Mock Test Series 1.0

Mock Test – 04

VARC

Direction (1–4): Read the following passage and answer the question that follows:

Businesses in America are constantly evolving, but how they get started has not changed much over the years. We have many different business models, there are Partnerships, Joint Ventures, Franchises, non-profits, Sole Proprietorships, Limited Liability and Corporations. Many of the corporations operating in the country today, started as Sole Proprietorships. According to the Foundations of Business 73% or 31 million of the businesses operating today are run as a Sole Proprietorship. Many people start this way to minimize cost and wait to see if the business is going to succeed.

Today we are going to explore the advantages and disadvantages of changing a business that is a Sole Proprietorship or Partnership to a Corporation. We know with Sole Proprietorship there is one owner and that individual is solely liable for every aspect of the business. If something goes wrong and a lawsuit ensues, the suing party will go after the owner personally. The business and personal assets of the owner will be at risk. Also, with Sole Proprietorship you have a lack of continuity. This means if the owner dies or is unable to continue working due to illness the business will cease to operate. There is also the problem of having enough money to keep the business going, as most banks and lenders don't like to lend large sums of money to Sole Proprietors. The same holds true for partnerships, except the liability is spread across more individuals.

One of the most important advantages is liability to the owner and/or partners. This is huge, because it helps to protect the personal assets of the owner and/or partners. This also means that the Corporation is responsible for the debt of the business, which protects the owner and/or partner from creditors. When the Corporation is in place it helps with the continuity of the business, if there are multiple members or shareholders, they have the option of keeping the business going if something was to happen to the owner or principle member. The business will exist until they choose to close it. Sole Proprietors and/or Partnerships do not have to pay business taxes but instead the profits and losses are "passed through" to the individual general partners, according to the U.S. Small Business Administration. Sole Proprietors and/or Partnerships must file a tax return to report losses and profits to the Internal Revenue Service, and general partners include their share of profits and loss in the return. Corporations are required to pay state and national taxes, and shareholders must also pay taxes on their salaries, bonuses and dividends. The corporate tax rate is usually lower than the individual income tax rate, according to the SBA. The Corporation operates as its own entity and this makes raising money come with more options. The company can still borrow for banks or lending institutions, but they can also raise money by selling stock. Some corporations have raised billions of dollars through Initial Public Offerings or I.P.O's. This money can be used to expand the business or help reduce debt. The transfer of ownership is also an advantage with the Corporation. If the owner/CEO dies, the company has board members and directors who help run the business and it doesn't rely on one person to keep it going. As the company gets larger, they can attract better managers with specialized training that can assist in the growth of the company.

The disadvantages of setting up a Corporation can be the cost. You will need legal help to properly set up the company. The cost for this can range from $2,500 - $5,000 and more depending on the complete legal needs. There are many forms that are required to be submitted to the secretary of state, which can be daunting if one is not prepared. One of the biggest disadvantages is all the extra paperwork. Once you go public there is no secrecy, stockholders and the government require many detailed reports. The company's finances and all other activities become public record

1. The central theme of the passage is about the choice between:

(a) Sole Proprietorships and Partnerships

(b) Sole Proprietorships and Corporations

(c) Sole Proprietorships, Partnerships, and Joint Ventures
(d) Sole Proprietorships, Partnerships, and Corporations

2. Which of the following statements best represents the essence of the passage?
(a) The passage emphasizes the importance of Sole Proprietorships in the American business landscape.
(b) The passage discusses the advantages and disadvantages of transforming a Sole Proprietorship or Partnership into a Corporation.
(c) The passage primarily focuses on the disadvantages of Corporations in comparison to Sole Proprietorships and Partnerships.
(d) The passage argues that Corporations are the ideal business model for all types of businesses

3. Which one of the following is not a valid inference from the passage?
(a) Sole Proprietorships are the most common type of business in America.
(b) Corporations offer more protection for personal assets than Sole Proprietorships.
(c) The corporate tax rate is usually higher than the individual income tax rate.
(d) Corporations have more options for raising money than Sole Proprietorships

4. Which one of the following, if true about the liability structure of a Corporation, would invalidate the purpose of transition from a Sole Proprietorship to a Corporation in the passage?
(a) The liability of a Corporation extends to the personal assets of the board members and directors.
(b) The Corporation's liability is limited to the assets of the business, protecting the personal assets of shareholders.
(c) The Corporation's liability is entirely handled by the CEO of the company.
(d) The liability of a Corporation can sometimes include the personal assets of shareholders depending on the type of deb.

Direction (5–7): Read the following passage and answer the question that follows:

Money market is an important segment of the financial market (system) as it provides avenue for equilibrating the short term (ranging from overnight upto an year) demand for and supply of funds. It also plays an important role in the transmission mechanism of monetary policy, as it acts as a medium through which the central bank can influence the short term liquidity and interest rates in the financial system.

Till the mid 1980s the Indian money markets was characterized by scarcity of instruments, stringent regulations pertaining to participants and interest rates, lack of depth and liquidity. Another drawback in the Indian money market during this period was existence of a large number of lenders and only a few chronic borrowers. Infact the basic requirement of a liquid and deep market that the participants should rotate between borrowing and lending activity was missing.

