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DIRECTIONS for questions 1 to 6: The passage given below is followed by a set of six questions. Choose the best answer to each question.

Like every other object of human inquiry, Architecture may be studied from two distinct points of view. Either it may be regarded statically, and described scientifically as a thing existing, without any reference to the manner in which it was invented; or it may be treated historically, tracing every form from its origin and noting the influence one style has had upon another in the progress of time.

The first of these methods, the scientific mode of study, is more technical and demands on the part of the student very considerable previous knowledge before it can be successfully prosecuted. The other, besides being more popular and easily followed, has the advantage of separating the objects of study into natural groups and tracing more readily their connection and relation to one another. The great superiority, however, of the historical mode of study arises from the fact that, when so treated, Architecture ceases to be a mere art, interesting only to an artist or his employer, but becomes one of the most important adjuncts of history, filling up many gaps in the written record and giving life and reality to much that, without its presence, could with difficulty be realised.

A still more important use of architecture, when followed as a history, is found in its ethnographic value. All different races of men had their own peculiar forms in using the productions of this art, and their own mode of expressing their feelings or aspirations by its means. When properly studied, it consequently affords a means as important as language for discriminating between the different races of mankind, often more so, and one always more trustworthy and more easily understood.

A great deal of the confusion of ideas existing on the subject of Architecture arises from the fact that writers have been in the habit of speaking of Painting, Sculpture, and Architecture as three similar fine arts, practised on the same principles. This error arose in the 16th century, when in a fatal hour, painters and sculptors undertook also the practice of architecture, and builders ceased to be architects. This confusion of ideas has been perpetuated to the present hour, and much of the degraded position of the art to this day is owing to the mistake then made. It cannot, therefore, be too strongly insisted upon that there is no essential connection between painting and sculpture on the one hand and architecture on the other.

The two former rank among what are called Phonetic arts. Their business is to express by colour or form ideas that could be – generally have been – expressed by words. With the Egyptians, their hieroglyphical paintings were their only means of recording their ideas... Poetry, Painting, and Sculpture are three branches of one form of art, refined from Prose, Colour, and Carving, and form a group apart, interchanging ideas and modes of expression, but always dealing with the same class of images and appealing to the same class of feelings.

Distinct and separate from these Phonetic arts is another group, generally known as the Technic arts, comprising all those which minister to the primary wants of mankind under such various heads as food, clothing, and shelter. Between these two groups is a third called the Aesthetic arts, forming the whole into one homogeneous mass. They take their rise from the fact that to every want which the technic arts are designed to supply, Nature has attached a gratification which is capable of refining all the useful arts into fine arts. Thus the technic art of agriculture is capable of supplying food in its simple form; but by the refinements of cookery and of wine-making, simple meats and drinks are capable of affording endless gratification to the senses. Shelter, too is easily provided, but ornamental shelter, or in other words architecture, is one of the most prominent of the fine arts. Music, though hardly known as a useful art, is the most typical of the Aesthetic arts, and, "married

to immortal verse," steps upwards into the region of the Phonetic arts, just as building, when used for ornament, is raised out of the domain of the Technic arts.

Q1. According to the passage, it can be inferred that the scientific mode of the study of Architecture

- ☐ a) **deals with facts rather than opinions.**
- ☐ b) involves the temporal study of the influence of various styles.
- ☐ c) does not involve the study of the origin of Architecture.
- ☐ d) becomes critical when combined with the history of Architecture.

Q2. Which of the following can be considered to be the most important advantage of the historical mode of studying Architecture as compared to the scientific mode?

- ☐ a) **The former is easier to understand and is more popular than the latter.**
- ☐ b) The historical mode of studying architecture supplements the study of history and helps in providing a complete picture of the past, which is not the case with the scientific mode of its study.
- ☐ c) The former helps in recognising the distinctions between different races of mankind while the latter does not.
- ☐ d) **The former provides an avenue for categorizing different objects and studying the interrelationship between the various groups while the latter does not.**

Q3. What does the author refer to when he talks about the "confusion of ideas" in the fourth paragraph?

- ☐ a) **The painters and sculptors of the 16th century considering themselves to be architects as well.**
- ☐ b) **Applying the principles of Painting and Sculpture to Architecture**
- ☐ c) The deplorable position of Architecture due to the influence of Painting and Sculpture.
- ☐ d) **The builders in the 16th century stopping the practice of Architecture.**

Q4. Which of the following is a characteristic of Phonetic arts?

- ☐ a) **Phonetic arts convey ideas and excite feelings using only words.**
- ☐ b) **Phonetic arts include all the arts which gratify our senses.**
- ☐ c) Phonetic arts include only those arts which use images to convey ideas.
- ☐ d) **Phonetic arts express feelings and ideas which could otherwise be conveyed in words.**

Q5. Which of the following criteria is not a differentiating factor between the different categories of arts?

- ☐ a) **The ability to express the ideas conveyed by an art using words.**
- ☐ b) **The extent of functional benefits afforded by an art.**
- ☐ c) The extent to which the senses are gratified due to an art.
- ☐ d) **The type of senses which are gratified by an art.**

Q6. Each of the following options presents the description of a piece of art and mentions along with it a category of art:

How many of them aptly match the description given with the respective category?

- I. An opera with exquisite lyrics: Aesthetic Art
- II. A makeshift hut which is not much to look at but provides shelter: Technic Art
- III. A dish made of boiled vegetables: Aesthetic Art
- IV. A building which is designed to be elegant: Phonetic Art

- ☐ a) 1
- ☐ b) 2
- ☐ c) 3
- ☐ d) 4

DIRECTIONS for questions 7 to 12: The passage given below is followed by a set of six questions. Choose the best answer to each question.

Picture a person running. You're probably picturing them wrong. It's okay, you wouldn't be alone. It turns out that artists have been drawing people running incorrectly for thousands of years. From Greek vases to drawing handbooks to modern sculptures, even our very best artists can't seem to get the pose right.

To successfully run, a person swings opposite arms and legs. As the right leg goes forward, the right arm goes back, and vice versa. You can easily confirm this by attempting to run in place right now.

But if you were asked to draw a person running, many of you would have the resulting stick figure (and let's be real, you'd draw a stick figure) moving their right arm and right leg forward at the same time.

When it comes to art, it's possible that rather than being an error, the awkward, one sided lurch forward is an artistic choice. In Egyptian art, for example, artists followed strict rules about the position of the head and body. But as art evolved, and as accuracy of form become more and more important, it's hard to imagine why someone like Da Vinci or Donatello would intentionally draw a person running in such an inaccurate pose. And modern "how to draw" guides are certainly not intentionally teaching someone the wrong posture.

But what about when it comes to our physical bodies? What's going on with the people who couldn't pose in the right running position? Jens Foell, a psychology researcher at Florida State University thinks it has to do with proprioception: the way we perceive the existence and placement of our body. "Even if you wake up in a dark room and can't feel anything on your skin, you'll still have some information about the arrangement of your limbs," Foell says.

Proprioception happens on multiple levels. There is information that the brain has built in about where arms and legs are (that information is why some people experience phantom limb pain after an amputation; their brains still thinks the limb is there). And there is also information coming in from the extremities. As you wiggle your fingers, your brain gets information coming in about what that feels like. How much of each of those two things – our internal map and our sensory input – make up proprioception is still a bit of a mystery, Foell says. But they're both involved, and they both happen in the background of your perception when you're asked to think about running position. "If you stretch out your hand to grab a pen, you're not thinking in terms of muscle tension, coordination of bones, increased blood flow to those muscles, and so on," he says. The same goes for thinking about running. This is a common mistake when it comes to thinking about how we think about

movement, says Andrew Wilson, a psychology researcher at Leeds Beckett University in the U.K.

The standard story about learning goes something like this: You assemble a collection of pieces of information about a thing that builds to an internal representation of that thing. So as you learn to run, you're building a mental model of what running involves in your head – right arm goes forward, right leg goes back. Once you can accurately imagine the movement, you can tell your arms and legs to do it. But that's not actually how learning happens, Wilson says. "When I learned to run, I did *not* build an abstract store of knowledge about how to arrange my limbs which I then call upon when I want to do running related things."

Wilson also points out that there's a huge difference between asking someone to strike a running pose, and asking someone to run. "The only thing your postural systems cares about is staying upright, maintaining balance," he says. "Running is about dynamic balance; maintaining balance as your mass moves. This is why we run in a contralateral pose – that's how you balance out all the various forces and preserve your upright posture. Posing as if running is static balance." In other words, the body asked to pose and asked to run is acting on two very different requests.

Wilson says it's possible that when standing, the homolateral pose is just more stable, while the contralateral pose is far more like a yoga-balancing act. Wilson even tested this a bit after I sent him the paper. "I tried the postures out on myself and some colleagues and we all did the homolateral pose first. If I'm right, people are not making an error: They are correctly solving different tasks that require different solutions."

