to have involved the animals being able to touch.

What role do the parts in boldface play in the argument above?

- A. The first is a position that the critic opposes. The second is a position that the critic supports.
- B. The first is an observation that supports the researcher's position. The second is an observation that opposes the researcher's position.
- C. The first is a finding on which the researchers base their conclusion. The second is a suggestion that might cast doubt on that finding.
- D. The first is an observation that supports the critic's conclusion. The second is the critic's conclusion.
- E. The first is part of the evidence that the critic disputes. The second is a suggestion that the researchers do not accept.

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Section I – Reading Comprehension

Passage

A conservation problem equally as important as that of soil erosion is the loss of soil fertility. Most agriculture was originally supported by the natural fertility of the soil; and, in areas in which soils were deep and rich in minerals, farming could be carried on for many years without the return of any nutrients to the soil other than those supplied through the natural breakdown of plant and animal wastes. In river basins, such as that of the Nile, annual flooding deposited a rich layer of silt over the soil, thus restoring its fertility. In areas of active volcanism, such as Hawaii, soil fertility has been renewed by the periodic deposition of volcanic ash. In other areas, however, natural fertility has been quickly exhausted. This is true of most forest soils, particularly those in the humid tropics. Because continued cropping in such areas caused a rapid decline in fertility and therefore in crop yields, fertility could be restored only by abandoning the areas and allowing the natural forest vegetation to return. Over a period of time, the soil surface would be rejuvenated by parent materials, new circulation channels would form deep in the soil, and the deposition of forest debris would restore minerals to the topsoil. Primitive agriculture in such forests was of shifting nature: areas were cleared of trees and the woody material burned to add ash to the soil; after a few years of farming, the plots would be abandoned and new sites cleared. As long as populations were sparse in relation to the area of forestland, such agricultural methods did little harm. They could not, however, support dense populations or produce large quantities of surplus foods.

Starting with the most easily depleted soils, which were also the easiest to farm, the practice of using various fertilizers was developed. The earliest fertilizers were organic manures, but later, larger yields were obtained by adding balanced combinations of those nutrients (e.g. potassium, nitrogen, phosphorus and calcium) that crop plants require in greatest quantity. Because high yields are essential, most modern agriculture depends upon the continued addition of chemical fertilizers to the soil. Usually these substances are added in mineral form, but nitrogen is often added as urea, an organic compound.

Early in agricultural history, it was found that the practice of growing the same crop year after year in a particular plot of ground not only caused undesirable changes in the physical structure of the soil, but also drained the soil of its nutrients. The practice of crop rotation was discovered to be a useful way to maintain the condition of the soil, and also to prevent the buildup of those insects and other plant pests that are attracted to a particular kind of crop. In rotation systems, a grain crop is often grown the first year, followed by a leafy-vegetable crop in the second year, and pasture crop in the third. The last usually contains legumes (e.g. clover, alfalfa), because such plants can restore nitrogen to the soil through the action of bacteria that live in nodules on their roots.

In irrigation agriculture, in which water is brought in to supply the needs of crops in an area with insufficient rainfall, a particular soil-management problem that develops is the salinization (concentration of salts) of the surface soil. This most commonly results from inadequate drainage of the irrigated land; because the water cannot flow freely, it

evaporates, and the salts dissolved in the water are left on the surface of the soil. Even though the water does not contain a large concentration of dissolved salts, the accumulation over the years can be significant enough to make the soil unsuitable for crop production. Effective drainage solves the problem; in many cases, drainage canals must be constructed, and drainage tiles must be laid beneath the surface of the soil. Drainage also requires the availability of an excess of water to flush the salts from the surface soil. In certain heavy soils with poor drainage, this problem can be quite severe; for example, large areas of formerly irrigated land in the Indus basin, in the Tigris-Euphrates region, in the Nile Basin, and in the Western United States, have been seriously damaged by salinization.

11. The areas most prone to salinization are
 - (a) those irrigated with well-water.
 - (b) those in which crop rotation is not practiced.
 - (c) sub-tropical forests.
 - (d) flat land irrigated from reservoirs.
12. The most appropriate title to his passage is
 - (a) Problems of soil erosion
 - (b) Agriculture in Volcanic islands.
 - (c) The importance of chemical fertilizers.
 - (d) Causes of and remedies of soil-infertility.
13. Natural fertility exhausts most quickly in
 - (a) river valley lands
 - (b) humid tropical forests
 - (c) volcanic areas
 - (d) lands near urban areas
14. The factor that can restore fertility to the soil not mentioned in the passage is
 - (a) alluvium brought by rivers
 - (b) bacterial action
 - (c) fertilizer fixation through lightning
 - (d) organic manure
15. Crop rotation helps to
 - I. increase the farmer's seasonal income.
 - II. preserve soil condition.
 - III. desalinize the soil.
 - IV. destroy pests.
 - (a) I, II, III & IV
 - (b) I, II & IV only.
 - (c) II & IV only
 - (d) II, III & IV only
16. One of the characteristics of agricultural land in Nile basin is
 - (a) it contains a lot of bacteria.
 - (b) it consists of heavy soil with poor drainage properties.
 - (c) the Nile water contains an excess of salts.
 - (d) it contains nutritive minerals.

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Passage

Scientism has left humanity in our technical mastery of inanimate nature, but improvised us in our quest for an answer to the riddle of the universe and of our existence in it. Scientism has done worse than that with respect to our status as social beings, that is, to our life with our fellow human beings. The quest for the technical mastery of social life, comparable to our mastery over nature, did not find scientism at a loss for an answer: reason suggested that physical nature and social life were fundamentally alike and therefore proposed identical methods for their domination. Since reason in the form of causality reveals itself most plainly in nature, nature became the model for the social world and the natural sciences the image of what the social sciences one day would be. According to scientism, there was only one truth, the truth of science, and by knowing it, humanity would know all. This was, however, a fallacious argument, its universal acceptance initiated an intellectual movement and a political technique which retarded, rather than furthered, human mastery of the social world.

The analogy between the natural and social worlds is mistaken for two reasons. On the one hand human action is unable to model the social world with the same degree of technical perfection that is possible in the natural world. On the other hand, the very notion that physical nature is the embodiment of reason from which the analogy between natural and social worlds derives, is invalidated by modern scientific thought itself.

Physical nature, as seen by the practitioner of science consists of a multitude of isolated facts over which human action has complete control. We know that water boils at a temperature of 212 degrees Fahrenheit and, by exposing water to this temperature, we can make it boil at will. All practical knowledge of physical nature and all control over it are essentially of the same kind.

Scientism proposed that the same kind of knowledge and of control held true for the social world. The search for a single cause, in the social sciences, was but a faithful copy of the method of the physical sciences. Yet in the social sphere, the logical coherence of the natural sciences finds no adequate object and there is no single cause by the creation of which one can create a certain effect at will. Any single cause in the social sphere can entail an indefinite number of different effects, and the same effect can spring from an indefinite number of different effects, and the same effect can spring from an indefinite number of different causes.

17. The author's attitude towards the application of scientism to the social sciences is best described as one of

- (a) committed scrutiny
- (b) dismissal
- (c) criticism
- (d) approval

18. According to the author, causes and effects in the social world are

- (a) unrelated to each other
- (b) difficult to identify or predict.
- (c) subject to manipulation at will.
- (d) reducible to a single cause for each effect.

19. Which of the following statements about scientism is best supported by the passage?

- (a) Scientism provides the basis for mastery of the social world
- (b) Scientism is only superficially concerned with cause-and-effect relationships
- (c) Scientism is poorly suited to explain social behaviour
- (d) Scientism is no longer applicable to the study of the natural sciences.

20. As is used in the passage, the term 'scientism' can best be defined as

- (a) belief that the methods of the physical sciences can be applied to all fields of enquiry.
- (b) faith that human beings can master their own physical limitations.
- (c) desire to keep the social sciences separate from the physical sciences
- (d) opinion that scientists must take moral responsibility for their actions

21. In the passage, the author is most concerned with doing which of the following?

- (a) Upholding the primacy of reason over superstition
- (b) Attacking a particular approach to the social sciences
- (c) Describing a method for achieving control over human social behaviour
- (d) Demonstration the superiority of the social sciences over the natural sciences

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Passage

From a vantage point in space, an observer could see that the Earth is engaged in a variety of motions. First, there is its rotation on its own axis, causing the alternation of day and night. This rotation, however, is not altogether steady. Primarily because of the moon's gravitational action, the Earth's axis wobbles like that of an ill-spun top. In this motion, called 'precession', the North and South Poles each traces out the base of a cone in space, completing a circle every 25,800 years. In addition, as the Sun and the Moon change their positions with respect to the Earth, their changing gravitational effects result in a slight 'nodding' of the earth's axis, called 'mutation', which is superimposed on precession. The Earth completes one of these 'nods' every 18.6 years.

The earth also, of course, revolves round the Sun, in a 6-million mile journey that takes 365.25 days. The shape of this orbit is an ellipse, but it is not the center of the Earth that follows the elliptical path. Earth and Moon behave like an asymmetrical dumb-bell, and it is the center of mass of this dumb-bell that traces the ellipse around the sun. The center of the Earth-Moon mass lies about 3000 miles away from the center of the Earth, and the Earth thus moves in an S-curve that crosses and recrosses its orbital path. Then too, the Earth accompanies the sun in the sun's movements: first, through its local star cloud, and second, in a great sweep around the hub of its galaxy, the Milky Way that takes 200 million years to complete.

