VARC

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.

In his seminal 1950 paper, Computing Machinery and Intelligence Alan Turing began by considering the question: “Can machines think?” He then went on to suggest that this question is difficult to answer directly, and he turned it around into a research experiment that he called ‘The Imitation Game’, but which subsequent generations simply know as the Turing test for Artificial Intelligence.

The basis of the test is whether a person sitting at a terminal communicating with another person in one room and a computer in another room can tell, in a reasonable length of time, which of their correspondents is the computer and which is the human. If most people sitting at the terminal cannot get this right most of the time, then the computer is judged to have passed the Turing test.

It is worth remembering that Turing wrote this paper only two years after the world’s first operational electronic stored-program computer ran its first program in Manchester, on June 21, 1948. Indeed, it was this machine that brought Turing to Manchester, and it was during his time here that he wrote this paper. Turing thought that all that a machine would require to pass his test was more memory - the 1948 Manchester ‘Baby’ was quite powerful enough already. He estimated that a gigabyte (a thousand million bytes) of memory should suffice, and this should be achievable by the end of the twentieth century.

By the beginning of the 21st century computers did, indeed, typically have a gigabyte of memory, and they were a million times faster than the ‘Baby’, but still they could not pass his test. Even today, with still far more computing power and memory, no machine has convincingly passed the test. This would have surprised Turing had he lived to see it.

Although research into artificial intelligence (AI) has delivered in many areas of life - think of Google, talking to your smartphone, driverless cars, and so on, it has failed to deliver as expected, particularly by many imaginative science fiction writers, in the area known as Artificial General Intelligence. This is the idea that a suitably programmed machine might display aspects of intelligence that we normally associate only with humans. My take on the failure to deliver this form of AI is that we have never actually worked out what natural intelligence is, so we don’t know what it is that we are trying to imitate in our machines.

As a result, in my research I have gone back to the source of human intelligence – the human brain and tried to see how we might use computers to better understand this mysterious organ upon which we all so critically depend.

This line of thinking has led to the development of the SpiNNaker machine – shorthand for Spiking Neural Network architecture. This is a machine designed specifically to support computer models of systems that work in

some ways that are similar to the brain. It can be used to model areas of the brain and to test new hypotheses about how the brain might work. …
If we do build computers capable of mimicking human intelligence they will, at least initially, be the size of aircraft hangars and consume a million times more power than the rather neat version that you carry around in your head. So they would be a very inefficient substitute for the real thing.
Why then, you might reasonably ask, bother trying to build computer models of the brain at all? There are three answers to this question. Firstly, this is a very effective way to advance the science and the quest to understand our own brains and minds remains as one of the great frontiers of science. As the late, great scientist Richard Feynman once said: “What I cannot create, I do not understand.” Secondly, a computer model of the brain would be very useful for understanding diseases of the brain, which is vital for developing new treatments.
Thirdly, understanding the brain is likely to lead to insights that can be used to build better and more efficient computer systems. These three threads: future neuroscience, future medicine and future computing underpin the one billion euro European flagship Human Brain Project, in which SpiNNaker is playing its role.

Q1. According to the author, what is the reason that we are not able to create an effective Artificial General Intelligence?

a) We have not been able to completely understand Artificial Intelligence which is requisite for creating Artificial General Intelligence.
b) We do not understand how our own brains work and without this understanding, it is not possible to create an effective Artificial General Intelligence.
c) We first need to understand how natural intelligence helps computers to pass the Turing Test.
d) We have not been able to understand how the Turing test works which is critical for creating Artificial General Intelligence.

Q2. Which of the following functions does the SpiNNaker machine serve?
I. It helps in building models of areas of the brain.
II. It helps in understanding various brain diseases.
III. It helps improve the computing power of existing computer systems.

a) Only I
b) Only I and II
c) Only II
d) I, II and III

Q3. It can be inferred from the passage that Turing made a mistake in assuming that

a) computers will have a gigabyte of memory by the twentieth century.
b) we will be able to understand how our brains work by the twentieth century.
c) a large amount of memory is sufficient to pass the Turing test.
d) Artificial Intelligence can be achieved by the twentieth century.

Q4. Consider the situation given in the second paragraph of the passage. If ten persons took the Turing test multiple times, in which of the following situations can a computer be said to have passed the Turing test?

a) One person mistook the human correspondent for the computer and vice versa, every time he took the test, while the other nine correctly identified the human and computer correspondents every time they took the test.
b) The ten persons mistook the human correspondent for the computer and vice versa half the number of times, and correctly identified the human and computer correspondents half the time.
c) All the ten persons were able to correctly identify the human and computer correspondents each time they took the test.
d) One person correctly identified the human and computer correspondents most of the time, while the other nine mistook the human correspondent for the computer and vice versa every time they took the test.

Q5. According to the passage, which of the following is a feature of Artificial General Intelligence but not of Artificial Intelligence?

a) Making complex calculations faster than the average human.
b) Recognizing the meaning of the words spoken.
c) Exhibiting intelligence normally associated with humans.
d) Understanding the emotional state of a person from his/her voice.

Q6. Which of the following can be definitely inferred from the passage about Manchester ‘Baby’?

a) Manchester ‘Baby’ was the most powerful computer of its time.
b) Manchester ‘Baby’ had less than a gigabyte of memory.
c) Manchester ‘Baby’ was not able to pass the Turing test.
d) Manchester ‘Baby’ had a better chance of passing the Turing test than the machines of the 21st century.

DIRECTIONS *for questions 7 to 9:* The passage given below is followed by a set of three questions. Choose the best answer to each question.
Earth is in the midst of its sixth mass extinction: Somewhere between 30 and 159 species disappear every day, thanks largely to humans, and more than

300 types of mammals, birds, reptiles, and amphibians have vanished since 1500. These rates do not bode well for the future of life on our planet, but what if extinction wasn't permanent? What if we could resurrect some of the species we've lost? The two animals at the forefront of this discussion are the woolly mammoth, a hairy, close relative of the elephant that lived in the Arctic, and the passenger pigeon, a small, gray bird with a pinkish red breast once extremely common in North America.

There are three main approaches to de-extinction scientists talk about. The first, called backbreeding, involves finding living species that have traits similar to the extinct species. Then scientists would selectively breed these animals to try to make a version that more closely resembles the extinct animal – a process already underway for some extinct species like aurochs. This isn't really a true de-extinction, but it might still let us fill in missing ecological functions. In the case of mammoths, scientists might try to mate Asian elephants with more body hair than usual, for example.

A second option is cloning. Scientists would take a preserved cell from a recently extinct animal (ideally before the last of its kind died) and extract the nucleus. They would then swap this nucleus into an egg cell from the animal's closest living relative and implant the egg into a surrogate host. (Researchers actually did this in 2007, and a common goat gave birth to an extinct species, the *Pyrenean ibex*. The infant lived only 7 minutes however, because of genetic problems with its lungs.) Cloning may eventually give us basically identical genetic copies of extinct species, but we'll be restricted to animals that went extinct more recently and have well-preserved cells with intact nuclei. The mammoth and the passenger pigeon may never be cloned.

The newest option is genetic engineering. Here, researchers would line up the genome of an extinct animal with that of its closest living relative. They would then use CRISPR and other gene-editing tools to swap relevant genes from the extinct animal into the living species and implant the hybrid genome into a surrogate (or grow it in an artificial womb). This approach doesn't produce genetically identical copies of extinct animals, but rather modern versions of an animal engineered to look and behave like its extinct relatives. This is the technology being used by the mammoth and passenger pigeon groups.

Q7. Which of the following questions is answered in the passage?

a) Should we bring extinct species back?
b) How do you de-extinct an animal?
c) Which species should we revive if we want to do the most good for our planet's ecosystems?
d) How close are we to winning the game of de-extinction?

Q8. Which of the following choices can be inferred to be false from the passage?

a) Back-breeding and genetic engineering can result in an animal that closely resembles the extinct animal.
b) The mammoth and the passenger pigeon may never be cloned because they went extinct a very long time ago.
c) While the *Pyrenean ibex* has been developed from the animal's closest living relative, the common goat, the cloning technique isn't true de-extinction.
d) The genetic engineering technique has been attempted to resurrect the mammoth and the passenger pigeon while backbreeding has been employed for extinct species like aurochs.