However RBI took many measures to deepen and widen the money market in accordance with the recommendations of the Committee to Review the Working of the Monetary System and the Working Group on the Money Market (Chairman: Shri N. Vaghul) [1987]. These measures included the deregulation of money markets interest rates, introduction of new money markets instruments such as certificates of deposits (June 1989), commercial paper etc.

Also the RBI gradually eased the barriers to entry and initiated measure to increase the number of participants in the Money Market. RBI in a ssociation with the public sector banks and financial institution had set up the Discount and Finance House of India Ltd. (DFHI) in April 1988 in order to impart liquidity to the financial instruments. Thus financial innovations in terms of money markets instruments, broadening of participants' base and strengthening of institutional infrastructure were undertaking during the 1990s based on the Vaghul Committee's framework.

Further during the late 1990s the Narasimham committee (1998) recommended rationalization of the money market

by ensuring participation of different classes of entities in various segments of money market. RBI has over the years taken many structural measures and instrument-specific measures like transformation of call money market into pure interbank market, bringing down the minimum maturity of the CDs to 7 days etc. to develop the money market in pursuance of the Narasimham committee recommendations.

Also a fullfledged liquidity Adjustment Facility was introduced on June 5, 2000 which replaced the traditional refinance support on fixed terms. The LAF was operationalised with a view to alter short term liquidity conditions as per the market conditions. In wake to strengthen the payment system infrastructure the Clearing Corporation of India Ltd. (CCIL) was formed in 2001. Also the introduction of the Negotiated Dealing System (NDS) in February 2002 and implementation of the Real Time Gross Settlement (RTGS) system in March 2004 further improved the efficiency in the money market.

The call money market is one of the most important and active segment of the Indian Money Market. Over the years RBI has taken many measures for development of the call/term money market. During the 1990s measures were taken to widen the participation of the call money market to include primary & satellite dealers & corporate (through primary dealers) in addition to the existing participants like commercial banks co-operative banks, LIC, UTI, etc. However the Narasimham committee recommended the conversion of the call/notice money market in a pure inter-bank market on prudential considerations and with an objective to improve the monetary transmission mechanism.

Thus in accordance with the Narasimham committee recommendations (1998), measures were taken to convert the call market into a pure inter bank market starting in 1999. Simultaneously steps were taken to develop a repo market outside the official window for providing a stable collateralised avenue for deployment of funds by the non-banks following their phased exit from the call money market. Also introduction of instruments such as Collateralised Borrowing and Lending Obligation further provided the banks and non banks with a funding alternative.

Consequently the call money market was transformed into a pure inter bank market in August 2005. Reflecting the conscious decision on the part of the RBI to make the call/notice money market a pure inter bank, the average daily turnover, which stood at around Rs. 351.44 bn in FY02, almost halved to Rs. 141.70 bn in FY04. However it increased in the subsequent years and was Rs.217.25 bn during FY07.

5. Based on the passage, a fundamental conclusion by the author is that:

(a) The development of the Indian money market has been largely successful due to RBI's deregulation of interest rates.

(b) The transformation of the call money market into a pure interbank market was essential for improving the monetary transmission mechanism.

(c) Financial innovations were the primary drivers of growth in the Indian money market.

(d) The introduction of the Negotiated Dealing System (NDS) and the Real Time Gross Settlement (RTGS) system were the most significant factors in the development of the money market.

6. Which one of the following sets of words and phrases serves best as keywords of the passage?

(a) Money market, Indian money market, financial instruments, monetary policy, deregulation, RBI, Vaghul Committee, Narasimham Committee, LAF, call money market

(b) Sukhamoy Chakravarty, N. Vaghul, Narasimham, DFHI, CD, RTGS, CCIL, NDS, primary dealers, corporate participation

(c) Short-term liquidity, interest rates, financial innovations, 1980s, 1990s, 2000s, market efficiency, market depth, repo market, interbank market

(d) Overnight funds, borrowing and lending, certificates of deposits, commercial paper, payment system infrastructure, prudential considerations, collateralised borrowing, average daily turnover, interbank market transformation.

7. Which one of the following statements best captures the sense of the sixth paragraph?

(a) The call money market is the sole focus of the RBI's efforts to develop the Indian money market.

(b) The call money market has been a significant segment of the Indian money market, and the RBI has taken measures to widen its participation and improve the monetary transmission mechanism.

(c) The call money market has been largely ignored by the RBI in its efforts to develop the Indian money market.

(d) The call money market has always been a pure interbank market in the Indian financial system

Direction (8–12): Read the following passage and answer the question that follows:

There are several key difficulties surrounding the topic of percentages. Research has shown that there has been one difficulty which is more common than others; the meaning of the terms 'of' and 'out of'. Hansen (2011) states that both terms represent an operator which needs explaining. Teachers need to address these before the topic is introduced to stop any confusion. 'Of' represents the multiplication operator, for example: 60% of 70 means 0.6 multiplied by 70; 'out of' represents the division operator, for example 30 out of 50 means 30 divided by 50. The teaching of these terms needs to be clear prior to teaching, so that children are confident in what these terms represent.