22. The passage is most likely directed towards an audience of
- (a) geologists.
 - (b) astronauts.
 - (c) meteorologists interested in weather prediction.
 - (d) person with little technical knowledge of astronomy.
23. Which of the following best describes the main subject of the passage?
- (a) The various types of the Earth's motions
 - (b) Past changes in the Earth's position
 - (c) The moon gravitational effect on the earth
 - (d) Oddities of the Earth's rotation of its axis.
24. The passage indicates that a single cycle of which of the following motions is completed in the shortest period of time?
- (a) Mutation.
 - (b) Precession.
 - (c) The Earth's rotation on its axis.
 - (d) The movement of the dumb-bell formed by the center of mass of Earth-Moon.
25. Which of the following techniques does the author use in order to make the descriptions of motion clear?
- I. Comparison with familiar objects.
 - II. Reference of geometric forms.
 - III. Allusions to the works of other authors.
- (a) I only
 - (b) II only
 - (c) I and II only
 - (d) II and III only

Passage

The connective tissues are heterogeneous group of tissues derived from the mesenchyme, a meshwork of stellate cells that develop in the middle layer of the early embryo. They have the general function of maintaining the structural integrity of organs, and providing cohesion and internal support for the body as a whole. The connective tissues include several types of fibrous tissue that vary only in their density and cellularity, as well as more specialized variants ranging from adipose tissue through cartilage to bone. The cells that are responsible for the specific function of an organ are referred to as it parenchyma, while the delicate fibrous meshwork that binds the cells together into functional units, the fibrous partitions or septa that enclose aggregations of functional units, and the dense fibrous capsule that encloses the whole organ, collectively make up its connective-tissue framework, or stroma. Blood vessels, both large and small, course through connective tissues, which is therefore closely associated with the nourishment of tissues and organs throughout the body. All nutrient materials and waste products exchanged between the organs and the blood must traverse peri-vascular spaces occupied by connective tissue. One of the important functions of the connective – tissue cells is to maintain conditions in the extra-cellular spaces that favour this exchange.

Some organs are suspended from the wall of a body cavity by thin sheets of connective tissues called mesenteries; others are embedded in adipose tissue a form of a connective tissue in which the cells are specialized for the synthesis and storage of energy-rich reserves of fat, or lipid. The entire body is supported from within by a skeleton composed of bone, a type of connective tissue endowed with great resistance to stress owing to its highly ordered, laminated structure and to its hardness, which results from deposition of mineral salts in its fibres and amorphous matrix. The individual bones of the skeleton are held firmly together by ligaments, and muscles are attached to bone by tendons, both of which are examples of dense connective tissue in which many fibre bundles are associated in parallel array to provide great tensile strength. At joints, the articular surfaces of the bones are covered with cartilage, a connective tissue with an abundant intercellular substance that gives it a firm consistency well adopted to permit smooth gliding movements between the opposed surfaces. The synovial membrane, which lines the margins of the joint cavity and lubricates and nourishes the joint surfaces, is also a form of connective tissue.

26. The passage has most probably been taken from a book on
- (a) neurology
 - (b) nutrition
 - (c) physiology
 - (d) calisthenics
27. Mesenteries are
- (a) adipose tissue in which some organs are embedded.
 - (b) referred to as parenchyma, and are responsible for specific functions of an organ.
 - (c) thin sheets from which some organs are suspended.
 - (d) cells through which blood flows.
28. Through peri-vascular spaces exchange takes place between
- (a) blood and organs.
 - (b) cells and embryo.
 - (c) nutrients and waste products.
 - (d) septa and stroma.

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29. Some instances of connective tissues are

- | | |
|----------------------|----------------------|
| I. Cartilage | II. Stroma |
| III. Lipid | IV. Synovia |
| (a) I, II, III & IV | (b) I, III & IV only |
| (c) I, II, & IV only | (d) I and II only |

Passage

Emile Durkheim, the first person to be formally recognized as a sociologist and the most scientific of the pioneers, conducted a study that stands as a research model for sociologists today. His investigation of suicide was, in fact, the first sociological study to use statistics. In *suicide* (1964, originally published in 1897) Durkheim documented his contention that some aspects of human behaviour – even something as allegedly individualistic as suicide – can be explained without reference to individuals.

Like all of Durkheim's work, suicide must be viewed within the context of his concern for social integration. Durkheim wanted to see if suicide rates within a social entity (for example, a group, organization, or society) are related to the degree to which individuals are socially involved (integrated and regulated). Durkheim describes three types of suicide: egoistic, anomic, and altruistic. Egoistic suicide is promoted when individuals do not have sufficient social ties. Since single (never married) adults, for example, are not heavily involved with the family life, they are more likely to commit suicide than are married adults. Altruistic suicide on the other hand, is more likely to occur when social integration is too strong. The ritual suicide of Hindu widows on their husbands funeral pyres is one example. Military personnel, trained to lay down their lives for their country, provide another illustration.

Durkheim's third type of suicide – anomic suicide increases when the social regulation of individuals is disrupted. For example, suicide rates increase during economic depressions. People who suddenly find themselves without a job or without hope of finding one are more prone to kill themselves. Suicides may also increase during period of prosperity. People may loosen their social ties by taking new jobs, moving to new communities, or finding new mates.

Using data from the government population reports of several countries (much of it from the French Government Statistical Office), Durkheim found strong support for his line reasoning. Suicide rates were higher among single than married people, among military personnel than civilians, among divorced than married people, and among people involved in nationwide economic crises.

It is important to realize that Durkheim's primary interest was not in the empirical (observations) indicators he used such as suicide rates among military personnel, married people, and so forth. Rather, Durkheim used the following indicators to support several of his contentions: (1) Social behavior can be explained by social rather than psychological factors; (2) suicide is affected by the degree of integration and regulation within social entities; and (3) Since society can be studied scientifically, sociology is worthy of recognition in the academic world. Durkheim was successful on all three counts.

30. In his study of suicide Durkheim's main purpose was

- (a) to document that suicide can be explained without reference to the individual.
- (b) to provide an explanation of the variation in the rate of suicide across societies.
- (c) to categorize various types of suicides.
- (d) to document that social behavior can be explained by social rather than psychological factors.

31. Single adults not heavily involved with family life are more likely to commit suicide. Durkheim categorized this as

- (a) anomic suicide.
- (b) altruistic suicide.
- (c) egoistic suicide.
- (d) Both (b) and (c)

32. According to Durkheim, suicide rates within a social entity can be explained in terms of

- (a) absence of social ties.
- (b) disruption of social regulation.
- (c) nature of social integration
- (d) All of the above.

33. Basing himself on his own indicators. Durkheim was

- (a) right on some counts, not others.
- (b) vindicated on all counts.
- (c) wrong but did not realize that he was right.
- (d) substantially correct but formally wrong.

34. To support his contentions, Durkheim relied on the following indicators

- (a) social behaviour is explicable predominantly through social factors.
- (b) suicide is contingent upon the degree of regulation and interaction.
- (c) recognizing sociology is to acknowledge that society is susceptible to scientific investigation.
- (d) All of the above.

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Section II – Logical Reasoning and Data Interpretation

DIRECTIONS: Answer the questions on the basis of the following information.

Recently, the answers of a test held nationwide were leaked to a group of unscrupulous people. The investigative agency has arrested the mastermind and nine other people A, B, C, D, E, F, G, H and I in this matter. Interrogating them, the following facts have been obtained regarding their operation. Initially the mastermind obtains the correct answer-key. All the others create their answer-key from one or two people who already possess the same. These people are called his/her “sources”. If the person has two sources, then he/she compares the answer-keys obtained from both sources. If the key to a question from both sources is identical, it is copied, otherwise it is left blank. If the person has only one source, he/she copies the source’s answers into his/her copy. Finally, each person compulsorily replaces one of the answers (not a blank one) with a wrong answer in his/her answer key.

The paper contained 200 questions; so the investigative agency has ruled out the possibility of two or more of them introducing wrong answers to the same question. The investigative agency has a copy of the correct answer key and has tabulated the following data. These data represent question numbers.

Name	Wrong Answer (s)	Blank Answer (s)
A	46	---
B	96	46, 90, 25
C	27, 56	17, 46, 90
D	17	---
E	46, 90	---
F	14, 46	92, 90
G	25	---
H	46, 92	---
I	27	17, 26, 90

1. Which one among the following must have two sources?

- (1) A (2) B
(3) C (4) D

2. How many people (excluding the mastermind) needed to make answer keys before C could make his answer key?

- (1) 2 (2) 3
(3) 4 (4) 5

3. Both G and H were sources to

- (1) F (2) B
(3) I (4) None of the nine.

4. Which of the following statements is true?

- (1) C introduced the wrong answer to question 27.
(2) E introduced the wrong answer to question 46.
(3) F introduced the wrong answer to question 14.
(4) H introduced the wrong answer to question 46.

DIRECTIONS: Answer these questions based on the table given below.

The table below gives information about four different crops, their different quality categories and the regions where they are cultivated. Based on the information given in the table answer the questions given below

Type of Crops with Quality and Region

Crop-1 => High R1, R2, R3, R4, R5 Medium R6, R7, R8 Low R9, R10, R11

Crop-2 => High R5, R8, R12 Medium R9, R13 Low R6

Crop-3 => High R2, R6, R7, R13 Medium R3, R9, R11 Low R1, R4

Crop-4 => High R3, R10, R11 Medium R1, R2, R4 Low R5, R9

5. How many regions produce medium qualities of Crop-1 or Crop-2 and also produce low quality of Crop-3 or Crop-4?

6. Which of the following statements is true?

- (1) All medium quality Crop-2 producing regions are also high quality Crop-3 producing regions.
(2) All high quality Crop-1 producing regions are also medium and low Crop-4 producing regions.
(3) There are exactly five Crop-3 producing regions, which also produce Crop-4 but not Crop-2.
(4) Some Crop-3, producing regions produce Crop-1, and high quality Crop-2.