Q9. Consider the statements given below as true:
"Humans killed off a lot of species over the last 10,000 years. Some resurrection is in order. A bit of redemption might come with it."
Which of the following would concur with the above ideas and the passage as a whole?

a) De-extinction is similar to remembering the Holocaust – our future generations will learn to preserve species.
b) De-extinction is just the next step in a progression that conservation has already been on.
c) Taking the closest living species one can get and adapting it based on the genome of the extinct species will help mankind earn its lost reputability and will restore the ecological function of an extinct species.
d) Humankind could do well to countermand some of its past sins by deciding to revive some of the extinct species.

DIRECTIONS *for questions 10 to 15:* The passage given below is followed by a set of six questions. Choose the best answer to each question.
"Loose lips sink ships" and "Keep mum – she's not so dumb" – the spirit of Second World War propaganda posters still animates the British response to terrorist atrocities. Lurking in the background is the idea that leakers are unpatriotic by their nature, and that telling the public concrete and inconvenient facts is almost treasonous. This is the obvious explanation for

the shock and outrage in the security establishment, and among politicians, at the publication of some of the details of the Manchester atrocity by the New York Times, which had them from sources in the American security community. Theresa May, Andy Burnham and Nicola Sturgeon have all claimed that the publication was undermining the pursuit of the criminals responsible. The American disclosures have been described as "unacceptable", a word which has come to mean its opposite: that this is something we are going to have to accept but only under noisy protest. The British police have stopped sharing their information on the Manchester bombing with their American counterparts. The damage to trust is real. It will not be undone by President Trump announcing that he wants the leakers caught and punished. In fact, the president's own recklessness with secrets may underlie some of the present disquiet among security professionals.
There are reasonable grounds for anger at the first leak, to an American news network, of the bomber's name. That is information which the police have very good reasons to keep quiet for a while, since it enables them to discover the friends and family of the criminal before the ones who might have something to hide can get round to hiding it. It also makes sense for any arrests and raids to be carried out without the presence of a journalistic scrum. Operational secrecy is sometimes necessary, and no responsible media organisation will hinder it. But the judgment of what constitutes operational secrecy will always be contested. British newspapers have in the past published stories about the CIA which the American media would not.
It is hard to see how the detailed information leaked to the New York Times hinders any investigation. Will Islamic State be strengthened by knowing the brand of rucksack that the bomber used? Such arguments are not entirely unfamiliar. The US media had published stories based on leaked British police investigations after the 7/7 London bombings in 2005. There will always be questions of taste and judgment in the choice of material to publish. There is a line beyond which crime photographs turn into a kind of exhibition of violence and increase the misery of grieving relatives and loved ones, but the pictures so far published do not approach that line.
It is important to distinguish between intelligence material, as handled by intelligence agencies and shared, in theory, only with carefully vetted groups, and the routine police databases to which tens of thousands of people have access, quite properly. They are much harder to shut down, and can sometimes be horribly abused. But nothing in the New York Times which has so far been published reveals secret intelligence sources or even hints at their existence.
This row was not confected. However, there are real questions to be answered about what was known about the bomber and when and by whom. What did the security services miss? What role was played by police cuts under Mrs May when she was home secretary? These are questions calling for calm deliberation, not angry demands for new powers to monitor the internet. This newspaper is on the side of greater openness. The police

and security services work for us, the citizens. They can't report to us directly but we must be free to report on them.

Q10. What is the primary reason why the "British police have stopped sharing their information on the Manchester bombing with their American counterparts"?

a) New York Times published information regarding the Manchester bombings which hindered the police investigation.
b) New York Times published leaked information regarding Manchester bombings.
c) President Trump is not seen as someone who can keep secrets by the British.
d) New York Times published the name of the bomber responsible for the Manchester bombings.

Q11. The author would most probably not support which of the following?

a) British newspapers publishing stories about the CIA.
b) Publishing pictures related to the 7/7 London bombings that are not insensitive.
c) Publishing the brand of the rucksack the bomber used.
d) American media publishing the name of the bomber.

Q12. Which of the following can be inferred from the passage about the information leaked by the New York Times?

a) The information published by the New York Times was in bad taste and exacerbated the misery of the victims' families.
b) The information that the New York Times obtained regarding the Manchester bombings was not a part of the routine police databases.
c) The New York Times published information to which tens of thousands of people already had access.
d) President Trump backed the publication of the information by the New York Times.

Q13. Which of the following views would be supported by the author as can be inferred from the passage?

a) The investigation of Manchester bombings should not be overshadowed by the outrage over the information leaks.
b) Newspapers should publish any information that they come across.

c) The content available to the public should be monitored by the government.
d) Newspapers should not publish pictures of violent crimes.

Q14. Which of the following can be inferred to be a feature of a responsible media organisation?

a) It should not publish information that it obtains through leaks from intelligence agencies.
b) It should recognise the importance of maintaining secrecy when required.
c) It should publish any information even if operational secrecy is violated.
d) It should publish only that information which is not relevant to any ongoing investigation.

Q15. The questions that the author asks in the last paragraph of the passage, “What did the security… home secretary?” will most probably help in

a) identifying the current whereabouts of the bomber.
b) understanding why the Manchester bombings were not averted.
c) understanding why the Manchester bombings happened.
d) identifying the role of newspapers in the investigation of Manchester bombings.

DIRECTIONS *for questions 16 to 18:* The passage given below is followed by a set of three questions. Choose the best answer to each question.

The Great Migration, or the relocation of more than 6 million African Americans from the rural South to the cities of the North, Midwest and West from 1916 to 1970, had a huge impact on urban life in the United States. Driven from their homes by unsatisfactory economic opportunities and harsh segregationist laws, many blacks headed north, where they took advantage of the need for industrial workers that first arose during the First World War. ...

After the post-Civil War Reconstruction period ended in 1876, white supremacy was largely restored across the South, and the segregationist policies known as Jim Crow soon became the law of the land. ... The Ku Klux Klan continued underground even after its official dissolution in 1869, and intimidation, violence and lynching of black southerners were common in the Jim Crow South.

After World War I broke out in Europe in 1914, industrialized urban areas in the North, Midwest and West faced a shortage of industrial laborers, as the war put an end to the steady tide of European immigration to the United States. With war production kicking into high gear, recruiters enticed African

Americans to come north, where the factory wage was typically three times more than what blacks could expect to make by working the land in the rural South.
By the end of 1919, some 1 million blacks had left the South. In the decade between 1910 and 1920, the black population of major Northern cities including New York, Chicago, Philadelphia and Detroit grew by large percentages. Many new arrivals found jobs in factories, slaughterhouses and foundries, where working conditions were arduous and sometimes dangerous. Female migrants had a harder time finding work, spurring heated competition for domestic labor positions.
Aside from competition for employment, there was also competition for living space in the increasingly crowded cities. While segregation was not legalized in the North (as it was in the South), racism and prejudice were widespread. After the U.S. Supreme Court declared racially based housing ordinances unconstitutional in 1917, some residential neighborhoods enacted covenants requiring white property owners to agree not to sell to blacks; these would remain legal until the Court struck them down in 1948.
As a result of housing tensions, many blacks ended up creating their own cities within big cities, fostering the growth of a new urban African-American culture. The most prominent example was Harlem in New York City, a formerly all-white neighborhood that by the 1920s housed some 200,000 African Americans. The black experience during the Great Migration became an important theme in the artistic movement known first as the New Negro Movement and later as the Harlem Renaissance, which would have an enormous impact on the culture of the era.

Q16. What was / were the primary reason(s) for the Great Migration to take place?

a) The blacks of the rural south of the United States did not want to work on the farms.
b) Because of World War I, there was a shortage of industrial workers in the north, midwest and west of the United States.
c) The blacks, dissatisfied with the deplorable economic conditions in the south, were attracted by the favourable economic opportunities available in the north of the United States.
d) Gender and racial equality was better in the north than in the south of the United States.

Q17. Which of the following statements can be inferred from the passage?

a) The Great Migration, which lasted for a period of more than fifty years, was initiated by Jim Crow and it transformed the demographics of America.
b) The Great Migration is the primary reason for the success of industrialization and the beginning of a new era of political activism and a new black culture in America.
c) The Great Migration paved the way for the equality of the blacks in all strata of life – there was no segregation of blacks and whites in the north as in the south.
d) As Chicago, New York and other cities saw their black populations expand exponentially in the 1910s, the migrants encountered poor working conditions, living space shortages, racism and prejudice.