Q7. Which of the following is a reason why a running person is usually drawn improperly?

- ☐ a) **Running posture varies from person to person.**
- ☐ b) **Our brain finds it difficult to recollect the posture of a running person and draw at the same time.**
- ☐ c) The improper posture in which a running person is drawn has always been an artistic choice.
- ☐ d) **The way our brain recollects running posture is different from the way we actually run.**

Q8. Which of the following can be inferred to be true regarding contralateral pose and homolateral pose?

- ☐ a) **Contralateral pose is used when walking, while homolateral pose is used when running.**
- ☐ b) **Contralateral pose involves moving in tandem the hand and leg on one side of the body, while homolateral pose involves moving in tandem the hand and leg on opposite sides of the body.**
- ☐ c) **We use contralateral pose for running but, while drawing a running person, we tend to draw a person in a homolateral pose.**
- ☐ d) **Egyptians used contralateral pose for representing a running person, while Da Vinci used homolateral pose for the same.**

Q9. Which of the following cannot be inferred from the passage as a feature of proprioception?

- ☐ a) **Proprioception makes use of the information available in the brain regarding the position of limbs.**
- ☐ b) **Proprioception is the reason why people experience pain coming from limbs that are no longer there.**
- ☐ c) **Tactile feedback also contributes to proprioception.**
- ☐ d) **Proprioception is the way in which we perceive the position of our limbs.**

Q10. According to Wilson, what is the reason for people tending to pose incorrectly when asked to strike a running pose?

- ☐ a) To achieve balance when striking a running pose, the position of limbs needs to be different as compared to that when actually running.
- ☐ b) It is impossible to maintain balance when striking a running pose accurately.
- ☐ c) Proprioception is involved only when running but not when striking a pose.
- ☐ d) The incorrect posture of running represented by various artists has influenced people striking a running pose.

Q11. Which of the following is definitely not true, according to the author, about the way people learn to run?

- ☐ a) People first think about which limbs to move in order to propel themselves forward and then start moving the limbs in that predetermined sequence in order to run.
- ☐ b) People start to run without building any abstract model on how to move their limbs.
- ☐ c) People observe how other people run and try to mimic their movements in order to run.
- ☐ d) People start by learning how to walk first and then learn how to run.

Q12. What are the different tasks that Wilson refers to when he states that “They are correctly solving different tasks that require different solutions”?

- ☐ a) Running and walking
- ☐ b) Running, striking a running pose and walking
- ☐ c) Running and striking a running pose
- ☐ d) Running in a contralateral pose and running in a homolateral pose

DIRECTIONS for questions 13 to 18: The passage given below is followed by a set of six questions. Choose the best answer to each question.

Nuclear war. Climate change. Pandemics that kill tens of millions.

These are the most viable threats to globally organized civilization. They’re the stuff of nightmares and blockbusters – but unlike sea monsters or zombie viruses, they’re real, part of the calculus that political leaders consider everyday. And according to a new report from the U.K.-based Global Challenges Foundation, they’re much more likely than we might think.

In its annual report on “global catastrophic risk,” the nonprofit debuted a startling statistic: Across the span of their lives, the average American is more than five times likelier to die during a human-extinction event than in a car crash.

Partly that’s because the average person will probably not die in an automobile accident. Every year, one in 9,395 people die in a crash; that translates to about a 0.01 percent chance per year. But that chance compounds over the course of a lifetime. At life-long scales, one in 120 Americans dies in an accident.

The risk of human extinction due to climate change – or an accidental nuclear war – is much higher than that. The Stern Review, the U.K. government’s premier report on the economics of climate change, estimated a

0.1 percent risk of human extinction every year. That may sound low, but it also adds up when extrapolated to century-scale. The Global Challenges Foundation estimates a 9.5 percent chance of human extinction within the next hundred years.

And that number probably underestimates the risk of dying in any global cataclysm. The Stern Review, whose math suggests the 0.1-percent number, only calculated the danger of species-wide extinction. The Global Challenges Foundation's report is concerned with all events that would wipe out more than 10 percent of Earth's human population.

"We don't expect any of the events that we describe to happen in any 10-year period. They might – but, on balance, they probably won't," Sebastian Farquhar, the director of the Global Priorities Project, told me. "But there's lots of events that we think are unlikely that we still prepare for."

For instance, most people demand working airbags in their cars and they strap in their seat-belts whenever they go for a drive, he said. We may know that the risk of an accident on any individual car ride is low, but we still believe that it makes sense to reduce possible harm.

So what kind of human-level extinction events are these? The report holds catastrophic climate change and nuclear war far above the rest, and for good reason. On the latter front, it cites multiple occasions when the world stood on the brink of atomic annihilation. Most of these occurred during the Cold War.

Climate change also poses its own risks. As I've written about before, serious veterans of climate science now suggest that global warming will spawn continent-sized superstorms by the end of the century. Farquhar said that even more conservative estimates can be alarming: UN-approved climate models estimate that the risk of six to ten degrees Celsius of warming exceeds 3 percent, even if the world tamps down carbon emissions at a fast pace.

Other risks won't stem from technological hubris. Any year, there's always some chance of a super-volcano erupting or an asteroid careening into the planet. Both would of course devastate the areas around ground zero – but they would also kick up dust into the atmosphere, blocking sunlight and sending global temperatures plunging.

Yet natural pandemics may pose the most serious risks of all. In fact, in the past two millennia, the only two events that experts can certify as global catastrophes of this scale were plagues. The Black Death of the 1340s felled more than 10 percent of the world population. Eight centuries prior, another epidemic of the *Yersinia pestis* bacterium – the "Great Plague of Justinian" in 541 and 542 – killed between 25 and 33 million people, or between 13 and 17 percent of the global population at that time.

Q13. Why does the author mention "Across the span car crash" in para 3?

- ☐ a) To applaud the statistical work done by the UK Based Global Challenges Foundation and to indicate that Americans are very careful drivers.
- ☐ b) To suggest that human extinction can happen any time soon as humans are not adapted to climate change.
- ☐ c) To prove that an average person will not die in an automobile accident.
- ☐ d) To give an example of an alarming finding that there is more risk to human life from a worldwide catastrophe or disaster to human life than one specific localized incident.

Q14. Which of the following statements would the author of the passage most agree with?

- ☐ a) Politicians are constantly worried about the occurrence of natural calamities.
- ☐ b) People in general tend to underestimate the possibility of occurrence of global disasters ☐ c) Sea monsters and zombies are unreal threats to humans.
- ☐ d) Nuclear war and climate change are the only two global catastrophes that humans should be worried about.

Q15. According to the passage, which of the following would be the closest example of a “global catastrophic risk” or the “most viable threat” to globally organized civilization?

- ☐ a) A lady being killed on a highway by a truck.
- ☐ b) A tsunami that washes away a city in a matter of two days.
- ☐ c) A pogrom.
- ☐ d) A deadly virus that spreads around countries in a matter of five days.

Q16. Which of the following statements is not true as per the passage?

- ☐ a) For the average human, the probability of death in a car crash is less than that of human extinction.
- ☐ b) There has been an accretion to the percentage of risk of human extinction over the years.
- ☐ c) The chances that humans will become extinct in the next hundred years is more than the chance that they will survive.
- ☐ d) There is an accretion to the percentage of risk of a person dying in an automobile accident over a life-long scale.

Q17. Which of the following can be inferred about *The Stern Review* and the report of the *Global Challenges Foundation* as discussed in the passage?

- ☐ a) There is a lot of discrepancy between the two reports but *The Stern Review* is more erroneous than the report of the *Global Challenges Foundation* as the former does not take into account all factors of human extinction.
- ☐ b) Both reports might be reliable but they differ in the scale of their findings.
- ☐ c) The report of the *Global Challenges Foundation* is more reliable as it takes into account the data for a whole century whereas *The Stern Review* considers the data relevant to only one year.
- ☐ d) The report of the *Global Challenges Foundation* would also consider an event that would destroy about 9% of the human population even though it does not expect such an event to happen in a 10-year period.

Q18. Which of the following would the author be least likely to mention as an example of preparation for an “unlikely event”?

[Identify all that apply and enter the corresponding numbers in the input box given below. You must enter your answer in increasing order only. For example, if you think that (1) and (2) apply, then enter 12 (but not 21) in the input box].

- (1) Intensive preparation for a simple exam.
- (2) Reading the safety manual in an aircraft before its takeoff.
- (3) Wearing a helmet while riding a bike.
- (4) Taking vaccination for a pandemic disease which is likely to spread in one's area of residence.

DIRECTIONS for questions 19 to 21: The passage given below is followed by a set of three questions. Choose the best answer to each question.

The American Dream: to own your own business and not work for “The Man.” Unfortunately, some people have turned that dream into a nightmare by starting and operating an illegal business – usually dealing drugs, but nearly any illegal business fits into our discussions here. When I use “drug dealer,” it also applies to any illegal business. The nightmarish sides of an illegal business are the consequences which include the great risk, potential violence, impact on families, cost to society, and often prison. To stay away from prison and crime, felons and potential felons need a legal way to support themselves and their families.