7. How many low quality Crop-1 producing regions are either high quality Crop-4 producing regions or medium quality Crop-3 producing regions?

8. How many high quality Crop 4 producing regions are there?

A study was conducted to ascertain the relative importance that employees in five different countries assigned to five different traits in their Chief Executive Officers. The traits were compassion (C), decisiveness (D), negotiation skills (N), public visibility (P), and vision (V). The level of dissimilarity between two countries is the maximum difference in the ranks allotted by the two countries to any of the five traits. The following table indicates the rank order of the five traits for each country.

Rank	India	China	Japan	Malaysia	Thailand
1	C	N	D	V	V
2	P	C	N	D	C
3	N	P	C	P	N
4	V	D	V	C	P
5	D	V	P	N	D

9. Three of the following four pairs of countries have identical levels of dissimilarity. Which pair is the odd one out?

- (1) Malaysia & China (2) China & Thailand
 (3) Thailand & Japan (4) Japan & Malaysia

10. Which amongst the following countries is most dissimilar to India?

- (1) China (2) Japan
 (3) Malaysia (4) Thailand

11. Which of the following countries is least dissimilar to India?

12. Which of the following pairs of countries are most dissimilar?

- (1) China & Japan (2) India & China
 (3) Malaysia & Japan (4) Thailand & Japan

Purana and Naya are two brands of kitchen mixer-grinders available in the local market. Purana is an old brand that was introduced in 1990, while Naya was introduced in 1997. For both these brands, 20% of the mixer-grinders bought in a particular year are disposed off as junk exactly two years later. It is known that 10 Purana mixer-grinders were disposed off in 1997. The following figures show the number of Purana and Naya mixer-grinders in operation from 1995 to 2000, as at the end of the year.

	1995	1996	1997	1998	1999	2000
Purana	120	162	182	222	236	236
Naya	0	0	30	80	124	134

13. How many Naya mixer-grinders were disposed off by the end of 2000?

14. How many Naya mixer-grinders were purchased in 1999?

15. How many Purana mixer-grinders were purchased in 1999?

16. How many Purana mixer-grinders were disposed off in 2000?

The year was 2006. All six teams in Pool A of World Cup hockey, play each other exactly once. Each win earns a team three points, a draw earns one point and a loss earns zero points. The two teams with the highest points qualify for the semi-finals. In case of a tie, the team with the highest goal difference (Goal For – Goals Against) qualifies.

In the opening match, Spain lost to Germany. After the second round (after each team played two matches), the pool table looked as shown below and no match was a draw.

Teams	Games Played	Won	Goals For	Goals Against	Point
Germany	2	2	3	1	6
Argentina	2	2	2	0	6
Spain	2	1	5	2	3
Pakistan	2	1	2	1	3
New Zealand	2	0	1	6	0
South Africa	2	0	1	4	0

In the third round, Spain played Pakistan, Argentina played Germany, and New Zealand played South Africa. All the third round matches were drawn. The following are some results from the fourth and fifth round matches.

- (a) Spain won both the fourth and fifth round matches.
- (b) Both Argentina and Germany won their fifth round matches by 3 goals to 0.
- (c) Pakistan won both the fourth and fifth round matches by 1 goal to 0.

17. Which one of the following statements is true about matches played in the first two rounds?

- (1) Pakistan beat South Africa by 2 goals to 1.
- (2) Argentina beat Pakistan by 1 goal to 0.
- (3) Germany beat Pakistan by 2 goals to 1.
- (4) Germany beat Spain by 2 goals to 1.

18. Which one of the following statements is true about matches played in the first two rounds?

- (1) Germany beat New Zealand by 1 goal to 0.
- (2) Spain beat New Zealand by 4 goals to 0.
- (3) Spain beat South Africa by 2 goals to 0.
- (4) Germany beat South Africa by 2 goals to 1.

19. If Pakistan qualified as one of the two teams from Pool A, which was the other team that qualified?

- (1) Argentina
- (2) Germany
- (3) Spain
- (4) Cannot be determined

20. Which team finished at the top of the pool after five rounds of matches?

- (1) Argentina
- (2) Germany
- (3) Spain
- (4) Cannot be determined

Venkat, a stockbroker, invested a part of his money in the stock of four companies - A, B, C and D. Each of these companies belonged to different industries, viz., Cement, Information Technology (IT), Auto, and Steel, in no particular order. At the time of investment, the price of each stock was Rs.100. Venkat purchased only one stock of each of these companies. He was expecting returns of 20%, 10%, 30%, and 40% from the stock of companies A, B, C and D, respectively. Returns are defined as the change in the value of the stock after one year, expressed as a percentage of the initial value. During the year, two of these companies announced extraordinarily good results. One of these two companies belonged to the Cement or the IT industry, while the other one belonged to either the Steel or the Auto industry. As a result, the returns on the stocks of these two companies were higher than the initially expected returns. For the company belonging to the Cement or the IT industry with extraordinarily good results, the returns were twice that of the initially expected returns. For the company belonging to the Steel or the Auto industry, the returns on announcement of extraordinarily good results were only one and a half times that of the initially expected returns. For the remaining two companies, which did not announce extraordinarily good results, the returns realized during the year were the same as initially expected.

21. What is the minimum average return Venkat would have earned during the year?

- (1) 30% (2) 31.25% (3) 32.5% (4) Cannot be determined

22. If Venkat earned a 35% return on average during the year, then which of these statements would necessarily be true?

- I. Company A belonged either to Auto or to Steel Industry.
 - II. Company B did not announce extraordinarily good results.
 - III. Company A announced extraordinarily good results.
 - IV. Company D did not announce extraordinarily good results.
- (1) I and II only
 - (2) II and III only
 - (3) I and IV only
 - (4) II and IV only

23. If Venkat earned a 38.75% return on average during the year, then which of these statement(s) would necessarily be true?

- I. Company C belonged either to Auto or to Steel Industry.
 - II. Company D belonged either to Auto or to Steel Industry.
 - III. Company A announced extraordinarily good results.
 - IV. Company B did not announce extraordinarily good results.
- (1) I and II only
 - (2) II and III only
 - (3) I and IV only
 - (4) II and IV only

24. If Company C belonged to the Cement or the IT industry and did announce extraordinarily good results, then which of these statement(s) would necessarily be true?

- I. Venkat earned not more than 36.25% return on average.
 - II. Venkat earned not less than 33.75% return on average.
 - III. If Venkat earned 33.75% return on average, Company A announced extraordinarily good results.
 - IV. If Venkat earned 33.75% return on average, Company B belonged either to Auto or to Steel Industry.
- (1) I and II only
 - (2) II and IV only
 - (3) II and III only
 - (4) III and IV only

Directions

The year is 2089. Beijing, London, New York, and Paris are in contention to host the 2096 Olympics. The eventual winner is determined through several rounds of voting by members of the IOC with each member representing a different city. All the four cities in contention are also represented in IOC. In any round of voting, the city receiving the lowest number of votes in that round gets eliminated. The survivor after the last round of voting gets to host the event. A member is allowed to cast votes for at most two different cities in all rounds of voting combined. (Hence, a member becomes ineligible to cast a vote in a given round if both the cities (s)he voted for in earlier rounds are out of contention in that round of voting). A member is also ineligible to cast a vote in a round if the city (s)he represents is in contention in that round of voting. As long as the member is eligible, (s)he must vote and vote for only one candidate city in any round of voting. The following incomplete table shows the information on cities that received the maximum and minimum votes in different rounds, the number of votes cast in their favour, and the total votes that were cast in those rounds.

Round	Total votes cast	Maximum votes cast		Eliminated	
		City	No. of votes	City	No. of votes
1		London	30	New York	12
2	83	Paris	32	Beijing	21
3	75				

It is also known that: All those who voted for London and Paris in round 1, continued to vote for the same cities in subsequent rounds as long as these cities were in contention. 75% of those who voted for Beijing in round 1, voted for Beijing in round 2 as well. Those who voted for New York in round 1, voted either for Beijing or Paris in round 2. The difference in votes cast for the two contending cities in the last round was 1. 50% of those who voted for Beijing in round 1, voted for Paris in round 3.

25. What percentage of members from among those who voted for New York in round 1, voted for Beijing in round 2?

- (1) 33.33 (2) 50
(3) 66.67 (4) 75

26. What is the number of votes cast for Paris in round 1?

- (1) 16 (2) 18
(3) 22 (4) 24

27. What percentage of members from among those who voted for Beijing in round 2 and were eligible to vote in round 3, voted for London?

- (1) 33.33 (2) 38.10
(3) 50 (4) 66.67

28. Which of the following statements must be true?

a. IOC member from New York must have voted for Paris in round 2.

b. IOC member from Beijing voted for London in round 3.

- (1) Only a (2) Only b
(3) Both a and b (4) Neither a nor b

Directions

The table below presents the revenue (in million rupees) of four firms in three states. These firms, Honest Ltd., Aggressive Ltd., Truthful Ltd. and Profitable Ltd. are disguised in the table as A, B, C and D, in no particular order.

States	Firm A	Firm B	Firm C	Firm D
UP	49	82	80	55
Bihar	69	72	70	65
MP	72	63	72	65

Further, it is known that: In the state of MP, Truthful Ltd. has the highest market share. Aggressive Ltd.'s aggregate revenue differs from Honest Ltd.'s by Rs. 5 million.

29. What can be said regarding the following two statements? Statement 1: Profitable Ltd. has the lowest share in MP market. Statement 2: Honest Ltd.'s total revenue is more than Profitable Ltd.

- (1) If Statement 1 is true then Statement 2 is necessarily true.
(2) If Statement 1 is true then Statement 2 is necessarily false.
(3) Both Statement 1 and Statement 2 are true.
(4) Neither Statement 1 nor Statement 2 is true.