Q18. Which of the following contributed most to the difficulty blacks faced in finding accommodation in the north, west and midwest of the United States as they migrated from the south?

a) In the north, west and midwest of the United States, segregation between the blacks and the whites was strictly enforced.
b) The demand for housing was much more than the supply.
c) Agreements were made prohibiting the sale of houses to blacks in white neighbourhoods.
d) Rising rents in segregated areas and a resurgence of the activities of the Ku Klux Klan after 1915, worsened black and white relations across the north, west and midwest of the United States.

DIRECTIONS *for questions 19 to 24:* The passage given below is followed by a set of six questions. Choose the best answer to each question.
Earth is poorly named. The ocean covers almost three-quarters of the planet. It is divided into five basins: the Pacific, the Atlantic, the Indian, the Arctic and the Southern oceans. Were all the planet's water placed over the United States, it would form a column of liquid 132 km tall. The ocean provides 3bn people with almost a fifth of their protein (making fish a bigger source of the stuff than beef). Fishing and aquaculture assure the livelihoods of one in ten of the world's people.
Humans have long assumed that the ocean's size allowed them to put anything they wanted into it and to take anything they wanted out. ... By the middle of the century, the ocean could contain more plastic than fish by weight. Ground down into tiny pieces, it is eaten by fish and then by people, with uncertain effects on human health. Appetite for fish grows nevertheless:

almost 90% of stocks are fished either at or beyond their sustainable limits. The ocean nurtures humanity. Humanity treats it with contempt. ...
Firstly, the bulk of the ocean is beyond the horizon and below the waterline. The damage being done to its health is visible in a few liminal places – the Great Barrier Reef or the oyster farms of Washington state. But for the most part, the sea is out of sight and out of mind. It is telling that there is only a single fleeting reference to the ocean in the Paris agreement on climate change.
A second problem is governance. The ocean is subject to a patchwork of laws and agreements. Enforcement is hard and incentives are often misaligned. Waters outside national jurisdictions – the high seas – are a global commons. Without defined property rights or a community invested in their upkeep, the interests of individual actors in exploiting such areas win out over the collective interest in husbanding them. Fish are particularly tricky because they move.
Third, the ocean is a victim of other, bigger processes. The emission of greenhouse gases into the atmosphere is changing the marine environment along with the rest of the planet. The ocean has warmed by 0.7°C since the 19th century, damaging corals and encouraging organisms to migrate towards the poles in search of cooler waters. Greater concentrations of carbon dioxide in the water are making it more acidic. That tends to harm creatures such as crabs and oysters, whose calcium carbonate shells suffer as marine chemistry alters. ...
“Ocean blindness” can be cured by access to information. Improvements in computing power, satellite imaging and drones are bringing the ocean into better view than ever before. Work is under way to map the sea floor in detail using sonar technology. On the surface, aquatic drones can get to remote, stormy places at a far smaller cost than manned vessels. Ocean-colour radiometry is improving understanding of how phytoplankton move and thrive. Tiny satellites, weighing 1-10kg, are enhancing scrutiny of fishing vessels: craft that switch off their tracking devices when they approach a marine protected area excite suspicion. As sea-floor soundings proliferate, the supervision of deep-sea mining should get better.
Clearer information may also help align incentives and allow private capital to reward good behaviour. Insurance firms, for instance, have an incentive to ask for more data on fishing vessels; if ships switch off their tracking systems, the chances of collisions rise, and so do premiums. Greater traceability gives consumers who are concerned about fish a way to press seafood firms into behaving responsibly.
Thanks to technology, the ocean’s expanse and remoteness are becoming less formidable – and less of an excuse for inaction. A UN meeting on the ocean next month in New York is a sign that policymakers are paying more attention to the state of the marine realm. But superior information does not solve the fundamental problem of enforcing property rights for the high seas. The effectiveness of incentives to take care of the ocean varies. Commercial

pay-offs from giving fish stocks time to recover, for example, are large and well-documented; but the rewards that accrue from removing plastic from the high seas are unclear.
Above all, better measurement of the effect of global warming on the ocean does not make a solution any easier. The Paris agreement is the single best hope we have as of now for protecting the ocean and its resources. But America is not strongly committed to the deal; it may even pull out. However, the limits agreed on in Paris will not prevent sea levels from rising and corals from bleaching. Indeed, unless they are drastically strengthened, both problems risk getting much worse.

Q19. It can be inferred from the passage that

a) The ocean stores more than nine-tenths of the heat trapped on earth by greenhouse-gas emissions and coral reefs are suffering as a result.
b) The author believes that the Paris Agreement is the only hope we have ever had in saving the corals of the oceans and America is ruining our chances.
c) Firms insuring fishing boats and ocean liners can, in their own way, play a role in ensuring that our oceans are saved.
d) We are aware of the benefits of removing plastic from water bodies but are unsure of the advantages of giving fish stocks time to recover by controlling fishing.

Q20. The author's tone in the last paragraph of the passage is

a) passionate.
b) pessimistic.
c) disparaging.
d) stoical.

Q21. Which of the following can help in curing the "ocean blindness" that has been discussed in the passage?
Identify all that apply and enter the corresponding number in the input box given below. You must enter your answer in increasing order only. For example, if you think (1) and (2) apply, then enter 12 (but not 21) in the input box.
(1) Creating time-lapse movies of sea life over tens of thousands of square kilometers.
(2) Satellite monitoring of the oceans.

(3) Acoustic techniques that produce pictures of the ocean's floor as well as its contents.
(4) Removing plastic from the high seas on a regular basis.
(5) Use of aquatic drones and ocean-colour radiometry.

Q22. Which of the following can complete and conclude the last paragraph of the passage?

a) Mankind is increasingly able to see the damage it is doing to the ocean. Whether it can stop it is another question.
b) Rather than filling the ocean, humankind has been working hard at emptying it.
c) If anything ought to be too big to fail, it is the ocean.
d) Why observe quotas if you think your neighbour can haul in catches with impunity?

Q23. The author of the passage attributes which of the following to the negative state of affairs of the oceans?

a) Our blatant disregard towards environmental issues such as carbon dioxide emissions and global warming.
b) Human nature which makes people protect only that as has been demarcated as theirs.
c) The current difficulty in studying and visualizing the effects of our actions on the oceans.
d) All of the above.

Q24. Why does the author suggest that the name "Earth" is incorrect for our planet?

a) We are increasingly worrying about the effect of our activities on water bodies but the lion's share of the Earth's surface has never been shown any such attention.
b) The oceans play a bigger role in promoting visibility by reflecting light than land does and oceans are fascinating things that make a planet far more habitable than land.
c) There is more water than there is earth in our world.

d) The oceans are the largest source of nutrition for mankind.

Q25. DIRECTIONS *for questions 25 to 28:* The sentences given below, when properly sequenced, form a coherent paragraph. Each sentence is labeled with a number (1, 2, 3, 4 or 5). Decide on the proper order for the sentences and key in the correct sequence as your answer in the input box given below the question.

1. Babies were placed in cooling blankets or packed in ice and even snow banks to slow circulation and reduce oxygen requirements before heart surgery.
2. Therapeutic hypothermia has become a part of surgical practice.
3. The babies are treated with cooling caps for 72 hours, which lower their metabolism just enough to reduce tissue oxygen requirements and allow the brain and other vital organs to recover.
4. today, physicians use moderate hypothermia as a staple of care for some newborns in medical distress, such as those born premature or suffering from fetal oxygen deprivation (hypoxia).
5. Experimental procedures with cooling started as early as the 1960s, mostly in cardiac and neonatal cases.

Q26. DIRECTIONS *for questions 25 to 28:* The sentences given below, when properly sequenced, form a coherent paragraph. Each sentence is labeled with a number (1, 2, 3, 4 or 5). Decide on the proper order for the sentences and key in the correct sequence as your answer in the input box given below the question.