Killen and Hindhaugh (2018) believe that once children understand that 1/10 is equal to 10% they will be able to use their knowledge of fractions, to determine other multiples of 10. For example; Find 40% of 200. If children are aware that 10% is 20, then it will become obvious to them that 40% must be 80. This method enlightens many other practical ways to find other percentages of a quantity. Once children know 10%, they may also start finding half percent's, such as; 5% or 25%. However, Killen and Hindhaugh (2018) state that a difficulty could occur when they are asking for a percentage of a quantity. If children are being asked to find the percentage, they may believe that the answer is always in percent. For example; find 60% of £480. Children may be capable of calculating the answer of 288 but instead of writing down £288, they may write down 288%. Teachers will need to explain this issue and address to children that once calculating the answer, it must be in the same units as the given quantity.

Hansen also comments that the key to succession in the understanding of percentages is the relationship and understanding the children have with fractions and decimals. For example: they should be aware that 50% is equivalent to ½ and 0.5, and 25% is equivalent to ¼ and 0.25. Teaching these topics in isolation of each other should be strictly avoided as this may destroy a child's deep mathematical understanding. Killen and Hindhaugh agrees with this as they noted that children need to continually link decimals, fractions and percentages to their knowledge of the number system and operations that they are familiar with. Reys, et al (2010) believes however that percentages are more closely linked with ratios and proportions in mathematics and how important it is for teachers to teach these other topics to a high level. This is to later reduce the amount of errors a child has over percentages. However, these theorists also agree that understanding percentages requires no more new skills or concepts beyond those used in identifying fractions, decimals, ratios and proportions. Reys, et al states that an effective way of starting these topics is to explore children's basic knowledge of what percentage means to them.

Barmby et al noted that a misconception occurs whenever a learner's outlook of a task does not connect to the accepted meaning of the overall concept. Ryan and Williams state that it is more damaging for children to have misconceptions of mathematical concepts than difficulties calculating them. Killen and Hindhaugh begin to talk how the use of rules and recipes are commonly used more so by teachers that are not fully confident with percentages. The main point of the argument is that if children are taught these rules linked to percentages, misconceptions can occur. This could be caused if the child forgets or misapplies the rule to their working out.

This method is not the most reliable to children but can be a quick alternative for teachers to teach their class, if they are not fully confident in the topic themselves. This links to one of the most common misconceptions in the primary classroom. Killen and Hindhaugh state that it is the teacher's responsibility for their children's successes in that subject area. If the teaching is effective, then the child will become more confident and develop more links revolving the topic of percentages. This will result in the child having a high level of understanding. However, if the teaching is not up to standard the child may lose confidence in themselves and end up being confused with the simplest of questions.

8. It can be inferred from the passage that the author is not likely to support the view that
(a) Teaching fractions, decimals, and percentages in isolation is beneficial for students.
(b) Rules and recipes are always the most reliable way to teach percentages.
(c) Understanding percentages requires learning new skills and concepts.
(d) Effective teaching can lead to a high level of understanding of percentages.

9. Which one of the following is not a valid inference from the passage?
(a) A strong understanding of fractions, decimals, ratios, and proportions is necessary for mastering percentages.
(b) Misconceptions in mathematical concepts can be more damaging for children than difficulties in calculations.
(c) Teaching percentages in isolation can improve a child's mathematical understanding.
(d) Teachers who are not confident in teaching percentages may rely on rules and recipes, which can lead to misconceptions.

10. Which of the following statements best describes the relationship between percentages, fractions, decimals, ratios, and proportions according to the passage?
(a) Percentages are only related to fractions and decimals, and they should be taught in isolation from ratios and proportions.
(b) Percentages are more closely related to ratios and proportions, and understanding percentages requires no new skills beyond those used in identifying fractions, decimals, ratios, and proportions.
(c) Percentages are unrelated to fractions, decimals, ratios, and proportions and should be taught as a separate concept.
(d) Understanding percentages requires a completely new set of skills that are unrelated to fractions, decimals, ratios, and proportions.

11. Which one of the following statements best reflects the main argument of the fourth paragraph of the passage?
(a) Misconceptions in mathematics are more damaging than difficulties in calculation.
(b) Effective teaching of percentages is the sole responsibility of the teacher.
(c) The use of rules and recipes in teaching percentages can lead to misconceptions and is not a reliable method.
(d) Teaching percentages in isolation can hinder children's deep mathematical understanding.

12. On the basis of the information in the passage, all of the following are potential problems children might face when learning percentages EXCEPT that they :
(a) Might not understand the terms 'of' and 'out of'.
(b) Might not understand the concept of the percentage of a quantity.
(c) Might struggle with the linkage between percentages and fractions or decimals.
(d) Might prefer to learn percentages in isolation of fractions and decimals.

Direction (13–16): Read the following passage and answer the question that follows:

In case that the pregnant woman is in early pregnancy or obese, she can undergo transvaginal sonography, which a

probe is placed in the woman's vagina. Sometimes the test is also carried out if the pregnant woman has got abnormal vaginal bleeding or pelvic pain. This type of sonography has the similar principle as the ultrasonography mentioned above. Some mothers may want to see the heartbeat of their babies, they can carry out the Doppler sonography. It has basically the same principle as the ultrasonography except the ultrasound is further enhanced by Doppler Effect. Generally the fetus's heartbeat can be detected after 7 weeks of gestation, thus the blood flow of the fetus can be detected as well. The blood flows in a circulation in the body of the fetus, the Doppler sonography can thus detect the change in directions of blood flow by Doppler effect and see if the circulation is normal or not. This can be done by measuring the change in the frequency received in the transceiver.