Our prisons are filled with ex-drug dealers, most of whom were trying to make a living illegally, and nearly all of whom swear they’re never going back to prison or a life of crime. I know this because I met and became friends with many ex-criminals while serving a 10-month sentence at Leavenworth Federal Prison Camp for a white collar crime.

According to an important study, as of 2010 there were roughly twenty million living Americans that were ex-felons or ex-prisoners, which was projected to be around twenty-four million people as of 2014. Factor in the families of living ex-prisoners and you have a lot of people directly impacted by incarceration. Include the victims of their crime and you have an even larger number. Add the number of people in criminal enterprise who are not yet felons and who knows how many people are affected? A report by CNN on December 10, 2013 stated that one in every 108 adult males in the US were currently in jail. To fight a legacy of crime and recidivism we need to create ways current and former criminals can make money legitimately, but how? I believe showing (ex) criminals how to be successful in legal businesses will change the destiny of millions of people.

Mastering business skills will make you a success in any business if given the chance. Unfortunately, “the system” is stacked against folks with a criminal background. The sad fact is that most employers still discriminate against anyone with a criminal record, even if that means they are violating Federal Law. Who’s the criminal now? The U.S. Equal Employment Opportunity Commission says that:

An employer’s use of an individual’s criminal history in making employment decisions may... violate the prohibition against employment discrimination under Title VII of the Civil Rights Act of 1964, as amended.

Many criminals and ex-cons don’t have formal education or training and often cannot get jobs earning enough to support themselves or their families. In jail it’s not always possible to get education or training beyond a G.E.D. which doesn’t help prepare you to get a well-paying career. Since it is difficult for ex-cons and others who have operated illegally to get jobs, much less well-paying jobs, it is likely they would return to a life of crime to support themselves and their families.

Q19. Which of the following group of people is not mentioned in the passage as being affected due to incarceration?

- ☐ a) **Ex-felons and ex-prisoners**
- ☐ b) **Families of the criminals who are not yet incarcerated**
- ☐ c) **Families of ex-prisoners**
- ☐ d) **Victims of crime**

Q20. As can be understood from the passage, which of the following is not one of the reasons why ex-felons are likely to return to a life of crime?

- ☐ a) **People without a criminal record are preferred over those with a criminal record by most employers.**
- ☐ b) **Most of the people with a criminal record do not have any formal training which will make them employable.**
- ☐ c) **People with criminal records do not have the ability to master business skills.**
- ☐ d) **Education and training provided in jail is inadequate for the prisoners to get jobs**

Q21. What is the primary purpose of the passage?

- ☐ a) **To emphasize the difficulties involved in ex-felons trying to earn their living legally.**
- ☐ b) **To analyse the reasons why ex-drug dealers return to a life of crime.**
- ☐ c) **To indicate how the legal system does not favour ex-criminals.**
- ☐ d) **To present various social aspects of the life of ex-prisoners after they are released from prisons**

DIRECTIONS for questions 22 to 24: The passage given below is followed by a set of three questions. Choose the best answer to each question.

Each day presents fresh evidence of just how fragile public confidence is in leaders worldwide. The spectacle of the most negative and demeaning U.S. presidential campaign in memory falls neatly into place alongside a diverse mix of homegrown spectacles of public distrust and disaffection with leadership around the world (think Brazil, Mexico, Russia, South Africa, Malaysia). And now we have the Panama papers, upending overnight the fortunes of a long list of the world's "leaders."

Interestingly, not every electorate appears to be reacting to news of their leaders' perceived misconduct in quite the same way. Icelandic Prime Minister Sigmundur Davio Gunnlaugsson was sent packing after 3% of the country's population marched on the Parliament (the equivalent of what in the US would have amounted to a march of 10 million Americans). At the same time, for example, Britain's PM David Cameron and Argentina's new President Mauricio Macri's dubious distinction of making it into Panama print seems to have met little public outcry. Admittedly, part of this distinction might be explained by the differing nature of the alleged transgressions.

This is an age of no more secrets. It may well be, however, that large numbers of global electorates and citizens are becoming somewhat inured to scandal, having experienced the whiplash of multiple disappointments from leadership over time. It may well also be that it's not so much we're in the midst of a leadership corruption epidemic, as it is that technology enables more intense and continuous scrutiny of our public and private sector leaders. We know from reading the seamy entrails of history that so many of our historical heroic figures would

not have likely stood up well under today's intense scrutiny.

Regardless of the reason for diminished trust in our leaders and institutions, the stakes are enormous. We live in an era in which individuals and the institutions they lead are increasingly less "enabled" to conjure up and execute the decisions needed to help transform our society to meet the critical demands of the future. It is, indeed, a time of inspiring possibilities and sobering realities.

Q22. Which of the following can be inferred about corruption among leaders in the current age as compared to corruption among the leaders in the past?

- ☐ a) **The leaders in the current age are more corrupt than the leaders in the past.**
- ☐ b) **The leaders in the past could have been as corrupt as the leaders in the current age.**
- ☐ c) **While the leaders in the current age are less corrupt than the leaders in the past, the current technology exposes the corruption of the former.**
- ☐ d) **The leaders in the past and the leaders in the current age are equally corrupt.**

Q23. Which of the following is an example that illustrates the fragility of public confidence in leaders?

- ☐ a) **The resignation of Sigmundur Davio Gunnlaugsson**
- ☐ b) **The public outcry regarding David Cameron's appearance in the Panama Papers**
- ☐ c) **The public apathy regarding Muricio Macri making it into Panama print**
- ☐ d) **The march of 10 million Americans into the Parliament**

Q24. The author states that it is a time of "sobering realities" because

- ☐ a) **the public mistrust of its leaders dampens the growth prospects.**
- ☐ b) **the individuals and the institutions they lead are not critical about the demands of the future.**
- ☐ c) **the individuals and the institutions they lead are not capable of transforming our society.**
- ☐ d) **the corruption among the leaders makes it impossible to meet the critical demands of the future.**

Q25. DIRECTIONS *for questions 1 to 4:* In each of the following questions, there are sentences or fragments of sentences that form a paragraph. Identify and select the sentence(s) or fragments of sentence(s) that is/are correct in terms of grammar and usage, including spelling, punctuation and logical consistency. Select all that are correct:

- ☐ a) **The aggression that China has shown in the past few years in its vast territorial grab in the South China Sea terrified**
- ☐ b) **its neighbours and set it in a collision course with America, long the guarantor of peace in East Asia.**
- ☐ c) **This week, an international tribunal demolished China's vaguely defined claims thoroughly to most of the South China Sea.**
- ☐ d) **How Beijing reacts to this verdict is of the utmost geopolitical importance. If, in its fury, China flouts the ruling and**
- ☐ e) **continues its creeping annexation, it will be elevating brute force on international law as the arbiter of disputes among states.**

Q26. DIRECTIONS *for questions 1 to 4:* In each of the following questions, there are sentences or fragments of sentences that form a paragraph. Identify and select the sentence(s) or fragments of sentence(s) that is/are correct in terms of grammar and usage, including spelling, punctuation and logical consistency. Select all that are correct:

- ☐ a) In a clean room at the Airbus Defence & Space (ADS) factory north of London scientists are working on *LISA Pathfinder*
- ☐ b) a hexagon-shaped satellite, due to be launched next year. The aim of the ambitious space mission is to try,
- ☐ c) for the first time, to find and measure gravitational waves – ripples in space-time predicted around Einstein's general theory of relativity.
- ☐ d) If that's possible, not only would earthlings have farther evidence that the theory is true,
- ☐ e) but they should also, eventually, be able to locate black holes more accurately.

Q27. DIRECTIONS *for questions 1 to 4:* In each of the following questions, there are sentences or fragments of sentences that form a paragraph. Identify and select the sentence(s) or fragments of sentence(s) that is/are correct in terms of grammar and usage, including spelling, punctuation and logical consistency. Select all that are correct:

- ☐ a) Life science still hides less mysteries. How do migratory birds sense direction?
- ☐ b) How are molecules in the air perceived as a smell? How, precise, do tadpoles lose their tails?
- ☐ c) For years, scattered view of the fringes have attempted to explain such phenomena using quantum mechanics,
- ☐ d) a weird bit of physics that predicts oddities like particles being in multiple places at once,
- ☐ e) eerily connected across vast distances or tunnelling through seemingly insuperable barriers.