1. This combination of vastness and vulnerability has left some people afraid of China and others afraid for it.
2. At the same time, China's recent financial tumult has been unnerving for the investors exposed to it.
3. The AIIB reflects China's new eagerness to institutionalise its official lending abroad, which has been generous but contentious.
4. China's growing global clout can be unsettling for the incumbents who must make room for it.
5. Both groups have found reason to worry about the Asia Infrastructure Investment Bank (AIIB), which has just held its initial annual meeting in Beijing and approved its first $509m-worth of projects.

Q27. DIRECTIONS *for questions 25 to 28:* The sentences given below, when properly sequenced, form a coherent paragraph. Each sentence is labeled with a number (1, 2, 3, 4 or 5). Decide on the proper order for the sentences and key in the correct sequence as your answer in the input box given below the question.

1. This could seriously weaken the operators' grip on their market, especially if Apple were to follow up by putting the new SIMs in iPhones or replacing them with software.
2. Some of Apple's latest iPads have a new type of SIM card that lets users switch easily between operators without replacing the card.
3. Apple revolutionized online music with the iPod and iTunes.
4. And the next set of businesses to have their applecarts overturned may be the mobile-telecoms operators.
5. It may be about to transform the payments business, given the successful launch last month of ApplePay.

Q28. DIRECTIONS *for questions 25 to 28:* The sentences given below, when properly sequenced, form a coherent paragraph. Each sentence is labeled with a number (1, 2, 3, 4 or 5). Decide on the proper order for the sentences and key in the correct sequence as your answer in the input box given below the question.

1. It takes nearly six months, on average, for a manuscript to wend its way from submission to publication.
2. The reason need not be a fatal flaw in the research; sometimes the work is simply not splashy enough for outlets high up in the pecking order.
3. Worse, before a paper is accepted by a journal, it is often rejected by one or more others.
4. But in the process, each journal's editors send the paper for peer review – appraisal by experts in the relevant field – in much the same way that each prospective purchaser of a house commissions his own survey.
5. Ask a researcher what annoys him most about scientific publishing, and slowness will come near the top of the list of gripes.

Q29. DIRECTIONS *for questions 29 to 32:* 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.

1. Seven decades later Galileo Galilei provided more direct proof of Earth's lack of specialness.
2. In 1543 Nicolaus Copernicus proposed, in a mathematically rigorous way, that the Earth is not the centre of the universe, and thus that all things do not revolve around it.
3. Jupiter belongs to a class of planets called gas giants and is a hostile place.
4. In fact, only the Moon does so.
5. He looked at Jupiter through a primitive telescope and found that the planet had four moons of its own, unlike earth, which just had one.

Q30. DIRECTIONS *for questions 29 to 32:* 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.

1. Then Polish delicatessens began to appear, selling herring and pierogi; then came Polish solicitors.
2. Gangmasters told stories about farm labourers picking cabbages at night, by the light of car headlamps.
3. But the Poles' most intriguing import, and the one that ought to cause native Britons to think hardest, is medical care.
4. They may not succeed in doing to the British medical market what Polish farm labourers did to England's fields but the attempt is worth watching.
5. The first thing Polish immigrants brought to Britain, when the country opened its doors to eastern European workers in 2004 was an admirable work ethic.

Q31. DIRECTIONS *for questions 29 to 32:* 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.

1. However, early diagnosis and treatment can help decrease the disruption to the person's life, family, and friendships.
2. These delusions also involve the misinterpretation of perceptions or experiences.
3. The main feature of this disorder is the presence of delusions, unshakable beliefs in something untrue or not based on reality.
4. Delusional disorder, previously called paranoid disorder, is a type of serious mental illness called a "psychosis" in which a person cannot tell what is real from what is imagined.
5. These delusions mainly involve situations that could occur in real life, such as being followed, poisoned, deceived, conspired against, or loved from a distance.

Q32. DIRECTIONS *for questions 29 to 32:* 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.

1. In most areas of life this miracle has been working magnificently: in America the number of hours of work that it takes to buy a car, or a wardrobe full of clothes, has halved in the past generation.
2. The last few years have seen a ferment of ideas for improving productivity in medicine and teaching.
3. Joseph Schumpeter argued that the miracle of capitalism lies in democratising wealth.
4. But in three big areas it has singularly failed to operate: health care, education and housing.
5. Elizabeth I owned silk stockings, he observed, but the “capitalist achievement” does not lie in “providing more silk stockings for queens but in bringing them within reach of factory girls.”

Q33. DIRECTIONS *for questions 33 and 34:* In the question, there are sentences, with each sentence having pairs of words, labelled (1) and (2) that are italicized and highlighted. In each sentence, from the pairs of italicized and highlighted words, select the appropriate word to form the correct sentence and then enter (in the input box provided below the question) the number corresponding to the appropriate words, in the same order that the pair of words appear in the question. For example, if you think that the

appropriate words for the sentences (i), (ii), (iii), (iv) and (v) are 1, 2, 1, 2 and 2 respectively, then enter your answer as 12122.

1. It was difficult for the team to ***reorganize (1)*** / ***regroup (2)*** and resume their campaign, after having lost the opening round.
2. He did not want to judge the case, as he was totally ***disinterested (1)*** / ***uninterested (2)*** in the issues involved.
3. He had an ***unexceptional (1)*** / ***unexceptionable (2)*** track record making him the ideal candidate.
4. The leader was ***pilloried (1)*** / ***pillaged (2)*** by the press for his unwitting remarks against a section of the people.
5. The birthday bash of the leader was an ***ostentatious (1)*** / ***ostensible (2)*** show of pomp and wealth.

Q34. DIRECTIONS *for questions 33 and 34:* In the question, there are sentences, with each sentence having pairs of words, labelled (1) and (2) that are italicized and highlighted. In each sentence, from the pairs of italicized and highlighted words, select the appropriate word to form the correct sentence and then enter (in the input box provided below the question) the number corresponding to the appropriate words, in the same order that the pair of words appear in the question. For example, if you think that the appropriate words for the sentences (i), (ii), (iii), (iv) and (v) are 1, 2, 1, 2 and 2 respectively, then enter your answer as 12122.

1. He was ***ambiguous (1)*** / ***ambivalent (2)*** about genetic engineering; sometimes highlighting its limitations and sometimes praising its achievements.
2. It has become quite common for advertisers of deodorants to depict their products as ones that hold ***sensual (1)*** / ***sensuous (2)*** appeal.
3. Favoured by those in authority for his ***complacent (1)*** / ***complaisant (2)*** attitude, he continued to rise over others who were more qualified.
4. With open arms the brave knight welcomed the ***quietus (1)***/ ***quietude (2)*** and stepped into the world of eternal glory.
5. The young student showed his utter displeasure on the ***sentient (1)*** / ***sententious (2)*** discourse given by his professor.

DIRECTIONS *for questions 1 to 4:* Answer these questions on the basis of the information given below.

In the game of basketball, when a player scores a goal, the points that the player scores for that goal depend on the distance between the player and the basket when he scored the goal. If this distance is at least 7 m, the player scores 3 points and if it is less than 7 m, the player scores 2 points. Further, the game, which lasts for exactly 24 minutes, is divided into four quarters, each lasting for exactly 6 minutes. The four quarters are separated by three breaks, each lasting for exactly three minutes. The timer stops whenever there is a break in the play. The team with the highest total number of points at the end of the fourth quarter wins the game.

Two teams, Atomic Supermen and Cascade Jaguars, played a game of basketball against each other. Given below are two tables, one for each team, giving the details of each goal scored by the team, the name of the player who scored the goal, the time into the game as shown by the timer (between 0:00 minutes and 24:00 minutes) when the goal was scored and the distance (in m) between the player and the basket:

Atomic Supermen		
Player	Time (mm:ss)	Distance (m)
Alex	01:00	6.5
Max	02:15	6.3
Alex	03:16	2.1
Glenn	05:16	10.3
Max	06:19	5.4
Rick	07:14	7.2
Glenn	10:01	7.9
Don	12:10	4.2
Glenn	13:15	8.5
Glenn	16:15	6.8
Rick	16:54	7.1
Rick	17:45	5.5
Don	18:54	6.1
Don	21:21	1.2
Max	23:15	11.5

Cascade Jaguars		
Player	Time (mm:ss)	Distance (m)
Hugh	00:15	1.5
Hugh	01:26	2.6
Hugh	04:16	5.4
Barry	08:23	7.1
Bob	10:10	8.6
Jack	11:14	9.4
Hugh	11:24	5.6
Allen	14:19	7.3
Allen	15:45	8.5
Hugh	17:21	4.5
Bob	19:29	9.7
Bob	20:35	10.5
Jack	22:14	12.8
Allen	23:10	11.5

Q1. DIRECTIONS *for questions 1 to 4:* Select the correct alternative from the given choices.
In which quarter were the maximum number of points scored by the two teams combined?

a) First quarter
b) Second quarter
c) Third quarter
d) Fourth quarter

Q2. DIRECTIONS *for questions 1 to 4:* Select the correct alternative from the given choices.
What is the total number of points scored by the team that won the game?

a) 34
b) 35
c) 36
d) 37

Q3. DIRECTIONS *for questions 1 to 4:* Select the correct alternative from the given choices.
Which player scored the highest number of points?