30. What can be said regarding the following two statements? Statement 1: Aggressive Ltd.'s lowest revenues are from MP. Statement 2: Honest Ltd.'s lowest revenues are from Bihar.

- (1) If Statement 2 is true then Statement 1 is necessarily false.
(2) If Statement 1 is false then Statement 2 is necessarily true.
(3) If Statement 1 is true then Statement 2 is necessarily true.
(4) None of the above.

31. What can be said regarding the following two statements? Statement 1: Honest Ltd. has the highest share in the UP market. Statement 2: Aggressive Ltd. has the highest share in the Bihar market.

- (1) Both statements could be true.
(2) At least one of the statements must be true.
(3) At most one of the statements is true.
(4) None of the above

32. If Profitable Ltd.'s lowest revenue is from UP, then which of the following is true?

- (1) Truthful Ltd.'s lowest revenues are from MP.
(2) Truthful Ltd.'s lowest revenues are from Bihar.
(3) Truthful Ltd.'s lowest revenues are from UP.
(4) No definite conclusion is possible.

Section III – Quant

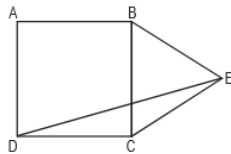
1. Direction for questions: Answer the questions based on the following information. In a locality, there are five small cities: A, B, C, D and E. The distances of these cities from each other are as follows. AB = 2 km; AC = 2km; AD > 2 km; AE > 3 km; BC = 2 km; BD = 4 km; BE = 3 km; CD = 2 km; CE = 3 km; DE > 3 km. If a ration shop is to be set up within 3 km of each city, how many ration shops will be required?

- a. 1 b. 2 c. 3 d. 4

2. A cube of side 12 cm is painted red on all the faces and then cut into smaller cubes, each of side 3 cm. What is the total number of smaller cubes having none of their faces painted?

3. If ABCD is a square and BCE is an equilateral triangle, what is the measure of $\angle DEC$?

- a. 15° b. 30°
c. 20° d. 45°



4. Instead of a metre scale, a cloth merchant uses a 120 cm scale while buying, but uses an 80 cm scale while selling the same cloth. If he offers a discount of 20% on cash payment, what is his overall profit percentage?

- a. 20% b. 25%
c. 40% d. 15%

5. From a circular sheet of paper with a radius 20 cm, four circles of radius 5 cm each are cut out. What is the ratio of the uncut to the cut portion?

- a. 1 : 3 b. 4 : 1
c. 3 : 1 d. 4 : 3

6. A wooden box (open at the top) of thickness 0.5 cm, length 21 cm, width 11 cm and height 6 cm is painted on the inside. The expenses of painting are Rs. 70. What is the rate of painting per square centimetres?

- a. Re 0.7 b. Re 0.5 c. Re 0.1 d. Re 0.2

7. A, S, M and D are functions of x and y, and they are defined as follows.

$A(x, y) = x + y$ $S(x, y) = x - y$
 $M(x, y) = xy$ $D(x, y) = x / y, y \neq 0$
What is the value of $M(M(A(M(x, y), S(y, x)), x), A(y, x))$ for $x = 2, y = 3$?

- a. 60 b. 140
c. 25 d. 70

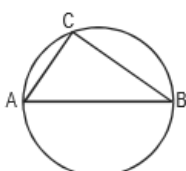
8. The cost of diamond varies directly as the square of its weight. Once, this diamond broke into four pieces with weights in the ratio 1 : 2 : 3 : 4. When the pieces were sold, the merchant got Rs. 70,000 less. Find the original price of the diamond.

- a. Rs. 1.4 lakh b. Rs. 2 lakh
c. Rs. 1 lakh d. Rs. 2.1 lakh

9. If n is any odd number greater than 1, then $n(n^2 - 1)$ is

- a. divisible by 96 always b. divisible by 48 always
c. divisible by 24 always d. None of these

10. The figure shows a circle of diameter AB and radius 6.5 cm.



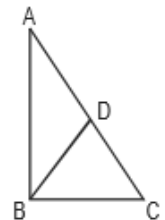
If chord CA is 5 cm long, find the area of $\triangle ABC$.

11. A watch dealer incurs an expense of Rs. 150 for producing every watch. He also incurs an additional expenditure of Rs. 30,000, which is independent of the number of watches produced. If he is able to sell a watch during the season, he sells it for Rs. 250. If he fails to do so, he has to sell each watch for Rs. 100. If he is able to sell only 1,200 out of 1,500 watches he has made in the season, then he has made a profit of

- a. Rs. 90,000 b. Rs. 75,000
c. Rs. 45,000 d. Rs. 60,000

12. Once I had been to the post office to buy five-rupee, two-rupee and one-rupee stamps. I paid the clerk Rs. 20, and since he had no change, he gave me three more one-rupee stamps. If the number of stamps of each type that I had ordered initially was more than one, what was the total number of stamps that I bought?

13. In $\triangle ABC$, $\angle B$ is a right angle, AC = 6 cm, and D is the mid-point of AC. The length of BD is



14. A salesman enters the quantity sold and the price into the computer. Both the numbers are two-digit numbers. But, by mistake, both the numbers were entered with their digits interchanged. The total sales value remained the same, i.e. Rs. 1,148, but the inventory reduced by 54. What is the actual price per piece?

- a. Rs. 82 b. Rs. 41
c. Rs. 6 d. Rs. 28

15. In a locality, two-thirds of the people have cable TV, one-fifth have VCR, and one-tenth have both. What is the fraction of people having either cable -TV or VCR?

- a. 19/30 b. 2/3
c. 17/30 d. 23/30

16. Given the quadratic equation $x^2 - (A - 3)x - (A - 2)$, for what value of A will the sum of the squares of the roots be zero?

- a. -2 b. 3
c. 6 d. None of these

17. If $a_1 = 1$ and $a_{n+1} - 3a_n + 2 = 4n$ for every positive integer n, then a_{100} equals

- (1) $3^{99} - 200$ (2) $3^{99} + 200$
(3) $3^{100} - 200$ (4) $3^{100} + 200$

18. In a mile race, Akshay can be given a start of 128 m by Bhairav. If Bhairav can give Chinmay a start of 4 m in a 100 m dash, then who out of Akshay and Chinmay will win a race of one and half miles, and what will be the final lead given by the winner to the loser? (One mile is 1,600 m.)

- a. Akshay, 1/12 mile b. Chinmay, 1/32 mile
c. Akshay, 1/24 mile d. Chinmay, 1/16 mile

19. Two liquids A and B are in the ratio 5 : 1 in container 1 and 1 : 3 in container 2. In what ratio should the contents of the two containers be mixed so as to obtain a mixture of A and B in the ratio 1 : 1?

- a. 2 : 3 b. 4 : 3
c. 3 : 2 d. 3 : 4

20. A man travels three-fifths of a distance AB at a speed 3a, and the remaining at a speed 2b. If he goes from B to A and return at a speed 5c in the same time, then

- a. $1/a + 1/b = 1/c$ b. $a + b = c$
c. $1/a + 1/b = 2/c$ d. None of these

21. There are five machines A, B, C, D and E situated on a straight line at distances of 10 metres, 20 metres, 30 metres, 40 metres and 50 metres respectively from the origin of the line. A robot is stationed at the origin of the line. The robot serves the machines with raw material whenever a machine becomes idle. All the raw material is located at the origin. The robot is in an idle state at the origin at the beginning of a day. As soon as one or more machines become idle, they send messages to the robot-station and the robot starts and serves all the machines from which it received messages. If a message is received at the station while the robot is away from it, the robot takes notice of the message only when it returns to the station. While moving, it serves the machines in the sequence in which they are encountered, and then returns to the origin. If any messages are pending at the station when it returns, it repeats the process again. Otherwise, it remains idle at the origin till the next message(s) is received.

Suppose on a certain day, machines A and D have sent the first two messages to the origin at the beginning of the first second, and C has sent a message at the beginning of the 5th second and B at the beginning of the 6th second, and E at the beginning of the 10th second. How much distance in metres has the robot travelled since the beginning of the day, when it notices the message of E? Assume that the speed of movement of the robot is 10 metres per second.

- (1) 140 (2) 80
(3) 340 (4) 360

22. Out of two-thirds of the total number of basketball matches, a team has won 17 matches and lost 3 of them. What is the maximum number of matches that the team can lose and still win more than three fourths of the total number of matches, if it is true that no match can end in a tie?

23. What value of x satisfy $x^{2/3} + x^{1/3} - 2 \leq 0$?

- (1) $-8 \leq x \leq 1$ (2) $-1 \leq x \leq 8$
(3) $1 < x < 8$ (4) $1 \leq x \leq 8$ (5) $-8 \leq x \leq 8$

24. The points of intersection of three lines $2X + 3Y - 5 = 0$, $5X - 7Y + 2 = 0$ and $9X - 5Y - 4 = 0$

- a. form a triangle
b. are on lines perpendicular to each other
c. are on lines parallel to each other
d. are coincident

25. A man has 9 friends: 4 boys and 5 girls. In how many ways can he invite them, if there have to be exactly 3 girls in the invitees?

26. In a watch, the minute hand crosses the hour hand for the third time exactly after every 3 hr 18 min and 15 s of watch time. What is the time gained or lost by this watch in one day?

- a. 14 min 10 s lost b. 13 min 50 s lost
c. 13 min 20 s gained d. 14 min 40 s gained

27. I sold two watches for Rs. 300 each, one at the loss of 10% and the other at the profit of 10%. What is the percentage of loss(-) or profit(+) that resulted from the transaction?

- a. (+)10 b. (-)1
c. (+)1 d. (-)10

A series S1 of five positive integers is such that the third term is half the first term and the fifth term is 20 more than the first term. In series S2, the nth term defined as the difference between the (n+1) term and the nth term of series S1, is an arithmetic progression with a common difference of 30.