Q28. DIRECTIONS *for questions 1 to 4:* In each of the following questions, there are sentences or fragments of sentences that form a paragraph. Identify and select the sentence(s) or fragments of sentence(s) that is/are correct in terms of grammar and usage, including spelling, punctuation and logical consistency. Select all that are correct:

- ☐ a) Energy has been an economic bonanza for Texas in recent years, and a financial headache for its transport planners.
- ☐ b) The state recently forecast that maintaining the roads and bridges that serves its oil- and gasfields and wind farms,
- ☐ c) along with the rest of the state's vast network of highways, would outstrip dedicated transport revenues of \$5 billion a year.
- ☐ d) Relief, however, is on its way. On November 4th, Texan voters agreed to
- ☐ e) steer off \$1.7 billion of oil- and gas-production taxes towards the highway fund.

DIRECTIONS *for questions 5 to 8:* Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

Q29. (1) The farther down we go, the less we know: the floor of the Marianas Trench has been less studied than the surface of Mars.

(2) Modern oceanography divides the deep sea into three zones: the bathyal, the abyssal and the hadal.

(3) “What passes in those remote depths of the sea, we can scarcely conjecture,” wrote Jules Verne in 1870 – conscious that where science had been unable to reach, fantasy could prosper.

(4) What a cadence those terms form – each more profound than the last.

(5) Rereading Verne’s book, I’m reminded of how drastically it fails as a novel (scant plot, absurd ending), and how magnificently it succeeds as a magic-carpet ride.

DIRECTIONS for questions 5 to 8: Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

Q30. (1) On November 12th, the European Space Agency (ESA) announced that *Philae*, a robotic probe, had landed on its target, a 4km-wide comet called 67P/Churyumov-Gerasimenko.

(2) *Philae* was indeed down, but it was down in the wrong place, and suffering from a serious shortage of sunshine to boot.

(3) Moreover, the comet appears to be made of stiffer stuff than expected.

(4) But, as the minutes and hours passed, it became clear that things had not gone entirely to plan.

(5) As mixed successes go, it was a spectacular one.

DIRECTIONS for questions 5 to 8: Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

Q31. (1) But these farmers failed to establish themselves above 3000 metres until about 3600 years ago.

(2) But a paper just published in Science, by Chen Fahu and Dong Guanghui of Lanzhou University, shows a fascinating example of just that.

(3) That it permitted the population to expand its range as well is a more subtle point.

(4) That agriculture permitted the human population to expand its size is obvious.

(5) A new crop not only allowed people to colonize the highest reaches of Tibet, but let them do so at a time when the weather was actually getting colder.

DIRECTIONS for questions 5 to 8: Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

- Q32.** (1) Its host does not know it yet, but inside his or her body this long white parasite is reproducing and growing.
- (2) Then slowly, excruciatingly, she will break through the skin of her host's foot and release her larvae.
- (3) It is just possible that the most important guinea worm in history has already found its home.
- (4) The worm feeds on this vicious cycle as much as it feeds on its human host.
- (5) Through the next few months, as millions of her ancestors have done before, she will feed and strengthen in the host's body.
-

DIRECTIONS for questions 9 to 12: The sentences given below, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number (1, 2, 3, 4 or 5). Decide on the proper order for the sentences and select the correct answer choice for the question given below the five sentences.

- Q33.** (1) That was when the magazine *Popular Electronics* ran a cover story on an extraordinary machine called the Altair 8800.
- (2) They will tell you that date was January 1975.
- (3) The headline on the story read: "Project Breakthrough! World's First Minicomputer Kit to rival Commercial Models."
- (4) Why don't you talk to veterans of Silicon Valley and ask them to tell you the most important date in the history of the personal computer revolution?
- (5) The Altair 8800 was a do-it-yourself contraption that you could assemble at home.

Question:

33. What is the number of the sentence which will occupy the fourth position in the coherent paragraph?

- ☐ a) 1
- ☐ b) 2
- ☐ c) 3
- ☐ d) 5

34. Which position will sentence labelled 1 occupy in the coherent paragraph?

- ☐ a) **Second**
- ☐ b) **Third**

- ☐ c) **Fourth**
- ☐ d) **Fifth**

35. What is the number of the sentence which will conclude the coherent paragraph?

- ☐ a) **1**
- ☐ b) **2**
- ☐ c) **3**
- ☐ d) **5**

36. How many sentences are placed between sentences labelled 3 and 4 in the coherent paragraph?

- ☐ a) **3**
- ☐ b) **2**
- ☐ c) **1**
- ☐ d) **0**

DIRECTIONS for questions 13 to 16: In each question, the word in capitals is used in **five** different ways. Identify the option(s) in which the usage of the word is INCORRECT or INAPPROPRIATE and enter the number corresponding to the sentence(s) (in which the usage is INCORRECT or INAPPROPRIATE) in the input box provided below each question. [Note: Enter your answer in increasing order only. For example, if you think that sentences (1) and (3) are incorrect, then enter 13 (but not 31) in the input box].

Q37. FLUSHED

- (1) The army lobbed tear gas shells to flush out the terrorists.
- (2) Her cheeks, normally a pale shade, flushed when she overheard the embarrassing remarks.
- (3) The mason has to ensure that the marbonite tiles are flush on the ground.
- (4) Flushed up with patriotism, I decided to quit my job and join the movement against terrorism.
- (5) A recently conducted economic study indicates that there are flush times ahead for multi-brand retail.

DIRECTIONS for questions 13 to 16: In each question, the word in capitals is used in **five** different ways. Identify the option(s) in which the usage of the word is INCORRECT or INAPPROPRIATE and enter the number corresponding to the sentence(s) (in which the usage is INCORRECT or INAPPROPRIATE) in the input box provided below each question. [Note: Enter your answer in increasing order only. For example, if you think that sentences (1) and (3) are incorrect, then enter 13 (but not 31) in the input box].

Q38. BUCKLE

- (1) The prime minister was accused of buckling over to right-wing religious groups.
- (2) The old man's knees and legs buckled after the long walk and yet he buckled down and got on with the work.

(3) The bridge buckled during the heat wave and the railway engineers were called to fix a buckle in the railway track.

(4) The business buckled due to the poor leadership of the top management.

(5) The colt broke into a buckle.

DIRECTIONS for questions 13 to 16: In each question, the word in capitals is used in **five** different ways. Identify the option(s) in which the usage of the word is INCORRECT or INAPPROPRIATE and enter the number corresponding to the sentence(s) (in which the usage is INCORRECT or INAPPROPRIATE) in the input box provided below each question. [Note: Enter your answer in increasing order only. For example, if you think that sentences (1) and (3) are incorrect, then enter 13 (but not 31) in the input box].

Q39. RULE

(1) The option of realigning the metro railway route and starting from scratch has been ruled out.

(2) As a thumbs rule, two teaspoons of sugar are adequate for a large mug of coffee.

(3) The judge gave his rules in favour of the diplomat.

(4) In my company, excellence is the rule rather than the exception and you need to rule your temper in if you wish to climb the corporate ladder.

(5) He could afford to bend the rules with impunity because of his 'connections.'

DIRECTIONS for questions 13 to 16: In each question, the word in capitals is used in **five** different ways. Identify the option(s) in which the usage of the word is INCORRECT or INAPPROPRIATE and enter the number corresponding to the sentence(s) (in which the usage is INCORRECT or INAPPROPRIATE) in the input box provided below each question. [Note: Enter your answer in increasing order only. For example, if you think that sentences (1) and (3) are incorrect, then enter 13 (but not 31) in the input box].

Q40. TRY

(1) I need to try my hands out on surfing.

(2) The steep climb up the Jungfrau tried my every muscle, bone, nerve and sinew.

(3) My uncle allowed me to try on the car on the weekend.

(4) The murder case was tried in a new city with a new jury.

(5) The young child frequently tries his grandmother's patience.

DIRECTIONS for questions 17 to 20: Each of the following questions has a set of five sequentially ordered statements. Classify the statements into Facts, Inferences and Judgements based on the following criteria:

- Facts, which deal with pieces of information that one has seen, heard or read; which are known matters of direct observation or existing reality; which are open to discovery or verification (You need to represent such a statement with the number '1')

- Inferences, which are logical conclusions or deductions drawn about the unknown, on the basis of the known i.e. based on the knowledge of facts (You need to represent such a statement with the number '2')

- Judgments, which are opinions, or recommendations or estimates or anticipations of common sense or intention that imply approval or disapproval of persons, objects, situations and occurrences in the past, the present or the future (You need to represent such a statement with the number '3')

Key in the five numbers that best describe the set of five statements, as indicated above, in the correct sequential order in the input box provided below the question.

Q41. (i) Given the nature of our current discourse on climate change, the omission of veganism in Bill McKibben's approach to reducing greenhouse gas emissions might not seem a problem.

(ii) Vegans are still considered a sort of "out there," a fringe group of animal rights activists with pasty skin and protein issues.

(iii) However, ignoring veganism in the fight against climate change is sort of like ignoring fast food in the fight against obesity.

(iv) Forget about ending dirty coal or natural gas pipelines.

(v) As the WPF report shows, veganism offers the single most effective path to reducing global climate change.