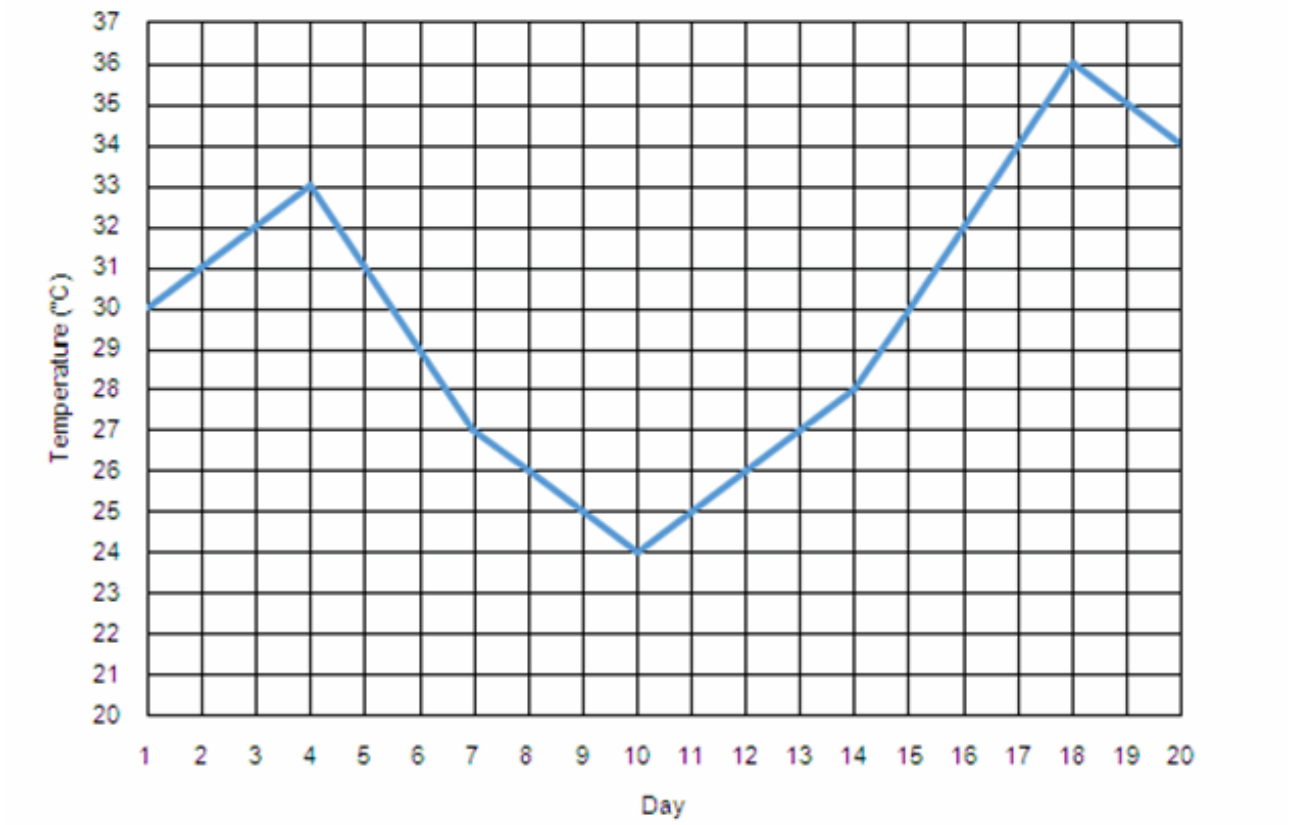
a) Hugh
b) Glenn
c) Bob
d) None of the above

Q4. DIRECTIONS *for questions 1 to 4:* Select the correct alternative from the given choices.
For which player is the average distance from which he scored a goal the highest?

a) Bob
b) Glenn
c) Max
d) None of the above

DIRECTIONS *for questions 5 to 8:* Answer these questions on the basis of the information given below.
Hari works in the Meteorological Department and he has to measure the temperature (in °C) at 9:00 AM every day. However, during a certain period of twenty days, from Day 1 to Day 20, Hari measured the temperature on only ten days. He then plotted the ten points on a graph sheet and connected

consecutive points on the graph using straight lines, forming a line graph. The line graph that Hari made is presented below:



Further, it is also known that
(i) the difference in temperature between any two consecutive measurements that Hari took was not more than 4°C.
(ii) the difference in the temperature measured by Hari for the third time and for the fourth time was 4°C.
(iii) the second measurement that Hari took was the same as the eighth measurement that he took.

Q5. DIRECTIONS *for questions 5 to 7:* Select the correct alternative from the given choices.
On which of the following days did Hari measure the temperature?

a) Day 2
b) Day 17
c) Day 6
d) More than one of the above

Q6. DIRECTIONS *for questions 5 to 7:* Select the correct alternative from the given choices.
What is the average of the temperatures measured by Hari during the ten days?

a) 30.5°C

b) 30.2°C
c) 30.3°C
d) 30.4°C

Q7. DIRECTIONS *for questions 5 to 7:* Select the correct alternative from the given choices.
If the average temperature at 9:00 AM from Day 1 to Day 4 is 30°C, what is the temperature at 9:00 AM on Day 2?

a) 25°C
b) 28°C
c) 31°C
d) Cannot be determined

Q8. DIRECTIONS *for question 8:* Type in your answer in the input box provided below the question.
What is the difference (in °C) between the fifth measurement and the ninth measurement that Hari took?

DIRECTIONS *for questions 9 to 12:* Answer these questions on the basis of the information given below.
Five persons, Alicia, Bob, Chuck, Derek and Eleanor, were marooned on an island. Each person, among the five, was from one of the two countries – Veritum, in which everyone always speaks the truth, and Mendacium, in which everyone always lies. Further, it is known that at least one person is from each country.
In the island, there were four trees each bearing fruits of a different type among – Apples, Bananas, Cherries and Kiwis. Each tree is present in a different part of the island among North, South, East and West. The five people searched the island for some time and met afterwards. They made the following statements:
Alicia: I found Cherries on the Northern part of the island.
Bob: I found Bananas on the Eastern part of the island.
Chuck: Alicia always lies.
Eleanor: I found Bananas on the Southern part of the island.
Chuck: Derek always lies.
Bob: I found Apples in the Northern part of the island.
Chuck: I found Cherries in the Southern part of the island.
Derek: I found Apples on the Western part of the island.
Alicia: I found Kiwis in the Eastern part of the island.

Q9. DIRECTIONS *for questions 9 to 12:* Select the correct alternative from the given choices.

If Alicia is from Veritum, then Apples are present in which part of the island?

a) West
b) East
c) South
d) North

Q10. DIRECTIONS *for questions 9 to 12:* Select the correct alternative from the given choices.
If the Kiwis are present in the Western part of the island, who among the following is definitely from Veritum?

a) Alicia
b) Bob
c) Chuck
d) Eleanor

Q11. DIRECTIONS *for questions 9 to 12:* Select the correct alternative from the given choices.
If the five of them together spoke the maximum possible number of lies, in which part of the island are Apples in?

a) West
b) South
c) North
d) East

Q12. DIRECTIONS *for questions 9 to 12:* Select the correct alternative from the given choices.
Information regarding the location of which of the following fruits will definitely help determine the island that each person is from?

a) Cherries
b) Bananas
c) Kiwis
d) More than one of the above

DIRECTIONS *for questions 13 to 16:* Answer these questions on the basis of the information given below.
Raghu had *n* marbles with him and he made *m* piles using these *n* marbles such that the number of marbles in the largest pile was less than twice the number of marbles in the smallest pile. Further, no two piles had the same number of marbles and the difference between the number of marbles in any two piles is even.