28. Second term of S2 is

- a. 50 b. 60
c. 70 d. None of these

29. What is the average value of the terms of series S1?

- a. 60 b. 70
c. 80 d. Average is not an integer

30. If $\log_{10}x - \log_{10}\sqrt{x} = 2 \log_x 10$, then a possible value of x is given by

- a. 10 b. 1/100
c. 1/1000 d. None of these

31. What is the sum of all two-digit numbers that give a remainder of 3 when they are divided by 7?

- a. 666 b. 676
c. 683 d. 777

32. There are 12 towns grouped into four zones with three towns per zone. It is intended to connect the towns with telephone lines such that every two towns are connected with three direct lines if they belong to the same zone, and with only one direct line otherwise. How many direct telephone lines are required?

- a. 72 b. 90
c. 96 d. 144

33. If both a and b belong to the set {1, 2, 3, 4}, then the number of equations of the form $ax^2 + bx + 1 = 0$ having real roots is

34. If three positive real numbers x, y, z satisfy $y - x = z - y$ and $xyz = 4$, then what is the minimum possible value of y?

- a. 21/3 b. 22/3
c. 21/4 d. 23/4

1. BDAC - B shows the problem faced by a researcher, D. elaborates why this happens, A continues with it and C., by using 'however' introduces the way out of the problem.

2. DABC - D starts with 'but' and states why use of electricity in industries poses problems. A. continues with the idea and the word 'also' shows that it should follow D. B. presents an alternate to the costly options by using 'in contrast', C. states another reason to avoid using mineral resources for generating electricity and leads to 6.

3. BDAC - The use of word 'rather' in B. indicates that it should follow 1. D. states that the competition depends on five basic competitive forces, A. continues with the same idea. C. states that not all industries have the same potential and this is elaborated in 6.

4. ABCD - The use of 'these measures' in A. refers to the measures stated in 1., so it should be the first sentence in the series. B talks about the objectives of these measures and C. and D. elaborate on the idea

5. E is illogically placed. Correct order would be DACB - D introduces an action of the government, A. explains what it is, C. relates it to another action and B. concludes the passage by stating the consequences of the action.

6. C is illogically placed. Correct order is DBEA - D starts with 'once upon a time' indicating that this should be the beginning of the passage. B. talks about how D. prompted Indians to stay closer to Soviet Union, E. states how this could be done and A. elaborates on the same.

7. E is illogically placed. Correct order is CDBA - C introduces an American to the passage, D. states who he was, B. talks about something he said, and A. shows the author's reaction to it.

8. E. The author's contention (argument) is that the French are very fond of junk food because there are so many American restaurants in Paris. The best way to defeat this argument is to show, if possible, that the French do not eat in those American restaurants. The closest to that is answer E which suggests that the American tourists are the ones who eat at those restaurants.

9. C. The first part in boldface is a summary statement encapsulating the scientist's observations. The scientist's conclusion is in the next (non-bold) sentence. The critic doubts this conclusion and the second bold-face part is a statement of what he thinks the scientists ought to check. Hence the first part should be termed an observation/finding/ etc. Therefore A cannot be correct as it calls the statement a position (i.e. conclusion). The second part should be termed a suggestion or something similar; it cannot be termed a finding or a conclusion and so we eliminate B and D. E is incorrect as it suggests that the critic disputes the evidence, whereas we disputes the methods and conclusion. Answer C is best.

10. c. The purpose of the passage is to:

A. highlight the differences among psychologists regarding the importance of the unconscious mind in making complex decisions.--> out of scope, passage doesn't talk about difference opinions of psychologists, rather it discusses the advantage of one method over the other

B. contrast and compare the workings of the rationality with that of deliberate, action-oriented and complex decision

making processes.--> Inconsistent (Rationality works are not compared)

C. prove by citing results of experiments that one decision-making process is better than the other.--> Correct , as the whole passage talks about the superiority of the unconscious mind over the conscious mind.Also, the author presents some evidence (results of experiments) in the passage in order to prove that the decision making process of the unconscious mind is better than the decisions making process of the conscious mind

D. show that unconscious mind is not that undependable as previously thought.--> Partial scope

E. ascertain that using conscious and unconscious minds together yield second-to-none judgements.--> Opposite ans , as the passage says that unconscious mind alone yields best decisions and conscious mind's decision making process is inferior to it

11. d In the lands with insufficient rainfall, where water is brought in from outside for irrigation, salinization can take place.

12. d The passage talks about problems as well as remedies for soil infertility.

13. b Natural fertility exhausts the fastest in humid tropical forests.

14. c The passage does not talk of fertilizer fixation through lightning.

15. c Crop rotation preserves soil and prevents build up of pests.

16. b The Nile basin contains heavy soil with poor drainage properties.

17. c The author criticizes the application of scientism to social sciences.

18. b The last paragraph highlights that in social sphere there is no single cause by the creation of which one can create a certain effect at will.

19. c The author has tried to show that scientism cannot be properly applied to explain social behaviour.

20. a According to scientism there is only one truth the truth of science and the methods of physical science can thus be applied to other fields of enquiry, like the social sciences.

21. b The author has attacked the approach of scientism towards social sciences.

22. d The passage uses comparisons with familiar objects and very simple language, indicating that it is aimed at people with little technical knowledge of astronomy.

23. a The first sentence of the passage shows that the passage is about the variety of motions of the earth.

24. c The Earth's rotation on its axis causes the alternation between day and night, which we all know takes only 24 hours.

25. c The author has used comparisons with objects like a top and references to geometric shapes like cones.

26. c Physiology is a study of the way living things function, hence the passage must have been taken from a book on physiology.

27. c Mesenteries are thin sheets of connective tissues from which certain organs are suspended.

28. a The nutrients and waste materials are exchanged between blood and organs through the peri-vascular spaces.

29. c Cartilage, stroma and synovia are examples of connective tissues.

30. a Durkheim was trying to document the fact that something as individualistic as suicide can be explained without reference to individuals.

31. c This was categorised as egoistic suicide.

32. d Durkheim uses all three as explanations for suicide within a social entity.

33. b Durkheim was successful on all three indicators that he based his contentions on.

34. d He has used all the given indicators to support his contentions.

Section II – Logic and DI

1. A, D and G each one has only one wrong answer and no blank answers. They must have obtained the key from the mastermind directly. A introduced 46 as the wrong answer, D introduced 17 as the wrong answer and G introduced 25 as the wrong answer. Mastermind – A (46), D (17) and G (25).

H and E must have obtained the key from A as they got 46 as the wrong answer. H further introduced 92 as the wrong answer and E introduced 90 as the wrong answer.
A(46) => H(46, 92) and E (46, 90).

F must have obtained the key from H and E and found that answers 92 and 90 did not match. He left these blank and introduced 14 as the wrong answer in addition to 46 (which was the same answer though wrong) for H and E. H (46, 92) and E(46, 90) => F(14, 46).

I must have obtained the key from D and E. Answers 17, 46, 90 didn't match and he left these as blank. He also introduced 27 as the wrong answer.
E(46, 90) and D(17) => I (27) [17, 46, 90]

C must have obtained the key from I and introduced 56 as the wrong answer.
I (27) [17, 46, 90] => C (27, 56) [17, 46, 90]

B must have obtained the key from E and G. Answers 25, 46, 90 didn't match and he left these blank. He also marked 96 as the wrong answer.
E(46, 90) and G (25) => B [25, 46, 90]

Therefore, Combining all the above diagrams we see that A and D have only 1 source (mastermind). Even C has only one source. Only B has 2 sources E and G. Hence, option 2.

2. C obtained the key from I who obtained it from D and E. E obtained it from A. Four people were needed: A, D, E and I. Hence, option 3.

3. From the flow chart above it is clear that, G and H were not the sources to anyone. Hence, option 4. Alternatively, G got question number 25 wrong and none of the other nine people got the same question number wrong. Similarly, H got question number 92 wrong and none of the other nine people got the same question number wrong. G and H were sources to none of the nine. Hence, option 4.

4. From the flowchart we get that, statement 3 is the only true statement. Hence, option 3.

5. The regions that produce medium quality of Crop-1 or Crop-2 are R6, R7, R8, R9 and R13

The regions that produce low quality of Crop-3 or Crop-4 are R1, R4, R5 and R9

Thus, only region R9 produces medium quality of Crop2 and low quality of Crop-4. Hence, option 2.

6. Option 1 is false because R9 is a medium quality Crop-2 producing region, which does not produce high quality of Crop-3.

Option 2 is false because R3 is a high quality Crop-1 producing region, which does not produce medium and low qualities of Crop-4.

Option 3 is true as there are exactly 5 regions (R1, R2, R3, R4 and R11) and that produce Crop-3 and Crop-4 but not Crop-2.

Option 4 is false as no regions producing Crop-3 produces high quality Crop-2. Hence, option 3.

7. Regions R9, R10 and R11 produce low quality of Crop-1.

Of these, regions R10 and R11 also produce high quality of Crop-4 while regions R9 and R11 produce medium quality of Crop-3. ∴ There are 3 low quality Crop-1 producing regions that are either high quality Crop-4 producing regions or medium quality Crop-3 producing regions. Hence, option 3.

8. This was easiest of all. High quality Crop 4 producing regions are R3, R10, R11.

9. 2 In 1999, total number of Naya mixer-grinder = 124
Number of Naya mixer-grinder disposed = 20% of 30 = 6
Number of mixtures bought 124 = [50 + 24] 50

10. 3 Number of Naya mixer-grinder disposed in 1999 is 6
Number of Naya mixer-grinder disposed in 2000 is 10. Total disposed by end of 2000 = 16

11. 4 Initial number of Purana mixer-grinder not available, hence cannot be determined.