Q42. (i) The Golden Compass is writer-director Chris Weitz's adaptation of the first volume of Philip Pullman's epic fantasy trilogy *His Dark Materials*.

(ii) There's a lot to like about Weitz's adaptation, and while not all of it has to do with the fussed-over production design and relentless Computer Generated Imagery effects, more of its virtues are tied up in those than should be.

(iii) As if it's afraid to stop for a single moment of reflection, the film rushes from one lushly realized setting to the next, letting characters talk about plot developments between the occasional action setpiece.

(iv) I believe that it's more *Phantom Menace* than *Return Of The King*, and the clipped pace never lets us get to know the characters we're supposed to care about.

(v) Things pick up towards the end, but the film ends just as it starts to find its groove, and without committing to the skeptical humanism and challenges to religion that define Pullman's series.

Q43. (i) Tesserae refer to small pieces of coloured stone, glass, ceramic or other hard material cut in a cubical or other regular shape and are frequently used in mosaic work.

(ii) Stone tesserae remained dominant in mosaics of Roman times, but between the 3rd and 1st centuries B.C., tesserae of *smalto*, or coloured glass, also began to be produced, cut from large slabs of glass that ranged from lightly tinted to opaque.

(iii) These relatively fragile glass tesserae were likely used in floor mosaics to provide pure blues, reds, and greens that could not be found in the more durable natural stone.

(iv) Glass was the major material for wall and vault mosaics of Early Christian and Byzantine churches, and marble and limestone tesserae were frequently used in the depiction of faces, woollen garments, rocks, and other objects that required a soft or rough appearance.

(v) There's something inherently illusionistic in the plagiaristic intent behind early mosaics which employed tesserae to achieve the fineness of detail that allowed for the copying of paintings or painterly effects.

Q44. (i) Though I can't call it the world's fastest browser as I think that Chrome and Safari are just as fast, the new Firefox is no longer a lumbering beast.

(ii) It launches quickly, fires up complex sites like Gmail and Google Maps without any hiccups, and runs tons of open tabs without crashing.

(iii) For much of the last year, as Microsoft, Google, and Apple released great new browsers, I'd been sticking with Firefox mainly out of a misguided sense of loyalty to its progressive manifesto but not any more.

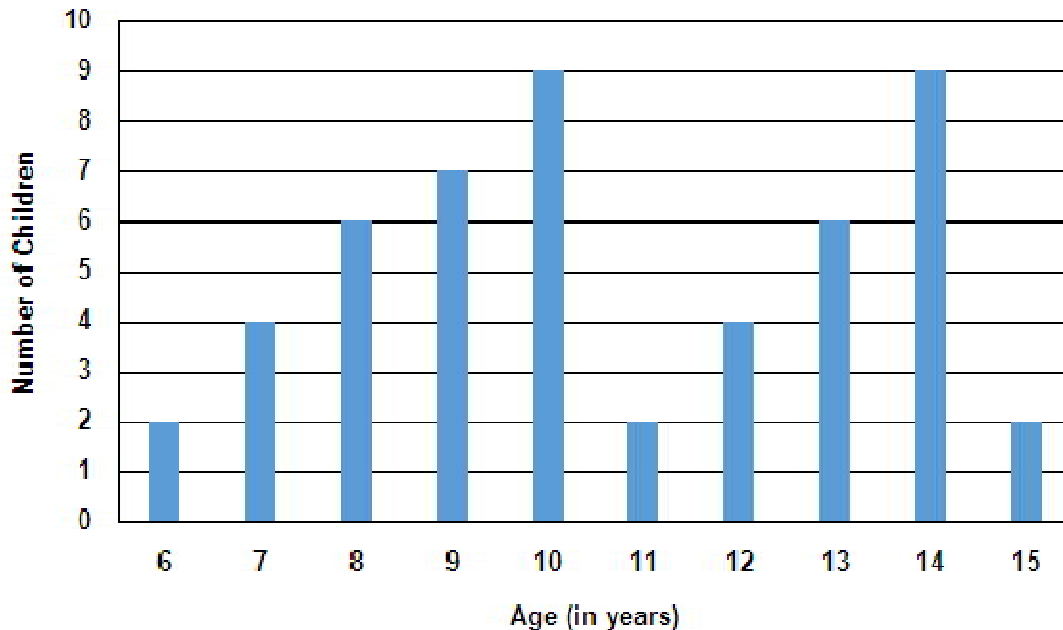
(iv) Firefox 3.5 offers the best implementation of the standard – and because it's the second-most-popular Web browser in the world, the new release is sure to prompt Web designers to create pages tailored to the Web's new language.

(v) In other words, Firefox isn't just an upgrade for your computer; it could well prompt a re-engineering of the Web itself.

DILR

DIRECTIONS for questions 1 to 3: Answer these questions on the basis of the information given below.

The children at a summer camp are ranked based on their ages (in completed years) such that the rank of any child is equal to one more than the number of children whose ages (in completed years) are lesser than his age (in completed years). The following chart gives the age-wise distribution of the children at the summer camp:



Q1. DIRECTIONS for questions 1 and 2: Type in your answer in the input box provided below the question.

What is the rank of a child whose age is 11 years?

Q2. DIRECTIONS for questions 1 and 2: Type in your answer in the input box provided below the question.

What is the age (in completed years) of a child ranked 35?

Q3. DIRECTIONS for question 3: Select the correct alternative from the given choices.

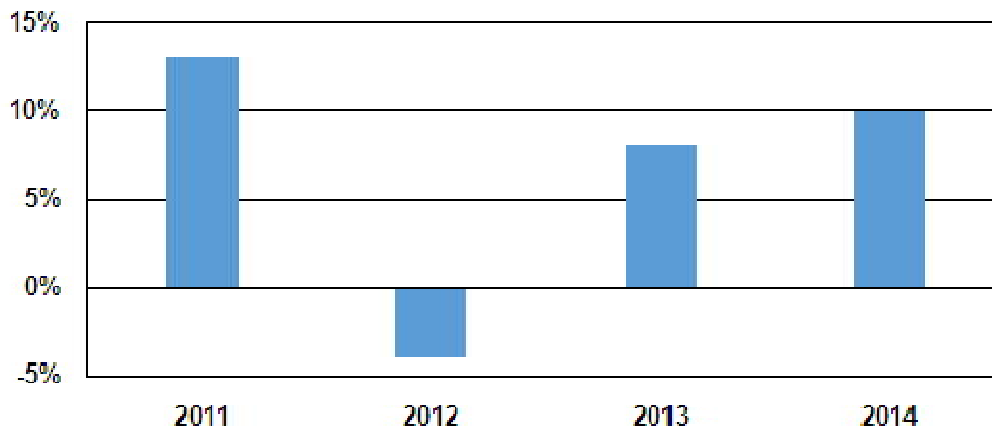
What is the median of the ages (taken in completed years) of all the children at the summer camp?

- ☐ a) 9 years
- ☐ b) 10 years
- ☐ c) 9.5 years
- ☐ d) 11 years

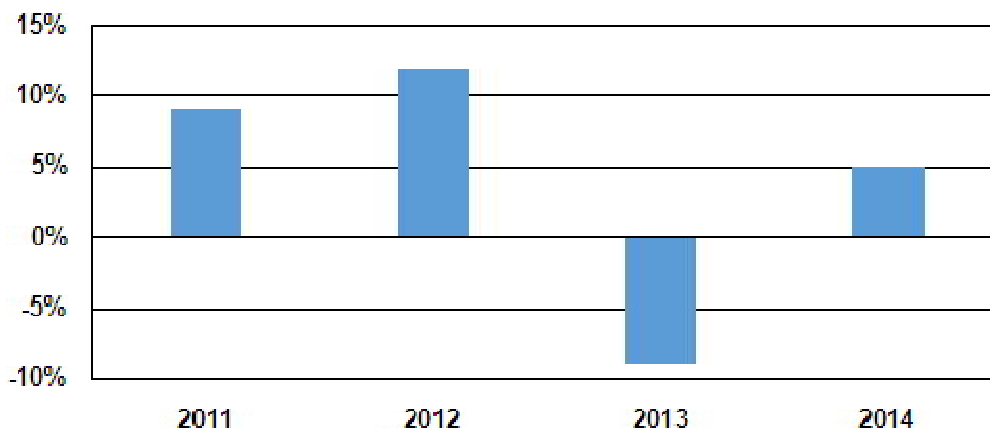
DIRECTIONS for questions 4 to 6: Answer these questions on the basis of the information given below.

The Total Cost of a company, in any year, comprises three different costs, Raw Material, Utility and Salary. The graphs below present the percentage change relative to the previous year for each of the three different costs from 2011 to 2014. Further, it is also known that, in 2010, Raw Material Cost, Utility Cost and Salary Cost accounted for 50%, 20% and 30% of the Total Cost.