In fact there are a few more types of prenatal checkup, such as amniocentesis and chronic villus sampling. Nonetheless, the ultrasonography is the safest way for diagnosis. The ultrasonography only involves a transducer placing outside the mother's abdomen, while amniocentesis and chronic villus sampling require mechanical penetration and sampling inside the mother's uterus or abdomen, this increases the risk of miscarriage during the tests. Despite this fact, ultrasonography can only give an early diagnosis of the mothers and fetuses, it cannot treat anomalies or genetic diseases. According to the test conducted by RADIUS study group in 1993, researchers found that obtaining sonography has no significantly negative effect on reducing perinatal morbidity or mortality among the fetuses or the mothers. Moreover, the detection of anomalies actually did not alter the outcome of newborn babies. Therefore it is important to acknowledge that ultrasonography is just a test whether the fetuses are healthy, but not a treatment to anomalies.

X-ray is an electromagnetic wave with a wavelength ranged from 0.01 to 10 nanometers (0.01 – 10 x10 – 9m). It has a speed of $3 \times 108\ ms^{-1}$ in vacuum. In fact, X-ray is commonly used in medical treatments, such as radiation therapy of cancer and medical imaging technology. X-ray is produced in an X-ray tube. In the X-ray tube, electrons are accelerated by applying a high voltage. Electrons then collide with a metal, and the sudden deceleration of electrons results in the emission of X-ray.

X-ray has high ionizing power, thus there are many people worrying about the harmful effects of having an X-ray diagnosis, especially pregnant women. It is true that a very high dose of radiation from X-ray may result in radiation sickness. Prolonged and continuous exposure to X-ray also increases the risk of cancer development, and in pregnant women, there may also be a risk for the fetus to develop childhood cancer or even miscarriage. Nevertheless, it seems that the harmful effects of exposing to X-ray are exaggerated. The serious harmful effects mentioned above are just the results of high dosage in a short period of time.

There are different kinds of X-rays, one type is used in scanning or diagnosis, one type is used in treating cancer. The energy stored in different types of X-rays is different. For normal X-ray scanning, the dosage is extremely small. The absorbed dose of X-ray is measured in rad, which 1 rad = 10×10^{-3} J kg–1 = 10 – 2 J kg-1. If a pregnant woman is having a chest X-ray, the estimated fetal dose is around 60 millirads, the dose is around 290 millirads for an abdominal X-ray. This is quite a low value, as the dose from the radiation from outer space is around 90-100 millirads. In fact, the risk of the fetus having eye abnormalities or mental retardation increases only when the dosage exceeds 10 rads, therefore it is very rare that pregnant women suffer from harmful effects by the X-ray radiation. According to the American Academy of Family Physicians, generally X-rays are safe even for pregnant women, and according to radiologists, no single diagnostic x-ray has a radiation dose significant enough to cause adverse effects in a developing embryo or fetus.

13. Based on the passage, what is the main idea conveyed about prenatal checkups and X-ray use for pregnant women?

(a) Ultrasonography and X-ray are the only prenatal checkups available for pregnant women.

(b) The risks of X-ray exposure during pregnancy are exaggerated and ultrasonography is the safest diagnostic method.

(c) Prenatal checkups can both diagnose and treat anomalies in fetuses.

(d) X-ray exposure during pregnancy is completely safe and no precautions are necessary.

14. The author of this passage is LEAST likely to support the view that
(a) High dosage of radiation from X-ray in a short period is benign to pregnant women and their fetus.
(b) Amniocentesis and chronic villus sampling pose risk of miscarriage during the tests.
(c) Doppler sonography is capable of detecting the heartbeat of a fetus.
(d) Ultrasonography cannot treat anomalies or genetic diseases in fetuses.

15. Which of the following best describes the primary difference between ultrasonography and Doppler sonography in prenatal checkups?
(a) Ultrasonography is an invasive procedure while Doppler sonography is non-invasive.
(b) Doppler sonography involves the use of X-rays while ultrasonography does not.
(c) Ultrasonography can detect the fetus's heartbeat, while Doppler sonography cannot.
(d) Doppler sonography measures changes in blood flow by utilizing the Doppler effect, while ultrasonography does not.

16. The author of this passage is LEAST likely to support the view that
(a) Pregnant women should avoid X-ray imaging due to the high risk of harm to the fetus.
(b) Ultrasonography is an effective method for detecting fetal health issues, but not for treating them.
(c) Transvaginal sonography can be an alternative option for certain pregnant women.
(d) Doppler sonography can be useful for observing fetal blood flow and heartbeat

17. Carefully read the statements in the questions below and arrange them in a logical order.
(a) Carbon credits can be traded on various markets, allowing companies to offset their emissions.
(b) Companies that exceed their emissions allowances can purchase carbon credits from those with surplus credits.
(c) To reduce greenhouse gas emissions, governments impose limits on the amount of emissions companies are allowed to produce.
(d) Carbon credits are a market-based mechanism designed to incentivize companies to reduce their greenhouse gas emissions