12. 1 20 Purana mixer-grinder were purchased in 1999.

13. 4 Thailand and Japan (Maximum difference of 4 ranks (5 – 1) = 4)

14. 1 China (Maximum difference between 2 parameter is 2)

15. 2 Japan (Maximum difference of 4)

16. 4 Japan and Malaysia (Inferring from first question)

Team Round 1 and Round 2 combinations

Goals for → Goals against Goals for → Goals against

Germany 2 → 1 and 1 → 0

Argentina 1 → 0 and 1 → 0

Spain 4 → 0 and 1 → 2 (Not possible)

Spain 5 → 1 and 0 → 1 (Possible)

Pakistan 2 → 0 and 0 → 1

New Zealand 1 → 2 and 0 → 4 (Not possible)

New Zealand 0 → 1 and 1 → 5 (Possible)

South Africa 1 → 2 and 0 → 2

17. 4

18. 2

From the statements from (a), (b), (c) given in the problem four teams (Spain, Argentina, Germany, Pakistan) appear to win

their matches in the fifth round. However, there are only three matches per round and hence only three teams can win their matches in any round. Hence, the data set appears to be inconsistent.

19. 4

20. 4

21. 1. At the time of investment, the total price of the four stocks was Rs. 400 Total expected returns = $(20 + 10 + 30 + 40) = \text{Rs. } 100$ Venkat would earn the minimum average return when the companies with the two lowest expected returns would give 2 times and 1.5 times their expected returns. Thus, minimum expected returns = $20 \times 1.5 + 10 \times 2 + 30 + 40 = \text{Rs. } 120 = 30\%$ of initial investment Hence, option 1.

22. 2. Venkat earned 35% average return i.e. Rs. 140. \therefore He earned Rs. 40 more than expected. $\therefore 40 = x + 0.5y$, where x and y correspond to expected returns on stocks that gave extraordinarily good results. $\therefore 0.5y = 40 - x$ But x and y can be 20, 10, 30 or 40. If $x = 20, y = 40$, which is possible If $x = 10, y = 60$, which is not possible If $x = 30, y = 20$, which is possible If $x = 40, y = 0$, which is not possible Thus, Company A with $x = 20$ necessarily announced extraordinarily good results along with company C or D. B did not announce extraordinarily good results. Hence, option 2.

23. 3. Venkat earned a return of 38.75% = Rs. 155 \therefore He earned Rs. 55 more than expected. $\therefore 55 = x + 0.5y$ where x and y correspond to expected returns on stocks that gave extraordinarily good results. But x and y can be 20, 10, 30 or 40. If $x = 20, y = 70$, which is not possible. If $x = 10, y = 90$, which is not possible. If $x = 30, y = 50$, which is not possible. If $x = 40, y = 30$, which is possible. Thus company C and company D announced returns that were respectively one and a half and two times the initially expected returns. \therefore Company C belonged to either Auto or Steel Industry and Company A and B did not announce extraordinarily good results. Statements I and IV are true. Hence, option 3.

24. 2. Company C gave a return of Rs.60. \therefore Total returns will be the minimum possible when B gives 1.5 times the initially expected returns. \therefore Total returns would be $20 + 15 + 60 + 40 = \text{Rs. } 135 = 33.75\%$ Statement II is true. Also, when returns are 33.75%, company B belongs to Auto or Steel Industry. Statement IV is true and Statement III is false. Total returns will be the maximum possible when D gives 1.5 times the initially expected returns. \therefore Total returns would be $20 + 10 + 60 + 60 = \text{Rs. } 150 = 37.5\%$ Statement I is false. Hence, option 2.

25. 4. Let there be x members in the IOC. As a member cannot vote if his or her city is in contention, the number of voters in Round 1 (R1) = $x - 4$ The number of voters in Round 2 (R2) = $x - 3$ and The number of voters in Round 3 (R3) = $x - 2 - n$ Where n is the number of voters who have voted for New York (NY) in R1 and Beijing (B) in R2. Given $x - 3 = 83, x - 4 = 82$ and $x - 2 - n = 75 \Rightarrow n = 9$ 21 members voted for B in R2. Out of these, 9 voted for NY in R1. The remaining 12 who voted for B comprised 75% of those who voted for B in R1. Thus $12/0.75 = 16$ members voted for B in R1. \therefore Paris (P) got $82 - 16 - 30 - 12 = 24$ votes in R1.

All those who voted for London (L) and P in R1 continued to vote for the same cities in subsequent rounds. Thus, 24 voters of P in R2 had voted for P in R1 too. Also from the given

information, 3 voters who had voted for NY in R1 voted for Paris in R2. Out of the remaining 5 that voted for P in R2, 4 had voted for Beijing in R1 and 1 vote came from the member who represented NY. In R3, the difference in the votes cast for L and P was 1. \Rightarrow L and P got 37 and 38 votes in some order.

The composition of 75 voters of R3 was as follows: 12 members who had voted for B in R1 and R2 were eligible for voting in R3. 30 and 24 members who voted for L and P in R1 continued to do so in R3. 4 voters of R3, voted for B in R1 and P in R2. 3 voters of R3, voted for NY in R1 and P in R2. 1 member represented NY and 1 represented B. From given information, 50% of voters of B in R1 i.e. 8 voted for P in R3 \Rightarrow 8 out of the 12 who voted for B in R1 and R2, voted for London in R3.

The information can be summarised as shown in the table:
Required percentage = $9 \times 100/12 = 75\%$ Hence, option 4.

City	R1	R2	Composition of votes of R2	R3	Composition of votes of R3
London	30	30	30 who voted for London in R1	38	30 who voted for London in R1
NY	12	0			
Paris	24	32	24 who voted for Paris in R1	37	24 who voted for Paris in R1
			+ 3 who voted for NY in R1		+ 3 who voted for NY in R1 and P in R2
			+ 1 representing NY		+ 1 representing NY
			+ 4 who voted for Beijing in R1		+ 1 representing NY
					+ 4 who voted for Beijing in R1 and P in R2
					+ 1 member representing Beijing
Beijing	16	21		0	
			12 who voted for Beijing in R1		
			+ 9 who voted for NY in R1		
Total	82	83		75	

26. As can be seen from the formulated table in the first question, 24 votes were cast for Paris in R1. Hence, option 4.

27. From the explanation given earlier, required percentage = $8 \times 100/12 = 66.67\%$ Hence, option 4.

28. It can be clearly seen from the explanation given earlier that only statement a is true. Hence, option 1.

29. Truthful Ltd. has the highest market share in MP. Thus Truthful Ltd. could be Firm A or Firm C. Aggregate revenues of Firms A, B, C and D are 190, 217, 222 and 185 (in million rupees) respectively. Thus, Aggressive Ltd. and Honest Ltd. could be A and D or B and C in some order.

Case 1: Truthful Ltd. = A Aggressive Ltd. and Honest Ltd. = B and C Profitable Ltd. = D

Case 2: Truthful Ltd. = C Aggressive Ltd. and Honest Ltd. = A and D Profitable Ltd. = B If statement 1 is true, then Firm B is profitable Ltd. \Rightarrow Honest Ltd. is Firm A or D. But, the total revenue of Firms A and D each is lesser than that of firm B.

Thus, if statement 1 is true, statement 2 is necessarily false. Hence, option 2.

30. If statement 1 is true then, Firm B is Aggressive Ltd. This implies that Firm C is Honest Ltd. Firm C's lowest revenues are from Bihar. Thus, statement 2 is necessarily true. Hence, option 3.

31. The two statements talk about two firms having the highest shares in the UP and Bihar Markets. Thus both the statements refer to Firm B. From the explanation given in the first question, only one of the two statements can be true at a time. Hence, option 3.

32. Profitable Ltd. is firm D (Case 1 from the explanation given earlier). ∴ Truthful Ltd. is firm A. Thus, Truthful Ltd.'s lowest revenues are from UP. Hence, option 3.

Section III Quant

1. a. Let us first ascertain the exact distances, in case of cities where this is not known, viz. AD, AE and DE. This can be done by using a set of three cities, e.g. A-C-D. Since these three form a triangle, $AC + CD > AD$; hence, $AD < 4$. Now let us look at A-C-E. So $AC + CE > AE$. Hence, $AE < 5$. Now considering C-D-E, we have $CD + CE > DE$. Hence, $DE < 5$. We find that the minimum distance between any two cities is 2 km and the maximum distance does not exceed 5 km. If we want a ration shop within 3 km of every city, we will require one shop as long as the distance between any two cities does not exceed 6 km (as it can be 6 km from each city). We find that there are no two cities that are more than 6 km from each other. Hence, only one ration shop can cater to all the cities.

2. b Since each side of the smaller cube is 3 cm, it can be figured out that each face of the original cube is divided into 4 parts, or in other words, the original cube is divided into 64 smaller cubes. For a smaller cube to have none of its sides painted, it should not be a part of the face of the original cube (i.e. none of its faces should be exposed). We can find at the centre of the original cube there are $(2 \times 2 \times 2) = 8$ such cubes. Hint: Students please note that the answer can only be a cube of some integer. The only cube among the answer choices is $(2)^3 = 8$.

3. a. Since $\triangle BCE$ is an equilateral triangle, $CE = BC = BE$. And since ABCD is a square, $BC = CD$. Hence, $CD = CE$. So in $\triangle CDE$, we have $CD = CE$. Hence, $\angle EDC = \angle CED$. Now $\angle BCE = 60^\circ$ (since equilateral triangle) and $\angle BCD = 90^\circ$ (since square). Hence, $\angle DCE = \angle DCB + \angle BCE = (60 + 90) = 150^\circ$. So in $\triangle CDE$, $\angle EDC + \angle CED = 30^\circ$ (since three angles of a triangle add up to 180°). Hence, we have $\angle DEC = \angle EDC = 15^\circ$.