Q13. DIRECTIONS *for question 13 and 14:* Type in your answer in the input box provided below the question.
If $n = 150$ and $m = 4$, what is the maximum possible number of marbles in any pile?

Q14. DIRECTIONS *for question 13 and 14:* Type in your answer in the input box provided below the question.
If $n = 184$ and $m = 5$, what is the minimum possible number of marbles in the largest pile?

Q15. DIRECTIONS *for questions 15 and 16:* Select the correct alternative from the given choices.
If $m = 11$ and at least one of the piles has an even number of marbles, what is the minimum possible value of n?

a) 308
b) 336
c) 352
d) 368

Q16. DIRECTIONS *for questions 15 and 16:* Select the correct alternative from the given choices.
If $m = 15$, what is the minimum possible value of n?

a) 645
b) 660
c) 665
d) 630

DIRECTIONS *for questions 17 to 20:* Answer these questions on the basis of the information given below.
Eight persons – Ajay, Chand, Dev, Giri, Hari, Kiran, Lalit and Manan – were sitting in eight equally spaced chairs around a circular table in a restaurant. Each of the eight persons ordered and paid for exactly one dish among Poutine, Marzipan, Ankimo, Arepas and Rendang such that each dish was ordered by at least one person. The five dishes were priced Rs. 250, Rs. 450, Rs. 650, Rs. 750, and Rs. 850, not necessarily in the same order.

Further, it is known that

1. no two persons who ordered the same dish were sitting next to each other and the prices of the dishes ordered by any two persons sitting adjacent to each other differed by not more than Rs. 200.
2. Hari, who ordered Ankimo, was sitting two places to the left of a person who paid Rs. 250, while Dev, who ordered Marzipan, paid Rs. 100 more than what Chand paid.
3. the total amount paid by Lalit, Giri and Hari was Rs. 100 more than the total amount paid by all the persons who ordered Arepas and Marzipan.
4. Kiran, who paid more than Rs. 650, was the only person who ordered Poutine, while Giri was sitting two places to the left of Ajay.
5. Rendang is priced Rs. 450 but it was not ordered by either Giri or Manan.

Q17. DIRECTIONS *for questions 17 to 19:* Select the correct alternative from the given choices.
Who among the following ordered Marzipan?

a) Giri
b) Chand
c) Ajay
d) Manan

Q18. DIRECTIONS *for questions 17 to 19:* Select the correct alternative from the given choices.
What did the person sitting to the right of Giri order?

a) Poutine
b) Ankimo
c) Arepas
d) Cannot be determined

Q19. DIRECTIONS *for questions 17 to 19:* Select the correct alternative from the given choices.
Who among the following is sitting opposite a person who ordered Arepas?

a) Giri
b) Dev
c) Chand
d) Kiran

Q20. DIRECTIONS *for question 20:* Type in your answer in the input box provided below the question.
What is the total amount (in Rs.) paid by all the eight persons combined?

DIRECTIONS *for questions 21 to 24:* Answer these questions on the basis of the information given below.
Sanjeev owns a used car showroom and he had six cars in his showroom, each manufactured by a different company among Chevrolet, Dodge, Hyundai, Maruti, Tata and Toyota. Each car was of a different colour among Red, Black, Grey, Orange, Yellow and Blue. However, the six cars were not in perfect condition and each car had a fault in a different part among Headlights, Actuator, Spark Plug, Air Conditioning, Fuel Supply and Brakes. The following information is known about the six cars:

1. The car manufactured by Tata was not Yellow in colour but it had a faulty Spark Plug.
2. The car manufactured by Toyota did not have any fault in its Brakes.
3. The Grey car had a fault in its Brakes, while the car manufactured by Hyundai was Blue.
4. The Red car was manufactured by Maruti and had a fault in its Headlights.
5. The car which had a fault in its Fuel Supply was Black in colour but it was manufactured by neither Toyota nor Chevrolet.

Q21. DIRECTIONS *for questions 21 to 24:* Select the correct alternative from the given choices.
Which company manufactured the Grey car?

a) Tata
b) Dodge
c) Toyota
d) Chevrolet

Q22. DIRECTIONS *for questions 21 to 24:* Select the correct alternative from the given choices.
What is the colour of the car which was manufactured by Tata?

a) Black
b) Orange
c) Grey
d) Cannot be determined

Q23. DIRECTIONS *for questions 21 to 24:* Select the correct alternative from the given choices.
The car manufactured by Chevrolet had a fault in its

a) Actuator
b) Air Conditioning
c) Brakes
d) Cannot be determined

Q24. DIRECTIONS *for questions 21 to 24:* Select the correct alternative from the given choices.
If the car which had a fault in its Air Conditioning is not Yellow in colour, the car which is Blue in colour had a fault in its

a) Air Conditioning.
b) Actuator.
c) Spark Plug.
d) Cannot be determined.

DIRECTIONS *for questions 25 to 28:* Answer these questions on the basis of the information given below.
Nick, who wanted to pursue post-graduation, was interested in applying to a few colleges out of nine colleges – Barnett, Camden, Edgestow, Faber, Greendale, Hudson, Maguire, Okoboji and Poppleton. However, among the nine colleges, Barnett, Greendale and Maguire are Tier I colleges; Edgestow, Hudson and Poppleton are Tier II colleges; Camden, Faber and Okoboji are Tier III colleges. The fees for applying to a Tier I college, a Tier II college and a Tier III college are USD 75, USD 50 and USD 40 respectively.
Further, it is also known that

1. Nick wants to spend a maximum of USD 320 for applying to the colleges.
2. if he applies to Greendale, he cannot apply to Poppleton.
3. if he applies to Maguire, he has to apply to Hudson but he cannot apply to Camden.
4. he applies to Okoboji, if and only if he applies to Barnett.

Q25. DIRECTIONS *for question 25:* Select the correct alternative from the given choices.
If Nick applies to the maximum possible number of colleges, which of the following colleges would he definitely not have applied to?

a) Barnett
b) Maguire
c) Greendale
d) More than one of the above

Q26. DIRECTIONS *for question 26:* Type in your answer in the input box provided below the question.

If Nick wants to spend at least USD 300 for applying to the colleges, what is the minimum number of colleges that he can apply to?

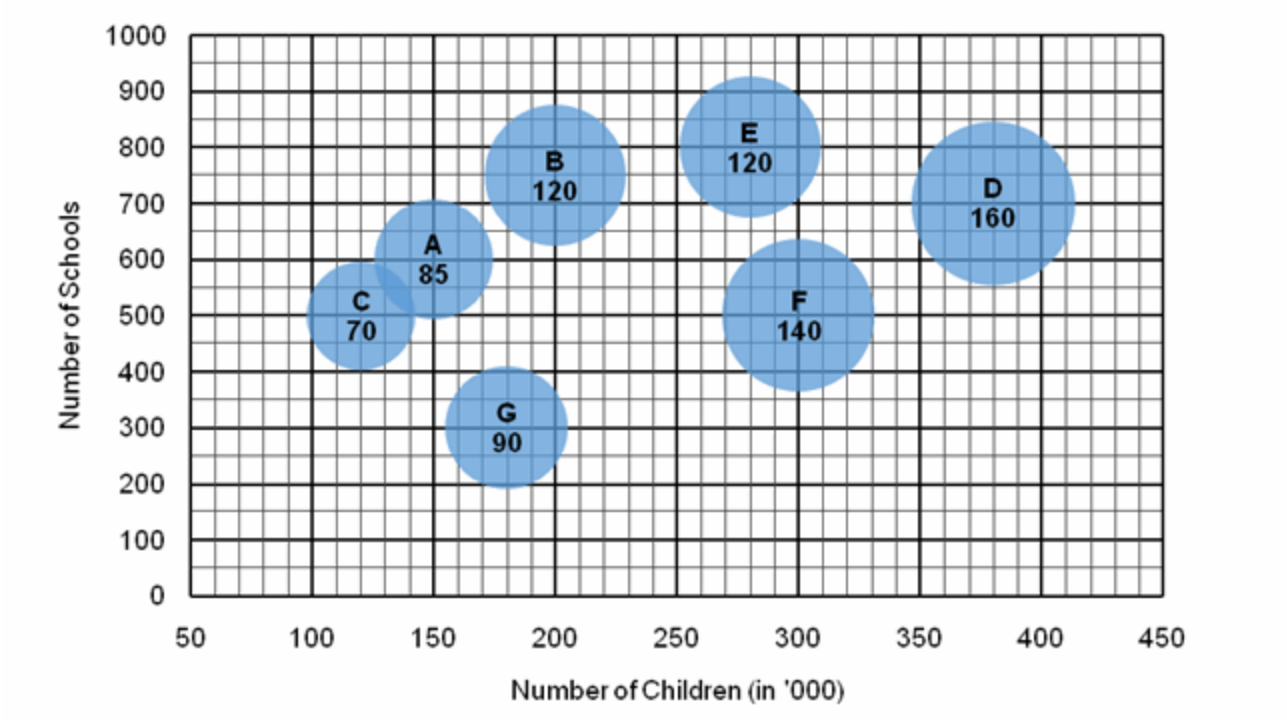
Q27. DIRECTIONS *for questions 27 and 28:* Select the correct alternative from the given choices.
If Nick applies to all the three Tier II colleges, which of the following colleges could he also have applied to?