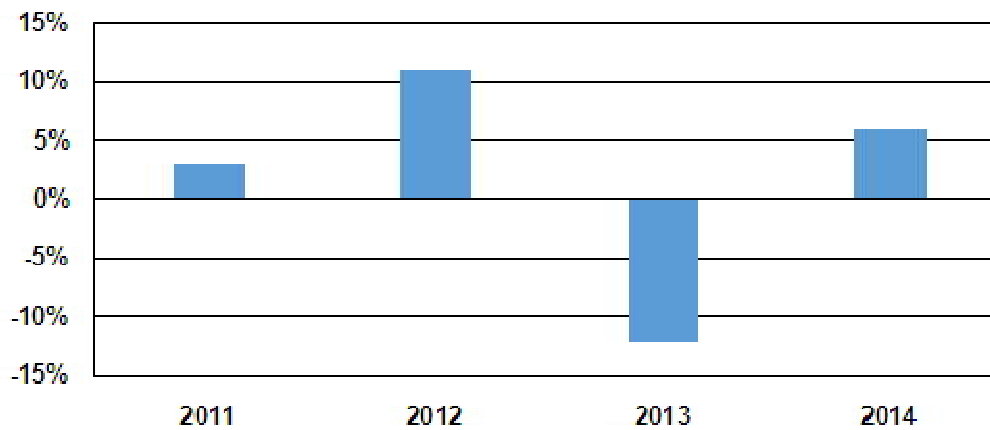
Raw Material



Utility



Salary



Q4. DIRECTIONS for questions 4 to 6: Select the correct alternative from the given choices.

The total cost of the company was the highest in which of the following years?

- ☐ a) 2011
- ☐ b) 2012
- ☐ c) 2013
- ☐ d) 2014

Q5. DIRECTIONS for questions 4 to 6: Select the correct alternative from the given choices.

The percentage increase/decrease in Utility Cost from 2012 to 2014 was

- ☐ a) **-2.51%.**
- ☐ b) **-4.45%.**
- ☐ c) **-7.89%.**
- ☐ d) **3.21%.**

Q6. DIRECTIONS for questions 4 to 6: Select the correct alternative from the given choices.

In 2014, the Raw Material Cost as a percentage of Total Cost was approximately

- ☐ a) **51%.**
- ☐ b) **54%.**
- ☐ c) **58%.**
- ☐ d) **61%.**

DIRECTIONS for questions 7 to 10: Answer these questions on the basis of the information given below.

Subramanyam, a cartographer, measures the distances of roads in three units – Surveyor’s Kilometre (SKM), Surveyor’s Mile (SM) and Nautical Mile (NM). He had four instruments – Instrument I, Instrument II, Instrument III and Instrument IV – that measure the distance between any two points. Instrument I and Instrument II measure the distance in SKM and SM respectively, while both Instrument III and Instrument IV measure the distance in NM. Each of the instruments measures any distance to a high degree of accuracy, However, Instrument I, Instrument II and Instrument III display the distance rounded off only to the nearest SKM, nearest SM and nearest NM respectively, while Instrument IV displays the distance rounded off to the nearest one-tenth (i.e., the first decimal place) of an NM.

On a particular day, Subramanyam used these instruments to measure the lengths of six Road Segments – A through F. For each road segment, the table below provides the distance displayed by each of Instrument I, Instrument II and Instrument III.

It is known that the instruments use the following rules for rounding off while displaying the distances:

In order to round off any number, say $(x + n)$, where x is the integral part and n is the decimal part, to the nearest whole number, the number is rounded off to x , if $n < 0.5$ and to $(x + 1)$, if $n \geq 0.5$.

In order to round off any number to the first decimal place, the number is first multiplied by 10, after which the above rule is applied and the result, thus obtained, is finally divided by 10.

Consider the following conversion ratios to hold between SKM, SM, and NM:

One SKM = 0.5 NM

One SM = 0.9 NM

Road Segment	Instrument I (SKM)	Instrument II (SM)	Instrument III (NM)
A	24	14	12
B	23	13	11
C	37	20	18
D	21	11	10
E	33	19	17
F	30	16	15

Q7. DIRECTIONS *for questions 7 to 10:* Select the correct alternative from the given choices.

What is the length of Road Segment E as displayed by Instrument IV?

- ☐ a) 16.6 NM
- ☐ b) 16.7 NM
- ☐ c) 16.8 NM
- ☐ d) 16.9 NM

Q8. DIRECTIONS *for questions 7 to 10:* Select the correct alternative from the given choices.

If the sum of the lengths of the six road segments as displayed by Instrument IV is 83.6 NM, what is the length of the longest Road Segment as displayed by Instrument IV?

- ☐ a) 18.3 NM
- ☐ b) 18.4 NM
- ☐ c) 18.5 NM
- ☐ d) Cannot be determined

Q9. DIRECTIONS *for questions 7 to 10:* Select the correct alternative from the given choices.

For which of the following Road Segments is the difference between the lengths displayed by Instrument III and Instrument IV the lowest?

- ☐ a) Road Segment B
- ☐ b) Road Segment C
- ☐ c) Road Segment D
- ☐ d) Road Segment F

Q10. DIRECTIONS *for questions 7 to 10:* Select the correct alternative from the given choices.

Which of the following can be the actual length of Road Segment A?

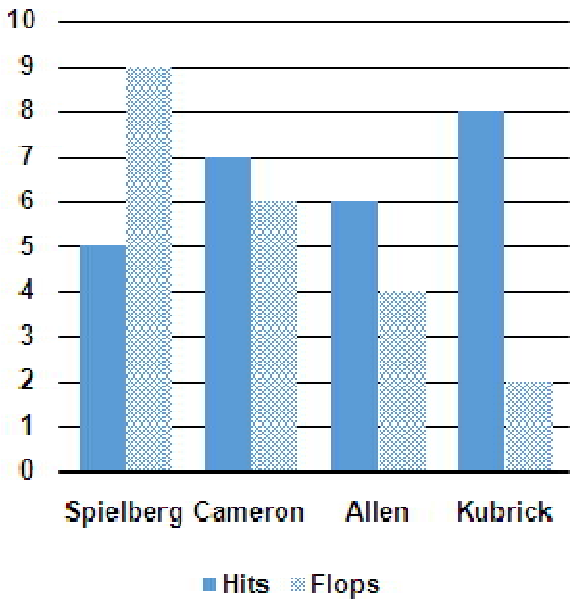
- ☐ a) 12.25 NM
- ☐ b) 12.12 NM
- ☐ c) 12.21 NM
- ☐ d) 12.5 NM

DIRECTIONS for questions 11 to 14: Answer these questions on the basis of the information given below.

A survey collected information about the number of movies directed by four different directors, Spielberg, Cameron, Allen and Kubrick, in the last decade. Each movie belonged to exactly one genre among Action, Sci-Fi, Comedy and Drama. Further, each movie was classified as either a Hit or a Flop based on its level of success. Each director directed at least one movie of each genre. It is also known that for each director, the number of movies of each genre that he directed is distinct.

The following information is known about the number of movies directed by the directors, classified according to the genre and the number of hits and flops of each director:

Director	Action	Sci-Fi	Comedy	Drama
Spielberg	6			
Cameron			2	
Allen		1	3	
Kubrick				4
TOTAL	12	16	8	11



Q11. DIRECTIONS for question 11: Select the correct alternative from the given choices.

How many Sci-Fi movies did Spielberg direct?

- ☐ a) 5
- ☐ b) 7
- ☐ c) 9

☐ d) **Cannot be determined**

Q12. DIRECTIONS for questions 12 and 13: Type in your answer in the input box provided below the question.

If the number of Drama movies directed by Spielberg is the same as the number of Action movies directed by Allen, what is the number of Action movies directed by Cameron?

Q13. DIRECTIONS for questions 12 and 13: Type in your answer in the input box provided below the question.

If the total number of Action movies that were hits is 4, and if the number of Drama movies directed by Allen is not the same as the number of Comedy movies directed by Kubrick, what can be the minimum possible number of Sci-Fi hits?

Q14. DIRECTIONS for question 14: Select the correct alternative from the given choices.

What is the number of Drama movies directed by Cameron?

- ☐ a) 1
- ☐ b) 2
- ☐ c) 3
- ☐ d) **Cannot be determined**

DIRECTIONS for questions 1 to 3: Answer these questions on the basis of the information given below.

Each of six persons – A through F – is a different professional among Author, Doctor, Lawyer, Nurse, Plumber and Teacher, not necessarily in the same order. There are exactly three females and three males among the six persons. The following information is known about their gender and their professions:

- (i) E, who is a male, is not a Plumber and the Teacher is a female.
- (ii) A is not a Teacher, while C is not a Lawyer.
- (iii) D is a Doctor and B is not a male.
- (iv) One of C and F, who are of the same gender, is an Author but neither of them is a Plumber.
- (v) The Lawyer is a female and B is not the Lawyer.