4. a Let the price per metre of cloth be Re 1. The shopkeeper buys 120 cm, but pays for only 100 cm. In other words, he buys 120 cm for Rs. 100. So his CP = $100/120 = \text{Re } 0.833$ per metre. Now he sells 80 cm, but charges for 100 cm. In other words, he sells 80 cm for Rs. 100. On this he offers a 20% discount on cash payment. So he charges Rs. 80 for 80 cm cloth. In other words, his SP = $80 / 80 = \text{Re } 1$ per metre. So his percentage profit in the overall transaction = $(1 - 0.833) / 833.01 = 20\%$.

5. c Area of the original paper = $\pi(20)^2 = 400\pi \text{ cm}^2$. The total cut portion area = $4(\pi)(5)^2 = 100\pi \text{ cm}^2$. Therefore, area of the uncut (shaded) portion = $(400 - 100) = 300\pi \text{ cm}^2$. Hence, the required ratio = $300\pi : 100\pi = 3 : 1$.

6. c. Thickness of the wall, the dimensions of the inside of the box is as follows: length = $(21 - 0.5 - 0.5) = 20 \text{ cm}$, width =

$(11 - 0.5 - 0.5) = 10 \text{ cm}$ and height = $(6 - 0.5) = 5.5$. Total number of faces to be painted = 4 walls + one base (as it is open from the top). The dimensions of two of the walls = (10×5.5) , that of the remaining two walls = (20×5.5) and that of the base = (20×10) . So the total area to be painted = $2 \times (10 \times 5.5) + 2 \times (20 \times 5.5) + (20 \times 10) = 530 \text{ cm}^2$. Since the total expense of painting this area is Rs. 70, the rate of painting = $70/530 = 0.13 = \text{Re } 0.1$ per sq. cm. (approximately).

7. d $M(M(A(M(x, y), S(y, x)), x), A(y, x)) = M(M(A(M(2, 3), S(3, 2))), 2), A(3, 2) = M(M(A((2 \times 3), (3 - 2))), 2), A(3, 2) = M(M(A(6, 1), 2), A(3, 2)) = M(M((6 + 1), 2), (3 + 2)) = M(M(7, 2), 5) = M((7 \times 2), 5) = M(14, 5) = (14 \times 5) = 70$.

8. c Let the original weight of the diamond be $10x$. Hence, its original price will be $k(100x^2)$. . . where k is a constant. The weights of the pieces after breaking are $x, 2x, 3x$ and $4x$. Therefore, their prices will be $kx^2, 4kx^2, 9kx^2$ and $16kx^2$. So the total price of the pieces = $(1 + 4 + 9 + 16)kx^2 = 30kx^2$. Hence, the difference in the price of the original diamond and its pieces = $100kx^2 - 30kx^2 = 70kx^2 = 70000$. Hence, $kx^2 = 1000$ and the original price = $100kx^2 = 100 \times 1000 = 100000 = \text{Rs. } 1$ lakh.

9. c $n(n^2 - 1) = (n - 1)n(n + 1)$. If you observe, this is the product of three consecutive integers with middle one being an odd integer. Since there are two consecutive even numbers, one of them will be a multiple of 4 and the other one will be multiple of 2. Hence, the product will be a multiple of 8. Also since they are three consecutive integers, one of them will definitely be a multiple of 3. Hence, this product will always be divisible by $(3 \times 8) = 24$. Hint: Students, please note if a number is divisible by 96, it will also be divisible by 48 and 24. Similarly, if a number is divisible by 48, it is will always divisible by 24. Since there cannot be more than one right answers, we can safely eliminate options (a) and (b).

10. b The radius of the circle is 6.5 cm. Hence, its diameter = 13 cm. And therefore $AB = 13 \text{ cm}$. Since the diameter of a circle subtends 90° at the circumference, $\angle ACB = 90^\circ$. Hence $\triangle ACB$ is a right-angled triangle with $AC = 5, AB = 13$. So CB should be equal to 12 cm (as 5-12-13 form a Pythagorean triplet). Hence, the area of the triangle = $1/2 \times AC \times CB = 1/2 \times 5 \times 12 = 30 \text{ sq. cm}$.

11. b Total expense incurred in making 1,500 watches = $(1500 \times 150) + 30000 = \text{Rs. } 2,55,000$. Total revenue obtained by selling 1,200 of them during the season = $(1200 \times 250) = \text{Rs. } 3,00,000$. The remaining 300 of them has to be sold by him during off season. The total revenue obtained by doing that = $(300 \times 100) = \text{Rs. } 30,000$. Hence, total revenue obtained = $(300000 + 30000) = \text{Rs. } 3,30,000$. Hence, total profit = $(330000 - 255000) = \text{Rs. } 75,000$.

12. a Since I paid Rs. 20 and because of lack of change, the clerk gave me Rs. 3 worth of stamps, it can be concluded that the total value of the stamp that I wanted to buy is Rs. 17. Since I ordered initially a minimum of 2 stamps of each denominations, if I buy exactly 2 stamps each, my total value is $2(5 + 2 + 1) = \text{Rs. } 16$. The only way in which I make it Rs. 17 is buying one more stamp of Re 1. Hence, the total number of stamps that I ordered = $(2 + 2 + 3) = 7$. In addition, the clerk gave me 3 more. Hence, the total number of stamps that I bought = $(7 + 3) = 10$ (viz. 2 five-rupee, 2 two-rupee and 6 one-rupee stamps).

13. c. In a right-angled triangle, the length median to the hypotenuse is half the length of the hypotenuse. Hence, $BD =$

$\frac{1}{2} AC = 3$ cm. This relationship can be verified by knowing that the diameter of a circle subtends a right angle at the circumference. e.g. in the adjacent figure D is the centre of the circle with AC as diameter. Hence, $\angle ABC$ should be 90° . So BD should be the median to the hypotenuse. Thus, we can see that $BD = AD = CD = \text{Radius of this circle}$. Hence, $BD = \frac{1}{2} \text{ diameter} = \frac{1}{2} AC = \frac{1}{2} \text{ hypotenuse}$.

14. B. Inventory has reduced by 54 units. This means two things: (i) actual quantity sold was less than the figure that was entered the computer (i.e. after interchanging digits), so the unit's place digit of the actual quantity sold should be less than its ten's place digit; and (ii) the difference between the actual quantity sold and the one that was entered in the computer is 54. From question 125, we can figure out that the only answer choice that supports both these conditions is (a), as $(82 - 28 = 54)$. So the actual quantity sold = 28. Now since the total sales is Rs. 1,148, actual price per piece = $1148/28 = \text{Rs. } 41$. Hence, the answer to question is (b).

15. b We are supposed to find out what fraction of the population has exactly one among the two (since either cable TV or VCR indicates they do not have both). Now $\frac{2}{3}$ of the people have cable TV, of whom $\frac{1}{10}$ of people also have VCR. Hence, fraction of population having only cable TV = $(\frac{2}{3} - \frac{1}{10}) = \frac{17}{30}$. Also $\frac{1}{5}$ of the people have VCR, of whom $\frac{1}{10}$ of people also have cable TV. Hence, fraction of people having only VCR = $(\frac{1}{5} - \frac{1}{10}) = \frac{1}{10}$. The total fraction of the people who either have cable TV or VCR = $\frac{17}{30} + \frac{1}{10} = \frac{2}{3}$

16. d If we write the given equation in the conventional form, i.e. $ax^2 + bx + c$, $a = 1$, $b = -(A - 3)$, i.e. $(3 - A)$ and $c = -(A - 2)$, i.e. $(2 - A)$. Let the roots of this equation be α and β . So the sum of the squares of the roots = $\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta$. Now $(\alpha + \beta) = \text{Sum of the roots} = -b/a = (A - 3)/1 = (A - 3)$ and $\alpha\beta = \text{Product of the roots} = (2 - A)/1 = (2 - A)$. Hence, $\alpha^2 + \beta^2 = (A - 3)^2 - 2(2 - A) = A^2 - 4A + 5 = 0$. None of the answer choices matches this.

17. $a_1 = 1$
 $a_{n+1} = 4n + 3a_n - 2$
 $a_2 = 4 - 2 + 3(1) = 5 = 3_2 - 1$
 $a_3 = 4(2) + 3(5) - 2 = 21 = 3^3 - 6$
 $a_4 = 4(3) + 3(21) - 2 = 73 = 3^4 - 8$
 $\therefore a_n = 3^n - 2(n)$
 $\therefore a_{100} = 3^{100} - 200$. Hence, option 3

18. d In a mile race, Akshay can be given a start of 128 m by Bhairav. This means that Bhairav can afford to start after Akshay has travelled 128 m and still complete one mile with him. In other words, Bhairav can travel one mile, i.e. 1,600 m in the same time as Akshay can travel $(1600 - 128) = 1,472$ m. Hence, the ratio of the speeds of Bhairav and Akshay = Ratio of the distances travelled by them in the same time = $1600/1472 = 25 : 23$. Bhairav can give Chinmay a start of 4 miles. This means that in the time Bhairav runs 100 m, Chinmay only runs 96 m. So the ratio of the speeds of Bhairav and Chinmay = $96 : 100 = 24 : 25$. Hence, we have $B : A = 25 : 23$ and $B : C = 25 : 24$. So $A : B : C = 23 : 25 : 24$. This means that in the time Chinmay covers 24 m, Akshay only covers 23 m. In other words, Chinmay is faster than Akshay. So if they race for $1 \frac{1}{2}$ miles = 2,400 m, Chinmay will complete the race first and by this time Akshay would only complete 2,300 m. In other words, Chinmay would beat Akshay by $100 \text{ m} = \frac{1}{16} \text{ mile}$.