18. Carefully read the statements in the questions below and arrange them in a logical order
(a) The Brazilian Forest Code stipulates that a certain portion of privately-owned lands must be kept as protected areas.
(b) In Brazil, landowners have the option to offset their environmental obligations by purchasing or leasing land in protected areas.
(c) To help landowners in Brazil meet these obligations, the country has developed an innovative environmental policy tool called the Environmental Reserve Quota (CRA).
(d) Brazil's extensive forest cover is essential for conserving biodiversity and helping to combat climate change

19. Carefully read the statements in the questions below and arrange them in a logical order.
(a) The brainchild of the movement was Pauline Newman, who organized the protest and successfully coordinated with other labor leaders.
(b) In 1909, garment workers in New York City staged a massive strike, known as the Uprising of the 20,000.
(c) The strike was crucial in the fight for better working conditions and wages for female garment workers.
(d) The majority of the strikers were young immigrant women, facing harsh working conditions and low wages

20. Carefully read the statements in the questions below and arrange them in a logical order
(a) This movement led to the establishment of national parks and the preservation of wildlife and natural habitats.
(b) In the late 19th and early 20th centuries, the conservation movement gained traction in the United States.

(c) The efforts of influential figures like John Muir and Theodore Roosevelt played a key role in the movement's success.
(d) The movement aimed to protect natural resources from industrialization and overexploitation.

21. Read the following passage and answer the question that follows:

The crowding of this section of the triangle pushes researchers and critics to question the role of the nation-state. Furthermore, the literature on global health governance increasingly questions the value of "state-based frameworks in the provision of health" (Ricci 2009). Because other policy actors mirror the role of nation-states in the provision of care, it creates some confusion around the exact role played by nation-states in the governance of global health (Ricci 2009). We can see this play out especially in low and middle-income countries (LMICs) where the relationship between the state and aid agencies is unclear (Galway, Corbett, and Zeng 2012). Thus, it becomes evident as to why the literature seeks to stress and question the role of the state in global health; "with the increased participation by a range of nonstate and transnational actors as primarily driven by globalization, the international has become the global" and structures of governance are unclear (Ricci 2009).

Which of the following best summarizes the passage?

(a) The passage focuses on the role of nonstate actors in global health governance and suggests that they are the key players in the provision of care.
(b) The passage emphasizes the importance of the nation-state in global health governance and how their role is changing in response to globalization.
(c) The passage explores the challenges in understanding the role of nation-states in global health governance due to the involvement of multiple nonstate and transnational actors.
(d) The passage argues that the international community should solely rely on nation-states for global health governance.

22. Read the following passage and answer the question that follows:

According to the U.S Department of Health and Human Services, they defined bullying as an unwanted, aggressive behavior that is amongst school-aged children that involve a real or perceived power imbalance. Bullying can have a huge impact on someone's life because it could lead to mental health issues, alcohol or drug use, or even worse suicide.

Bullying could lower the child's self-esteem and make them feel less of themselves. It also has an effect on the parents because any parent doesn't want to see their children in an upsetting state of mind. On the other hand, some parents think that bullying could help a child get a taste of what the world has to hold. They also believe that it could help their child in a sense "toughen up", and that it could help their child learn self-defense.

In the book Born A Crime by Trevor Noah, he addresses that he himself was a victim of bullying and how he learns from it. I chose the topic of bullying because growing up I was bullied a lot and as I got older I have always wanted to research other people's thoughts of bullying. In my personal opinion, schools should have a zero tolerance policy for bullying because bullying can cause children to have issues with their mental health, live in fear and have self-esteem issues. Children should grow up with high self-esteem and feel like they belong in the world.

Which of the following best summarizes the passage?

(a) The U.S. Department of Health and Human Services defines bullying as aggressive behavior among school-aged children, and Trevor Noah's book Born A Crime serves as a useful resource for understanding the effects of bullying.
(b) Bullying is an unwanted behavior that can have detrimental effects on a child's mental health and self-esteem, and schools should implement zero tolerance policies to combat these issues.
(c) Parents play a significant role in bullying, as some believe it helps their children toughen up and learn self-defense, while others are more concerned about the negative impact on their children's mental health.
(d) Bullying is a widespread issue that can lead to substance abuse and suicidal tendencies, and it

is important to research the topic in order to better understand the experiences of those who have been affected.

23. Which of the following is the ODD ONE OUT?
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

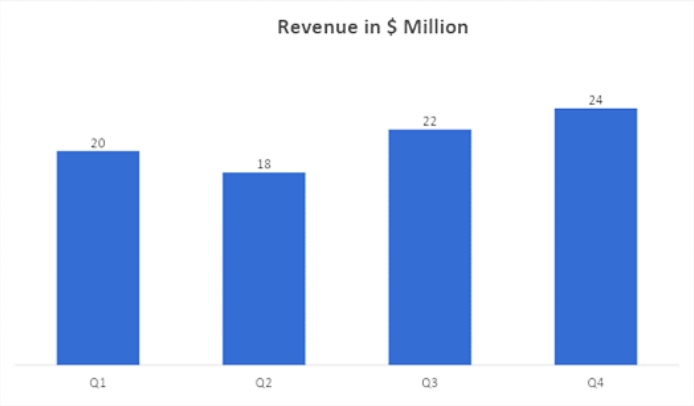
(a) The aphorism by Friedrich Nietzsche holds relevance for endurance athletes undergoing rigorous training regimes.
(b) Coral reefs, despite the current adverse conditions, show remarkable resilience and adaptability.
(c) Major ecosystems on our planet exhibit a formidable capacity to endure and adapt to changing atmospheric chemistry and climate.
(d) Given the persistence of the climate crisis, it's intriguing to conjecture the potential state of our ecosystems in the intermediate and distant future.
(e) Coral reefs may evolve into a different form, with the food web likely to be dominated by smaller fish species.