Q15. DIRECTIONS for questions 1 to 3: Select the correct alternative from the given choices.

What is the profession of B?

- ☐ a) **Plumber**
- ☐ b) **Teacher**

- ☐ c) Lawyer
- ☐ d) Nurse

Q16. DIRECTIONS for questions 1 to 3: Select the correct alternative from the given choices.

Which of the following is a profession of a person who is a female?

- ☐ a) Author
- ☐ b) Nurse
- ☐ c) Doctor
- ☐ d) Plumber

Q17. DIRECTIONS for questions 1 to 3: Select the correct alternative from the given choices.

Which of the following statements is true?

- ☐ a) The Author is a male.
- ☐ b) The Doctor is a female.
- ☐ c) E is a Lawyer.
- ☐ d) The Plumber is a male.

DIRECTIONS for questions 4 to 6: Answer these questions on the basis of the information given below.

Six persons, Naveen, Pavan, Raj, Tarun, Utsav and Vikas, are sitting around a circular table with eight equally spaced chairs. Of the eight chairs, two are empty. The following information is known about the positions of the six persons:

- (i) Naveen is not sitting opposite an empty chair but he is sitting adjacent to Utsav.
- (ii) Pavan is the only person sitting adjacent to Vikas.
- (iii) The two empty chairs are neither next to each other nor opposite each other.
- (iv) Each person has at least one person sitting adjacent to him.
- (v) Pavan, who is sitting to the left of Raj, is not sitting opposite Tarun.

Q18. DIRECTIONS for questions 4 to 6: Select the correct alternative from the given choices.

Which of the following persons is sitting opposite an empty chair?

- ☐ a) Vikas
- ☐ b) Utsav
- ☐ c) Pavan
- ☐ d) Cannot be determined

Q19. DIRECTIONS for questions 4 to 6: Select the correct alternative from the given choices.

If Naveen is sitting to the left of one of the empty chairs, who is sitting opposite Pavan?

- ☐ a) Naveen
- ☐ b) Utsav
- ☐ c) Vikas
- ☐ d) Cannot be determined

Q20. DIRECTIONS for questions 4 to 6: Select the correct alternative from the given choices.

For which of the following pairs of people can it be said that each person in the pair has the other person as their only neighbour?

- ☐ a) Vikas, Tarun
- ☐ b) Vikas, Pavan
- ☐ c) Utsav, Naveen
- ☐ d) Tarun, Raj

DIRECTIONS for questions 7 to 10: Answer these questions on the basis of the information given below.

Six runners – Amar, Balu, Chintu, David, Gautam and Himesh – participated in a race in which each runner started the race at a different time. During the race, some of the runners overtook other runners and finished in different relative positions from the ones they were in when they started. It is also known that, during the race, exactly two runners overtook one runner each, exactly one runner overtook two runners and no other runner overtook any other runner. Further, Amar, who was not the last to start the race, overtook only Himesh, but exactly one other runner started his race between Amar and Himesh. Also, Chintu, who started the race immediately after David, overtook two runners, one of whom was Gautam.

Q21. DIRECTIONS for questions 7 to 10: Select the correct alternative from the given choices.

Who was the first runner to finish the race?

- ☐ a) Himesh
- ☐ b) Amar
- ☐ c) Balu
- ☐ d) Chintu

Q22. DIRECTIONS for questions 7 to 10: Select the correct alternative from the given choices.

Who among the following overtook at least one other runner?

- ☐ a) David
- ☐ b) Himesh
- ☐ c) Gautam

☐ d) Balu

Q23. DIRECTIONS for questions 7 to 10: Select the correct alternative from the given choices.

Which runner was overtaken by two different runners?

- ☐ a) Gautam
☐ b) Himesh
☐ c) Balu
☐ d) None of them

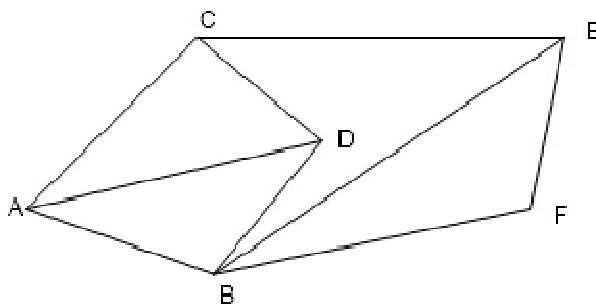
Q24. DIRECTIONS for questions 7 to 10: Select the correct alternative from the given choices.

Who was the last person to finish the race?

- ☐ a) David
☐ b) Chintu
☐ c) Gautam
☐ d) Himesh

DIRECTIONS for questions 11 to 14: Answer these questions on the basis of the information given below.

The diagram below shows the roads connecting six cities –A through F. However, all the roads in the diagram below were not opened for travel at the same time and any person can travel along any road only after the road is opened for travel. The roads AC, AB, BD, CE and BF were opened for travel at the beginning of 2011, the roads AD and EF were opened for travel at the beginning of 2012 and the remaining roads were opened for travel at the beginning of 2013.



Q25. DIRECTIONS for questions 11 to 13: Type in your answer in the input box provided below the question.

In 2011, in how many ways can a person travel from city A to city F without passing through any city twice?

Q26. DIRECTIONS for questions 11 to 13: Type in your answer in the input box provided below the question.

If, in 2012, a person travelled from city D to city E, what is the minimum number of cities that he must have passed through?

Q27. DIRECTIONS for questions 11 to 13: Type in your answer in the input box provided below the question.

What is the difference between the number of ways that a person can travel from city A to city F without passing through any city twice in 2012 and that in 2013?

Q28. DIRECTIONS for question 14: Select the correct alternative from the given choices.

The route taken by which of the following persons would not change in 2013 as compared to that in 2012, if each person passes through the minimum number of cities and does not pass through any city twice?

- ☐ a) A person travelling between city B and city E.
- ☐ b) A person travelling between city D and city F.
- ☐ c) A person travelling between city D and city E.
- ☐ d) A person travelling between city C and city D.

QA

Q1. Let \overline{x} and $[x]$ represent the fractional component of x and the greatest integer less than or equal to x , respectively, such that $x = [x] + \overline{x}$. If two functions $f: \mathbb{R} \rightarrow \mathbb{R}$ and $g: \mathbb{R} \rightarrow \mathbb{R}$ are defined by $f(x) = \overline{x}$ and $g(x) = \cos([x])$, the range of $g \circ f(x)$ is

- ☐ a) $\{0\}$.
- ☐ b) $\{1\}$.
- ☐ c) $\{-1, 1\}$.
- ☐ d) $[-1, 1]$.

Q2. The operators $\$$ and $\#$ are defined for real numbers x and y as follows:

(i) $x \$ y = x^y$, if both x and y are positive

$= y \# x$, otherwise.

(ii) $x \# y = (x + y)$, if xy is positive

$= (-1)^y$, otherwise

The value of $\{1 \$ [5 \$ (3 \$ 2)]\} \# (101.6 \# \log_{10} 0.1)$ is

- ☐ a) -1 .
- ☐ b) $\frac{2 + 10^{1.6}}{2}$.
- ☐ c) 1 .
- ☐ d) 0

Q3. The average age of class X is 24 years and that of class Y is 28 years. If a student aged ' a ' years is transferred from X to Y, the average age of only one class would not increase. Which of the following specifies the exact set of all the possible values of ' a '?

- ☐ a) $a \leq 24$
- ☐ b) $a \geq 28$
- ☐ c) $a \leq 24$ or $a \geq 28$
- ☐ d) None of the above

Q4. There are three arithmetic progressions – A, B and C – with the same common difference, whose terms are as follows:

A : a_1, a_2, a_3, \dots

B : b_1, b_2, b_3, \dots

C : c_1, c_2, c_3, \dots

If it is known that $b_m = a_1$, $\frac{a_m}{b_m} = \frac{6}{5}$, $c_n = b_1$ and $\frac{a_n}{b_n} = \frac{8}{7}$, find $\frac{a_1}{c_1}$.

- ☐ a) $5 : 1$
- ☐ b) $6 : 1$
- ☐ c) $7 : 2$
- ☐ d) Cannot be determined

Q5. A factory produces some units of a product over the seven days of a week, as per the following schedule:

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
120	180	170	240	160	150	130

At the end of any day, the finished goods can be transported to the market by a truck which can carry upto 1500 units of the product at a time. Any of the finished goods (ready at the end of the day) retained overnight at the factory will incur a storage cost of Rs.5 per unit for each night of storage. The hiring cost for the truck is Rs.1000 per day.

Which of the following schedules of days on which the truck is operated will result in the minimum value for the total cost of storage and transportation?

- ☐ a) 2nd, 4th, and 7th days.
- ☐ b) 2nd, 4th, 6th and 7th days.
- ☐ c) 2nd, 5th and 7th days.
- ☐ d) 3rd, 5th and 7th days.