a) Maguire
b) Greendale
c) Barnett
d) More than one of the above

Q28. DIRECTIONS *for questions 27 and 28:* Select the correct alternative from the given choices.
If Nick spent more than USD 250 for applying to the colleges and he applied to Poppleton, how many of the following colleges would he have definitely applied to?
I. Maguire
II. Faber
III. Barnett

a) 0
b) 1
c) 2
d) 3

DIRECTIONS *for questions 29 to 32:* Answer these questions on the basis of the information given below.
The bubble chart below presents the number of children (in '000), both boys and girls, in schools in each of seven states, A through G, along the horizontal axis and the number of schools in each state along the vertical axis. The size of the bubble, mentioned in each bubble, represents the number of boys (in '000) in the schools in each state.



Q29. **DIRECTIONS** *for question 29:* Select the correct alternative from the given choices.
What is the maximum number of boys per school in any state?

a) 320
b) 300
c) 280
d) 230

Q30. **DIRECTIONS** *for question 30:* Type in your answer in the input box provided below the question.
In how many states is the number of boys in all the schools in that state greater than the number of girls?

Q31. **DIRECTIONS** *for questions 31 and 32:* Select the correct alternative from the given choices.
For which state is the number of girls per school the highest?

a) G
b) E
c) D
d) F

Q32. **DIRECTIONS** *for questions 31 and 32:* Select the correct alternative from the given choices.

If the difference between the average number of boys per school in a state and the average number of girls per school in that state is called *Gender Variance*, then what is the highest *Gender Variance* for any state (rounded off to two decimal places)?

a) 80
b) 53.33
c) 85.71
d) 50

QA

Q1. DIRECTIONS *for questions 1 to 6:* Select the correct alternative from the given choices.

$\sqrt{3^3\sqrt{3^{\frac{1}{3}}\sqrt{3^3\sqrt{3^{\frac{1}{3}}.....\infty}}}}$ can be approximated as

a) $9^{\frac{19}{9}}$
b) 3.
c) $9^{\frac{19}{18}}$
d) $9^{\frac{19}{24}}$

Q2. DIRECTIONS *for questions 1 to 6:* Select the correct alternative from the given choices.

Let M = $10^{10^{10^{10}}}$. If M ends with N zeroes and N ends with P zeroes, how many digits are there in P?

a) 2
b) 3
c) 10
d) 11

Q3. DIRECTIONS *for questions 1 to 6:* Select the correct alternative from the given choices.

If x and y are two real numbers satisfying $3 \leq x \leq 4$ and $5 \leq y \leq 8$, which of the following has the lowest minimum value?

a) x2 *y*

b) 6*xy*
c) *xy*2
d) (*y* – 3)2*x*

Q4. DIRECTIONS *for questions 1 to 6:* Select the correct alternative from the given choices.
A trader mixes two varieties of rice, the cost prices of which differ by Rs.7 per kg, in a certain ratio, and the effective cost price of the resultant mixture is Rs.11 per kg. If he instead mixes the varieties in the inverse ratio, the effective cost price will be Rs.14 per kg. Find the cost price (in Rs.per kg) of the less expensive variety of rice.

a) 7
b) 8
c) 9
d) 10

Q5. DIRECTIONS *for questions 1 to 6:* Select the correct alternative from the given choices.
A pack of 52 playing cards comprises four suites of 13 cards each. In each suite, there are cards of 13 distinct face values – from 1 to 13. In how many ways can a pack of 52 playing cards be distributed equally among four persons so that each person receives cards of all the possible face values?

a) 52C13
b) (24)13
c) $\frac{52!}{(13!)^4}$
d) (13!)4

Q6. DIRECTIONS *for questions 1 to 6:* Select the correct alternative from the given choices.
Find the area (in sq. units) of the region in which all of the following inequalities are satisfied
$|x-y| \leq 1, |x| \leq 1$ and $|y| \leq 1$

a) 2.5
b) 3
c) 2
d) 1

Q7. DIRECTIONS *for question 7:* Type in your answer in the input box provided below the question.

Ram bought a few mangoes and apples spending an amount of at most Rs. 2000. If each mango costs Rs.4 and each apple costs Rs.6, and Ram bought at least one fruit of each type, how many different possible amounts could he have spent in purchasing the fruits?

Q8. DIRECTIONS *for questions 8 and 9:* Select the correct alternative from the given choices.
In a 300 m race, Soumya beats Divya by 10 seconds or 50 m. Soumya then challenges Divya to a second race in which she gives Divya a headstart of 150 m. If Soumya increases her speed by one and a half times that in the previous race, while Divya increases her speed to twice that in the previous race, what should be the length of the second race for Soumya and Divya to finish the race at the same time? Assume that both start simultaneously in both the races.

a) 450 m
b) 300 m
c) 350 m
d) 500 m

Q9. DIRECTIONS *for questions 8 and 9:* Select the correct alternative from the given choices.
Find the distance between the lines $7x + 24y = 21$ and $7x + 24y + 4 = 0$.

a) 1
b) 2
c) 3
d) 4

Q10. DIRECTIONS *for question 10:* Type in your answer in the input box provided below the question.
There is a park which is in the shape of a right-angled triangle, with a tower erected at the midpoint of the longest edge of the park. If the two perpendicular edges of the park subtend angles of 60° and 90° at the top of the tower and the area of the park is $648\sqrt{2}$ sq.m, what is the height of the tower (in m)?

Q11. DIRECTIONS *for questions 11 and 12:* Select the correct alternative from the given choices.

Several unit cubes are used to construct a larger cube. The large cube is now cut perpendicular to one of its faces along both the diagonals of that face. If K is a natural number, then is the side of the cube an odd integer?
Which of the following two statements can be used to answer the above the question?
I. The total number of unit cubes cut is 2K2 + 3K + 1
II. The total number of unit cubes cut is 72K2

a) Only I
b) Only II
c) Either I or II
d) Neither I nor II

Q12. DIRECTIONS *for questions 11 and 12:* Select the correct alternative from the given choices.
A right circular cone is cut (parallel to its base) into five slices, all of the same height. What is the ratio of the volume of the middle slice to that of the biggest slice?

a) 27 : 125
b) 19 : 61
c) 37 : 91
d) 4 : 25

Q13. DIRECTIONS *for question 13:* Type in your answer in the input box provided below the question.
A number N2, where N is a natural number, is such that exactly three of its factors are less than N. What is the number of factors of N3?