24. Which of the following is the ODD ONE OUT?
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

(a) The creation of the BBC Radiophonic Workshop in 1958 revolutionized the field of sonic experimentation and the production of new sound effects for radio programmes.
(b) The Doctor Who theme music, composed in 1963, stands as one of the pioneering works of electronic music for television, thanks to Delia Derbyshire, a UK electronic music pioneer.
(c) The influence of the Radiophonic Workshop extended beyond radio, having a profound impact on television, film scoring, experimental rock music, and electronic music.
(d) The use of tape machines and electronic devices in the Radiophonic Workshop allowed for the production of sounds previously unheard, as showcased in the Tomorrow's World BBC television programme.
(e) The electronic music scene in the 1960s was greatly shaped by the groundbreaking work of the Radiophonic Workshop, specifically in the realm of television scoring.

LRDI

Directions (25–29) : Read the following information carefully and answer the questions that follow.
The revenue of ABC Pvt LTD across 4 quarters in 2022 is shown in the chart below:



The profit of a company is equal to Revenue – Cost

25. If the cost in Q1 is $ 15 Million. The profit in the 4 quarters Q1, Q2, Q3, Q4 are in the ratio of 1 : 2 : 3 : 2. Then find the total cost in Q2 & Q4

(a) $12 Million (b) $22 Million
(c) $18 Million (d) $24 Million

26. If the cost in Q1 is $ 15 Million. The profit in the 4 quarters Q1, Q2, Q3, Q4 are in the ratio of 1 : 2 : 3 : 2., then find the % increase in cost from Q2 to Q4?

(a) 75% (b) 55%
(c) 60% (d) 65%

27. Because of Global Financial turmoil, ABC company is projecting total revenue for 2023 to be down by 14.29% with respect to 2022 and the ratio of the projected revenues in Q1, Q2, Q3 & Q4 is 2 : 3 : 3 :4. Then find out the projected revenue from Q4 in 2023.

(a) $20 Million (b) $24 Million

(c) $12 Million (d) $18 Million

28. Because of Global Financial turmoil, ABC company is projecting total revenue for 2023 to be down by 14.29% with respect to 2022 and the ratio of the projected revenues in Q1, Q2, Q3 & Q4 is 2 : 3 : 3 :4, if the quarterly costs in Q1, Q2, Q3 & Q4 are in the ratio of 1 : 2 : 1 : 2 respectively and the savings are in the ratio of 1 : 1 between Q3 and Q4 then find the total projected savings of Q1 & Q4 combined in 2023 (in $ Million)

(a) 12 (b) 24
(c) 20 (d) 18

29. In Q4 of 2022, ABC incurred a sudden cost of $40 Million because of which it ended the year with no profit, no loss. If the ratio of profits in Q1, Q2 & Q3 is 4 : 3 : 1, then find the total cost in Q1 & Q3 (in $ Million)

(a) 32 (b) 34
(c) 36 (d) 38

Directions (30–34) : Read the following information carefully and answer the questions that follow.

Thomas Alva Edison, after discovering how to glow a bulb by using electricity, conducted a test by using 100 bulbs which are numbered from B_1 to B_{100} . For this test he hired 100 junior scientists which are numbered from J_1 to J_{100}. Every Junior Scientist has access to these 100 bulbs on his computer screen and if a bulb is kept on/off by any junior scientist then it is shown on the screen of each junior scientist. If Scientist 1 keeps B_n in on/off position, then it is on/off in all the screens of each scientist.

Initially all the bulbs are in off position. J_1 puts all the bulbs in on position. J_2 changes the position of those bulbs whose subscript is a multiple of 2 (put it in off mode if it is presently in on mode and vice versa). Similarly J_3 Changes the position of all the bulbs whose subscript is a multiple of 3. The same process will be repeated till B_{100}. Every bulb in the on position represent a code number on the screen which is as follows,

$B_1 = a_1$, $B_2 = b_1$, $B_3 = c_1$, … $B_{26} = z_1$, $B_{27} = a_2$, $B_{28} = b_2$…$B_{53} = a_3$ $B_{78} = z_3$ ……. $B_{100} = v_4$.

If a short circuit happens due to any reason then the Junior scientists whose subscript is similar to the subscript of the bulb cannot change the position of that bulb and the code represented on the screen if the bulb is in on position.

Note : Short circuits disturb the functioning of the scientist's screen only but the bulb will be in the same position as it was earlier changed by the scientist.

30. If all the screens remain working (there is no short circuit happened), then what will be the message displayed on the screen by the bulbs pressed by the junior scientists?