19. d We can solve this by alligation. But while we alligate, we have to be careful that it has to be done with respect to any

one of the two liquids, viz. either A or B. We can verify that in both cases, we get the same result. e.g. the proportion of A in the first vessel is $\frac{5}{6}$ and that in the second vessel is $\frac{1}{4}$, and, and we finally require $\frac{1}{2}$ parts of A. Similarly, the proportion of B in the first vessel is $\frac{1}{6}$, that in the second vessel is $\frac{3}{4}$ and finally we want it to be $\frac{1}{2}$. With respect to liquid A.

$\frac{5}{6}$		$\frac{1}{4}$
	$\frac{1}{2}$	
$\frac{1}{4}$		$\frac{1}{3}$
	$3:4$	

20. c Let the total distance be x. Hence, the man travels a distance $\frac{3x}{5}$ at a speed 3a. Hence, total time taken to travel this distance = $\frac{3x}{15a} = \frac{x}{5a}$. He then travels a distance $\frac{2x}{5}$ at a speed 2b. Hence, time taken to travel this distance = $\frac{2x}{10b} = \frac{x}{5b}$. So total time taken in going from A to B = $\frac{x}{5a} + \frac{x}{5b}$. Now he travels from B to A and comes back. So total distance travelled = $2x$ at an average speed 5c. Hence, time taken to return = $\frac{2x}{5c}$. Since the time taken in both the cases remains the same, we can write $\frac{x}{5a} + \frac{x}{5b} = \frac{2x}{5c}$. $\frac{1}{a} + \frac{1}{b} = \frac{2}{c}$.

21. R \leftarrow 10m \rightarrow A \leftarrow 10m \rightarrow B \leftarrow 10m \rightarrow C \leftarrow 10m \rightarrow D \leftarrow 10m \rightarrow E
 Initially the robot would have received messages from A and D. He goes to A 1st, and then to D and returns to the station at R. He would have travelled 80m and hence taken 8 seconds. When he is back at R, he would have received messages from B and C, and would travel to B, then C and come back, thus travelling additional 60m. This will be a total of 140m and 14 seconds, when he reaches back his station to receive the message from E.

22. a The team has played a total of $(17 + 3) = 20$ matches. This constitutes $\frac{2}{3}$ of the matches. Hence, total number of matches played = 30. To win $\frac{3}{4}$ of them, a team has to win 22.5, i.e. at least win 23 of them. In other words, the team has to win a minimum of 6 matches (since it has already won 17) out of remaining 10. So it can lose a maximum of 4 of them.

23. Put $x^{2/3} = y$. Then equation (I) becomes $y^2 + y - 2 \leq 0 \Rightarrow (y + 2)(y - 1) \leq 0 \Rightarrow -2 \leq y \leq 1$
 $-2 \leq x^{1/3} \leq 1 \Rightarrow -8 \leq x \leq 1$ Hence, option 1

24. d The three lines can be expressed as $Y = \frac{5}{3} - \frac{2x}{3}$; $Y = \frac{5x}{7} + \frac{2}{7}$ and $Y = \frac{9x}{5} - \frac{4}{5}$. Hence, the slopes of the three lines are $-\frac{2}{3}$, $\frac{5}{7}$ and $\frac{9}{5}$ respectively and their Y intercepts are $\frac{5}{3}$, $\frac{2}{7}$ and $\frac{4}{5}$ respectively. For any two lines to be perpendicular to each other, the product of their slopes = -1 . We find that the product of none of the slopes is -1 . For any two to be parallel, their slopes should be the same. This is again not the case. And finally for the two lines to be intersecting at the same point, there should be one set of values of (x, y) that should satisfy the equations of 3 lines. Solving the first two equations, we get $x = 1$ and $y = 1$. If we substitute this in the third equation, we find that it also satisfies that equation. Hence, the solution set $(1, 1)$ satisfies all three equations, suggesting that the three lines intersect at the same point, viz. $(1, 1)$, hence they are coincident.

25. b Out of the 5 girls, 3 girls can be invited in 5C_3 ways. Nothing is mentioned about the number of boys that he has to invite. He can invite one, two, three, four or even no boys. Out

of 4 boys, he can invite them in the said manner in $(2)^4$ ways. Thus, the total number of ways is $5C3 \times (2)^4 = 10 \times 16 = 160$.

26. b In a watch that is running correct, the minute hand should cross the hour hand once in every $65 + \frac{5}{11}$ min. So they should ideally cross three times once in $3 \times \frac{720}{11} = \frac{2060}{11}$ min = 196.36 min. But in the watch under consideration they meet after every 3 hr, 18 min and 15 s, i.e. $(3 \times 60 + 18 + \frac{15}{60}) = \frac{793}{4}$ min = 198.25 min. In other words, our watch is actually losing time (as it is slower than the normal watch). Hence, when our watch elapsed 198.25 min, it actually should have elapsed 196.36 min. So in a day, when our watch will elapse $(60 \times 24) = 1440$, it should actually elapse $1440 \times \frac{196.36}{198.25} = 1426.27$. Hence, the amount of time lost by our watch in one day = $(1440 - 1426.27) = 13.73$, i.e. 13 min and 50 s (approximately).

27. b In this case, we need not use the data that SP = Rs. 300 each. This has to be used only to figure out that the SP of both the articles is the same. Also since the profit percentage on one is equal to the loss percentage on the other, viz. 10% effectively, it will be a loss given by $10^2 / 100 = 1\%$. Hence, the correct answer is (-)1.

First series: (S1) = x, y, x/2, z, x + 20

Second series: (S2) = a1, a2, a3, a4

Now $a1 = y - x$, $a2 = x/2 - y$, $a3 = z - x/2$ and $a4 = x + 20 - z$

$$a2 - a1 = 30 \text{ gives } 3x - 4y = 60 \quad \dots (i)$$

$$a4 - a3 = 30 \text{ gives } 3x - 4z = 20 \quad \dots (ii) \text{ and}$$

$$a4 - a2 = 60 \text{ gives } x - 2z + 2y = 80 \quad \dots (iii)$$

Solving these equations we get the values of $x = 100$, $y = 60$, $z = 70$

$\therefore S1 = 100, 60, 50, 70, 120$

$S2 = -40, -10, 20, 50$

28. d

29. c

$$30. \log_{10}x - \log_{10}\sqrt{x} = 2 \log_x 10 \dots$$

Consider LHS of (i) $\log_{10}x - \frac{1}{2} \log_{10}x = \frac{1}{2} \log_{10}x$.

Equating the LHS and the RHS, we get, $\log_{10}x = 4 \log_x 10$

Now, let $\log_{10}x = \log_x 10^4 = y$

Therefore, $10^y = x$ and $x^y = 10^4$ Solving these two equations,

we get, $y = \pm 2$; Therefore $x = 10^2 = 100$ or $x = 10^{-2} = 1/100$

Hence, option 2.

31. Any number that gives a remainder of 3 when divided by 7 will be of the form $7k + 3$.

Since we only need two-digit numbers, k will range from 1 to 13 {where $7(1) + 3 = 10$ and $7(13) + 3 = 94$ }

Sum of these numbers from k 1 to 13 with formula $7k + 3 = 13 \times 3 + 7(1 + 2 + \dots + 13)$

$$= 39 + 7 \times 13 \times \frac{14}{2} = 39 + 637 = 676 \text{ Hence, option 2.}$$

32. Case 1: Lines within Zones Within every zone there will be $3 + 3 + 3 = 9$ lines Total number of phone lines within each zone for all 4 zones together = $9 \times 4 = 36$

Case 2: Lines connecting different Zones Let Zone 1 have towns A, B and C. A will be connected to 9 towns of the other 3 zones, each through a single direct line. Similarly, B and C will also be connected to 9 different towns. The number of direct lines from Zone 1 to other towns (in Zones 2, 3 and 4) = $3 \times 9 = 27$ For Zone 2, we must only count the number of lines to Zones 3 and 4 (lines between Zone 1 and Zone 2 have already been considered.) The number of lines from the 3 towns of Zone 2 to other towns (in Zones 3 and 4) = $3 \times 6 = 18$

Now, for Zone 3, we should only count the number of lines to Zone 4 (lines to Zones 1 and 2 have already been considered.) The number of direct lines from the 3 towns of Zone 3 to the 3 towns in Zone 4 = $3 \times 3 = 9$ Total number of direct telephone lines = $36 + 27 + 18 + 9 = 90$ Hence, option 2.

$$33. \quad ax^2 + bx + 1 = 0 \dots (i) \text{ For equation (i) to have real roots, } b^2 - 4a \geq 0 \text{ i.e. } a \leq b^2/4 \quad \dots (ii)$$

If $b = 4$, equation (ii) is satisfied by, $a = 1, 2, 3, 4$ 4 equations are possible.

If $b = 3$, equation (ii) is satisfied by $a = 1, 2$ 2 equations are possible.

If $b = 2$, equation (ii) is satisfied by $a = 1$ 1 equation is possible.

If $b = 1$, equation (ii) is not satisfied. Thus, total number of possible equations = 7 Hence, option 2.

$$34. \quad y - x = z - y \quad 2y = x + z \quad \dots (i)$$

$$xyz = 4 \quad \dots (ii)$$

It is known that Arithmetic Mean (A.M.) \geq Geometric Mean (G.M.) i.e. $A.M. \geq G.M.$

$$\text{Hence } x + y + z / 3 \geq (xyz)^{1/3} \quad \dots (iii).$$

From all three we get:

$$3y/3 \geq 4^{1/3}. \text{ Therefore } y \geq 2^{2/3}. \text{ The minimum value of } y \text{ is } 22/3.$$

Hence, option 2.