Q14. DIRECTIONS *for questions 14 to 23:* Select the correct alternative from the given choices.
ABCD is a rhombus of side 12 cm. The diagonals of the rhombus meet at the point P. Line segments PX and PY are joined, where X and Y are the midpoints of the sides AD and CD respectively. If the length of the line segment PD is 10 cm, find the length of the line segment XY.

a) $2\sqrt{11}$ cm
b) $3\sqrt{11}$ cm
c) $4\sqrt{11}$ cm
d) Cannot be determined

Q15. DIRECTIONS *for questions 14 to 23:* Select the correct alternative from the given choices.
Each of Rohit, Sameer and Tarun has a field. The ratio of the areas of their fields is 3 : 8 : 3 respectively. Sameer is half as efficient as Tarun and twice as efficient as Rohit. Each person begins the work on his field at the same time. The first person who completes the work on his field moves on to the person's field on which the least amount of work has been completed. Both of them together then complete the work on that field and then move on to the third person's field, if there is any work still left on it. All three together then complete the work in that field. If it is known that Tarun working alone, can complete the work on his field in 6 hours, find the time taken to complete the work on all the three fields.

a) 12 hours
b) 14 hours
c) 16 hours
d) 18 hours

Q16. DIRECTIONS *for questions 14 to 23:* Select the correct alternative from the given choices.
A baker had a certain number of boxes and a certain number of cakes with him. Initially, he distributed all the cakes equally among all the boxes and found that there was no cake left without a box. He later found that he had one more box with him and so he redistributed all the cakes equally among all the boxes with him and found that there was one cake less per box than initially and one cake was left without a box.
Given below are two quantities I and II. Compare I and II using the information given in the question above and select the option that gives the correct relationship between I and II.
I. The number of cakes per box in the first case.
II. The total number of boxes.

a) I > II
b) II > I
c) I = II
d) The relationship between I and II cannot be determined from the given information.

Q17. DIRECTIONS *for questions 14 to 23:* Select the correct alternative from the given choices.
Two students take the square of a certain natural number and express it in the number systems to base 5 and base 6 respectively. A third student takes these two representations and assuming that they are both expressed in base 10, adds up the numbers. Which of the following cannot be the value of the units digit of the sum obtained by the third student?

a) 2
b) 6
c) 8
d) 7

Q18. DIRECTIONS *for questions 14 to 23:* Select the correct alternative from the given choices.

If the 12th term of an arithmetic progression is $23\frac{7}{29}$ and its 64th term is $136\frac{22}{29}$ find the sum of the first 75 terms of the progression.

a) 1500
b) 4500
c) 6000
d) 9000

Q19. DIRECTIONS *for questions 14 to 23:* Select the correct alternative from the given choices.
A regular 12-sided polygon is inscribed in a circle of a radius *r* cm. Find the area (in sq.cm) of the region between the circle and the polygon.

a) (π – 2) *r*^2
b) (π – 3) *r*^2
c) (π – 1) *r*^2
d) None of the above

Q20. DIRECTIONS *for questions 14 to 23:* Select the correct alternative from the given choices.
All the natural numbers from 1 to 100 are written adjacent to each other in a single row. Now, this is considered as a single number, N, with 192 digits. N is then broken into two parts, each part being considered to be a new number, by placing a single partition between any two consecutive digits of N and the two numbers so obtained are added to form a new number, N1. Now, N1 is broken into two parts in a manner similar to that followed above for N and the two numbers thus arrived at are again added to form another new number, N2. This process is continued to arrive at N3, N4…. and so on, till we finally get a single digit number N*m*. What is the value of N*m*?

a) 5
b) 3
c) 1
d) Depends on the actual order of partitioning the original number N.

Q21. DIRECTIONS *for questions 14 to 23:* Select the correct alternative from the given choices.
Let *a*, *b*, *c* and *d* be four positive integers, satisfying the equations $a + b = c + 2d + 1$ and $a - b = c - 2d - 1$. If both *c* and *d* are odd, which of the following is true of the parities of *a* and *b*?

a) Both are even
b) Both are odd
c) *a* is odd and *b* is even.
d) Cannot be determined

Q22. DIRECTIONS *for questions 14 to 23:* Select the correct alternative from the given choices.
Given below are two quantities I and II. Compare I and II, and select the answer choice that gives the correct relationship between I and II.
I. 1849 + 1850 + 1851
II. 1951 – 1950 – 1949

a) I > II
b) II > I
c)
I = II

d) I + II = 0

Q23. DIRECTIONS *for questions 14 to 23:* Select the correct alternative from the given choices.
Find the number of ordered pairs (*a*, *b*), where both *a* and *b* are whole numbers, such that $a - \frac{1}{b} = \frac{a}{b} + 1$

a) 1
b) 3
c) 4
d) 2

Q24. DIRECTIONS *for question 24:* Type in your answer in the input box provided below the question.
An expression E is defined as $E = 2x2 + 3y2 - 6x + 9y + 15$. What is the least integral value of E?

Q25. DIRECTIONS *for questions 25 and 26:* Select the correct alterative from the given choices.
Let *y*, *x*, *t* and *s* be four functions of θ (where θ ∈ R), defined as follows:
$y = \frac{2^{\theta} - 2^{-\theta}}{2}$, $x = \frac{2^{\theta} + 2^{-\theta}}{2}$, $t = \frac{y}{x}$ and $s = \frac{1}{x}$ where θ varies in the interval (0, 1).
Find the ratio of the maximum value of (*t*^2 + *s*^2) to the minimum value of (*t*2 + *s*2).

a) 0
b) 1
c) 2
d) None of these

Q26. DIRECTIONS *for questions 25 and 26:* Select the correct alterative from the given choices.
A trader claims to sell vegetables at a profit of 20% over his cost price. If he uses a false weight and weighs only 800 gm instead of 1000 gm, what is his overall profit percentage?

a) 25%
b) 40%
c) 50%
d) 60%

Q27. DIRECTIONS *for questions 27 and 28:* Type in your answer in the input box provided below the question.
What is the sum of the factors of each factor of 1024?

Q28. DIRECTIONS *for questions 27 and 28:* Type in your answer in the input box provided below the question.
If log5 3, log5 2*x* and log5 (3*x* + 13/3) are in arithmetic progression, find *x*.

Q29. DIRECTIONS *for question 29:* Select the correct alterative from the given choices.
If *k* is a natural number and $f_k(x)\, f_{(k+1)}(x) = 1$, then find the value of $\sum_{k=1}^{100} \left(f_{k(k+2)}(x) f_{(k+1)(k+3)}(x) \right)$

a) 1
b) 100

c) 200
d) Does not have a unique value.

DIRECTIONS *for questions 30 and 31:* Answer the questions on the basis of the information given below.
There are ten pairs of identical white socks, 12 pairs of identical black socks and 14 pairs of identical yellow socks, all of which are kept in a box. I now randomly draw a few socks from the box.

Q30. If I have to be certain of drawing at least one pair of socks of the same colour, what is the minimum number socks that I have to draw from the box?

a) 15
b) 24
c) 37
d) None of the above

Q31. If I have to be certain of drawing at least one pair of socks of each colour, what is the minimum number of socks that I have to draw from the box?

a) 46
b) 50
c) 54
d) None of the above

Q32. **DIRECTIONS** *for questions 32 and 33:* Select the correct alterative from the given choices.
A ray is defined as a directed line segment (i.e., a line segment with a specified direction), while a reversal is an operation defined as reversing the direction of a ray. If there are 1001 rays in a plane and all the rays were reversed after a total of R reversals were performed, which of the following is a possible value of R?

a) 2002
b) 1008
c) 1024
d) 2157

Q33. **DIRECTIONS** *for questions 32 and 33:* Select the correct alterative from the given choices.
There are *n* terms in an arithmetic progression. The *n* terms of the arithmetic progression are now distributed into eight sub-series – S1, S2 ……and S8 – as follows. The 1st, 9th, 17th terms and so on go into S1; the 2nd, 10th, 18th terms and so on go into S2; the 3rd, 11th, 19th terms and so on go into

S3, and so on for S4 till S8. If for exactly three of the eight sub-series, the average of the sub-series is a term of the same sub-series, how many of the following values can *n* assume?
(i) 43
(ii) 53
(iii) 51
(iv) 69
(v) 77

a) 1
b) 2
c) 3
d) 5

Q34. DIRECTIONS *for question 34:* Type in your answer in the input box provided below the question.
There are three cities A, B and C. Each of these cities is connected with the other two cities with at least one direct road. We can travel from one city to another city either by a direct road connecting the two cities or by travelling through the third city. If the total number of routes from A to B and from B to C are 25 and 17 respectively, find the number of direct roads from A to C.