(a) $a_1, d_1, i_1, p_1, y_1, j_2, w_2, l_3, c_4, v_4$
(b) $a_1, d_1, i_1, p_1, y_2, j_2, w_2, l_4, c_4, v_4$
(c) $a_2, d_1, i_1, p_1, y_1, j_2, w_2, l_3, c_4, v_4$
(d) $a_1, d_1, i_1, p_1, y_1, j_3, w_3, l_3, c_4, v_4$

31. The normal code signal is denoted as C which is a set of all the codes when none of the screens are short circuited. Find out the minimum subscript of junior scientist(s) whose screens were short circuited if the code on the screen was C + $\{q_1, y_2, g_4\}$. If multiple screens are short circuited, then write the sum of the subscripts of the junior scientist whose screen were short circuited in the answer.

32. All the junior scientists are divided into 4 groups- alpha (J_1, J_2, J_3, … J_{25}), Beta (J_{26}, J_{27}, J_{28}, … J_{50}), gamma (J_{51}, J_{52}, J_{53}, … J_{75}), pi (J_{76}, J_{77}, J_{78}, … J_{100}). If all the screens of Gamma groups were short circuited, then find the number of alphanumeric in the code received on the main screen?

33. All the junior scientists are divided into 4 groups- alpha (J_1, J_2, J_3, … J_{25}), Beta (J_{26}, J_{27}, J_{28}, … J_{50}), Gamma (J_{51}, J_{52}, J_{53}, … J_{75}), Pi (J_{76}, J_{77}, J_{78}, … J_{100}). If all the screens in Pi group are short circuited, then find the number of alphanumeric in the code received on the main screen?

34. The normal code signal is denoted as C which is a set of all the codes when none of the screens are short circuited. Find out the minimum subscript of bulb(s) which were short circuited if the code on the screen was C + $\{t_2, n_4\}$. If multiple screens are short circuited, then write the sum of the subscripts

of the junior scientist whose screen were short circuited in the answer.

Directions (35–39) : Read the following information carefully and answer the questions that follow.

An all Indian wrestling academy organised wrestling competition. The top seven scorers were Aman, Baman, Chaman, Deepesh, Eesh, Faizal and Gaurav not necessarily in the same order, 7 groups – G_1, G_2, G_3, G_4, G_5, G_6 and G_7 – were formed such that each group had 6 of the above-mentioned top scorers and there were no two groups having same 6 participants. Following table gives the aggregate of scores by participants in each group :

Group	Aggregate
G1	447
G2	440.6
G3	460.4
G4	465.8
G5	442.2
G6	455
G7	451

35. Find the score of participant who scored the minimum points in the wrestling competition

(a) 83.2 (b) 86.4

(c) 61.2 (d) 66.6

36. Find the score of participant who scored the maximum points in the wrestling competition

(a) 84.8 (b) 86.4

(c) 80 (d) 76

37. The number of points scored by 'Deepesh' is the average of the number of points scored by 'Chaman' and 'Gaurav' and the number of points scored by 'Aman' is the average of the number of points scored by 'Chaman' and 'Eesh'. Find the number of points scored by 'Chaman'

(a) 66.6 (b) 72

(c) 86.4 (d) 80

38. The number of points scored by 'Deepesh' is the average of the number of points scored by 'Chaman' and 'Gaurav' and the number of points scored by 'Aman' is the average of the number of points scored by 'Chaman' and 'Eesh'. If Gaurav scored the minimum number of points then what is the average of the points scored by Deepesh and Aman

(a) 71.3 (b) 72

(c) 63 (d) 64

39. How many of the top scorers scored points less than the average points scored by all the 7 top scorers?

(a) 4 (b) 2

(c) 3 (d) 1

Directions (40–44) : Read the following information carefully and answer the questions that follow.

The renowned musical platform, Saregamapa, recently hosted a singing competition featuring four finalists: Amit, Bakshi, Ciara, and Danish. This competition was structured into three stages, with the participants' performances in each round contributing to their final ranking.

The overall ranking was determined by accumulating each finalist's scores across all three rounds. The finalist with the greatest cumulative score emerged as the champion, earning the coveted Rank 1. The second-highest scorer received Rank 2, and so on. Please refer to the table below for a summarised record of the participants' scores over the three rounds.

	Scores				
Rounds	I	II	III	Total	Rank
Ciara		6	8	17	
Bakshi	7	5			1
Amit	6	6			2
Danish					

Let's consider the following details about the scoring:

(i) Danish achieved an identical score in the first and second rounds. The cumulative score from these two rounds equaled his score from the third round.
(ii) The scoring framework ensured that no finalist scored more than eight points in any individual round. Additionally, the aggregate score for a finalist across all three rounds was never less than thirteen points.
(iii) Each finalist exhibited varied performance across the three rounds, ensuring no one achieved identical scores in all rounds.
(iv) Each finalist's total score was unique, ensuring no two finalists ended up with the same cumulative score.
(v) It's crucial to note that the scores obtained by each finalist in any given round were expressed as integer values, maintaining a consistent scoring system.