Q6. There are two trees, each of height $8h$ meters, both of which grow continuously. Both the trees begin to grow at the same rate (in meters/min), but while the first tree continues to grow at that constant rate, the second one grows at a rate such that its rate of growth at any instant is proportional to its height at that instant. If the first tree grows to a height of $9h$ meters by the end of the first year, by what percentage does the height of the second tree increase by the end of eight years?

- ☐ a) 161.80%
- ☐ b) 171.83%
- ☐ c) 100%
- ☐ d) 176.84%

Q7. Raghu wants to construct a circular swimming pool in his plot which is in the shape of a trapezium. The lengths of the oblique sides of the plot are 26 m and 30 m. If the radius of the biggest circle that can be marked for the pool is 12 m, what must be the minimum area (in sq.m) of the plot?

- ☐ a) 336
- ☐ b) 672
- ☐ c) 728
- ☐ d) 1344

Q8. In the co-ordinate plane, what is the area (in sq.units) common to the two regions defined as $y \geq 2|x| - 6$ and $y \leq 6 - 2|x|$?

Q9. The area of a rectangle is 675 sq.cm. If both the length and the breadth (in cm) of the rectangle are integers, how many such rectangles are there, for which at least one of the dimensions is not a multiple of 3 and at least one of the dimensions is not a multiple of 5?

Q10. There is a sequence of numbers whose n^{th} term is t_n . It is given that $t_n = (t_{n-1} - 1)^2 + 1$, where n is a positive integer greater than 1. If $t_1 = 3$, what is the product of the first 10 terms of the sequence?

- ☐ a) $2^{1023} - 1$
- ☐ b) $2^{1024} - 1$

- ☐ c) $2^{512} - 1$
- ☐ d) $2^{2048} - 1$

Q11. Which of the following can be the product of the two numbers 134125XY06 and 85AB22?

- ☐ a) 114,747,111,990,332
- ☐ b) 1,147,471,111,990,332
- ☐ c) 1,147,471,111,990,832
- ☐ d) 1,147,451,111,099,032

Q12. A point P is 3 units away from the line $3x + 4y + k = 0$ (represented by L_1) and 4 units away from the line $4x - 3y + \ell = 0$ (represented by L_2). The reflection of the point P on L_1 is P_1 ; the reflection of P_1 on L_2 is P_2 ; the reflection of P_2 on L_1 is P_3 ; the reflection of P_3 on L_2 is P_4 . Find the area (in sq.units) of the figure formed by joining P_1, P_2, P_3 and P_4 .

- ☐ a) 48
- ☐ b) 96
- ☐ c) 24
- ☐ d) None of the above

Q13. Find the number of three-element sets of distinct positive integers $\{a, b, c\}$ such that $abc = 210$.

Q14. Find the number of positive integral solutions of $x_1 + x_2 + x_3 + x_4 = 20$, where $x_1 > x_2$.

Q15. Nagrath has a rectangular piece of land of dimensions 25 yards \times 20 yards. He was told to construct his house on a plot which has exactly four straight sides, all of which are equal in length. If Nagrath wants to mark and fence such a plot of the greatest possible area from out of his rectangular plot, what is the length (in yards) of the fence required?

- ☐ a) 88
- ☐ b) 80
- ☐ c) 82
- ☐ d) 84

Q16. For any real x , $-1 \leq x \leq 1$, if $\sin \theta = x$, then an inverse function $\sin^{-1}x$ is defined such that $\sin^{-1}x = \theta$. Similarly, inverse functions are defined for the other trigonometric functions. Now, if $\sin^{-1}x + \sin^{-1}(1 - x) = \cos^{-1}x$, then the possible value/s of $2x^2 - x + 1$ is/are

- ☐ a) 0.

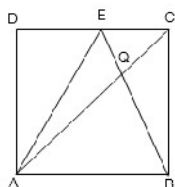
- ☐ b) $\frac{1}{2}$
- ☐ c) 1
- ☐ d) Both (B) and (C).

Q17. The coefficient of x^{11} in the expansion of $(x-1)(x-3)(x-5)\dots(x-23)$ is .

Q18. There are four magic boxes, A, B, C and D, which have 7, 2, 3 and 10 toffees respectively in them. If the number of toffees in these boxes double every second, then after 256 years the number of toffees in which of the following pairs of boxes will be closest to each other?

- ☐ a) A and B
- ☐ b) B and C
- ☐ c) C and D
- ☐ d) A and D

Q19. In the figure given below ABCD is a square. A triangle AEB is drawn with point E on CD.



If the diagonal AC intersects BE at Q, such that the area of triangle AQB = 10 sq.cm and that of triangle CQE = 5 sq.cm, then find the area of triangle AED.

- ☐ a) 10 sq.cm.
- ☐ b) 5 sq.cm .
- ☐ c) 8 sq.cm.
- ☐ d) Cannot be determined

Q20. When a number is written in the octal system, i.e., to the base 8, it has six digits. When the same number is written in the hexadecimal system, i.e., to the base 16, it has four digits. How many digits will the number have when written in the binary system?

- ☐ a) 15
- ☐ b) 14 or 15
- ☐ c) 16
- ☐ d) 13 or 14

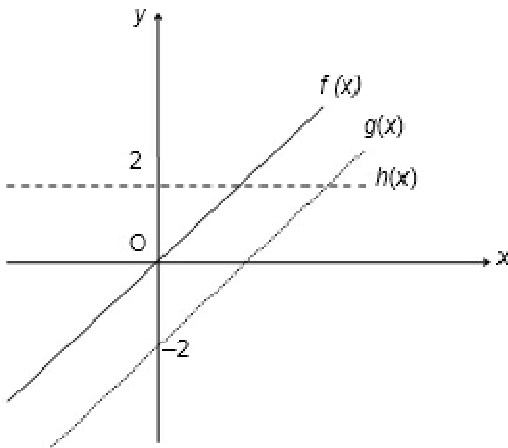
Q21. A piece of work can be done by 11 men and 16 boys in 2 days. If the same work can be done by 5 men and 11 boys in 4 days, in how many days can 1 man and 4 boys complete the same work?

- ☐ a) $16\frac{2}{5}$
- ☐ b) $20\frac{1}{2}$
- ☐ c) $41\frac{1}{4}$
- ☐ d) $14\frac{3}{5}$

Q22. A person has five tickets of a lucky draw for which a total of 12 tickets were sold and exactly six prizes are to be given. The probability that the person will win at least one prize is

- ☐ a) $\frac{61}{132}$
- ☐ b) $\frac{131}{132}$
- ☐ c) $\frac{31}{132}$
- ☐ d) $\frac{11}{12}$

Q23. Study the following graph and pick the correct statement from the choices.



- ☐ a) $f(x) + g(x) + h(x) = 0$
- ☐ b) $f(x) + g(x) = h(x)$
- ☐ c) $g(x) + h(x) = f(x)$
- ☐ d) $f(x) - g(x) + h(x) = 0$

Q24. If $x = \sqrt{2} - 1$, then the value of $x^4 + 4x^3 + 6x^2 + 4x + 7$ is

- ☐ a) $(\sqrt{2} - 1)^4$

- ☐ b) $4 + 4\sqrt{2}$.
- ☐ c) 6.
- ☐ d) 10.

Q25. All the possible five-digit numbers are formed using only the digits 4, 5 and 6. How many of them will have at least two fives?

DIRECTIONS for questions 26 and 27: Answer the questions on the basis of the information given below.

Let $S = \{a_1, a_2, a_3, a_4, \dots, a_{967}\}$, where $a_i = 1$ for all i ($1 \leq i \leq 967$). Now the following algorithm is performed upon the elements of S .

Step 1 : START

Step 2 : $k = 1$

Step 3 : $i = 1$

Step 4 : If remainder of $\left(\frac{i}{k}\right) = 0$, then $a_i = a_i \times (-1)$

Step 5 : $i = i + 1$,

Step 6 : If $i \leq 967$, go to step 4

Step 7 : $k = k + 1$

Step 8 : If $k \leq 967$, go to step 3

Step 9 : STOP

Q26. DIRECTIONS for question 26: Select the correct alternative from the given choices.

Find the value of a_{671} .

- ☐ a) 276
- ☐ b) 1638
- ☐ c) 1
- ☐ d) -1

Q27. DIRECTIONS for question 27: Type in your answer in the input box provided below the question.

Find the value of $a_1 + a_2 + a_3 + \dots + a_{967}$.

Q28. DIRECTIONS *for question 28:* Select the correct alternative from the given choices.

Given two points $P = (3, 0)$ and $Q = (0, 6)$, find the co-ordinates of the point A, lying on the line $x = -y$, such that the triangle PAQ has the least possible perimeter.

- ☐ a) $(1, -1)$
- ☐ b) $(-1, 1)$
- ☐ c) $\left(\frac{3}{2}, \frac{-3}{2}\right)$
- ☐ d) **None of the above**