40. How much did Danish score in round III?

41. What was Amit's total score?
(a) 20 (b) 19
(c) 18 (d) None of these

42. What was the sum of the scores of all the four finalists in round II?
(a) 21 (b) 20
(c) 24 (d) None of these

43. What was the sum of the final scores of all the four finalists?
(a) 70 (b) 71
(c) 68 (d) None of these

44. What is Danish's total score across all the rounds?

Quant

45. A shopkeeper sells Apples. He buys 100 kg of Apples and sells them in packages of 1 kg and 3 kg. He offers 2 packets of 1 kg of Apple free to customers who buys the 3 kg packet. He marks up the price of the Apples by 30% and ends up realizing a profit percentage of 17%. What percentage of the total quantity of Apples sold is sold in 3 kg packets?

46. Atul invested 35% of the sum at 5% per annum at simple rate of interest and rest of the sum at 10% per annum at compound rate of interest. If he received total Rs.3841.6 as interest after 2 years, then calculate the sum
(a) Rs. 24000
(b) Rs. 22400
(c) Rs. 32000
(d) Rs. 32400

47. p, q, r are the sides of the triangle PQR which satisfies the inequation $\left(1+\frac{q-r}{p}\right)^{p} \times \left(1+\frac{r-p}{q}\right)^{q} \times \left(1+\frac{p-q}{r}\right)^{r} \geq 1.$ If the in radius of the triangle is 1 cm, then find the circumradius of the triangle PQR (in cm).

48. What is the last digit of $981^{8789}\,(782^{54} + 8762^{6759}) + 564^{5641}\,(987^{453} + 1)$?

49. Adani won Rs. 65000, 1/5th of which he deposits in Swiss bank and gets it compounded annually for 2 years while he partnered with QIA in a business, with investment of Rs. 4000 less than the remaining money. After 5 months, QIA withdrew Rs. 4800, 2 months after which Adani increased his investment by 10% and the share of profit of Adani after 1 year is Rs. 40,625 which is 625/88 times of the interest received from Swiss bank. Find the amount invested by QIA, if the total profit from the business is Rs. 87,100. Also find the rate of interest given by Swiss bank.
(a) Rs. 60,000, 20% (b) Rs. 65,000, 15%
(c) Rs. 65,500, 20% (d) Rs. 55,000, 12%

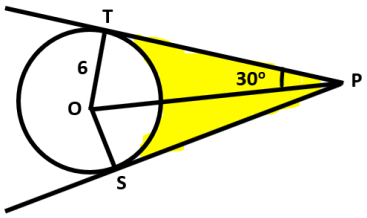
50. A Buyer buys items at the rate of Rs. 30 per item for his shop. But the selling price is linked to the number of items available. Thus, selling price of

first item is Rs. 1, second one for Rs. 3, third for Rs. 5…and so on. The wholesaler wants to make an overall profit of at least 35%, what is the least number of items he should sell?

51. Let the sum of the possible values of x in the equation $\log_3\left(3^{\frac{1}{4x}}+243\right)=\left(\log_3 2^2\right)+\frac{1}{2x}+2$ is P, then what is the value of 36P?

52. When a number is successively divided by 7, 2 and 3, the remainders obtained are 6, 1 and 2, respectively. What will be the remainder when 32 divides the same number?

53. What is the area (in cm^2) of the yellow portion in the following figure? [Assume $\sqrt{3}=1.73$, $\pi=\frac{22}{7}$]



(a) 24.57 (b) 26
(c) 27.54 (d) 29.36

54. Let $(b \sin\theta - \sqrt{3})^2 + (b\cos\theta - 1)^2 = 0$, then if $x^{\frac{5}{6}}k\left(\frac{x}{k}+\frac{k}{x}\right)=b^2x^{-\frac{1}{6}}$, what is the maximum value of x?

55. Area of rhombus is 147 cm^2. Ratio of volume of sphere to the volume of a cylinder is 9: 5, where radius of the sphere is equal to the shorter diagonal of the rhombus and base radius of cylinder is equal to the longer diagonal of the rhombus. Base radius of cylinder is 40% of its height, then what is the difference between the length of both the diagonals of the rhombus?

56. The average height of A-group cows and B-group cows in a farm, are 158 cm and 176 cm respectively and the combined average height of both the groups of cows is 160. Find the ratio of heights of cows for group A to the heights of cows for the group B.

(a) 5 : 1 (b) 1 : 6
(c) 1 : 7 (d) 8 : 1

57. Let in a park, a group of 3 children A, B, and C sit in three corners 4 cm, 5 cm and 7 cm apart from each other. Now if a girl runs around them in such a way that she is always at a distance of 1 cm from the imaginary lines joining each of the two children, then the distance travelled by her is given by

(a) 16 (b) 20
(c) $16+2\pi$ (d) $16+3\pi$

58. An entrepreneur imports some cheap headphones at a cost of \$7 each from China. To make the headphones branded and customized, he hires an engineer at a fixed wage. Then, he sells 100 of these headphones at \$11 each. If the remaining headphones are sold at \$10 each, then he makes a net profit of \$200, and he makes a net loss of \$200 if the remaining headphones are sold at \$8 each. The wage of the engineer, (in \$), is.

59. If α, β are the real roots of the quadratic equation $(px^2 - 4px + 2p + 1) = 0$ where $p \le \frac{1}{2}$. Then find the roots of the below quadratic equation.
$(\alpha/\beta)^{2023}x^2 - (\alpha+\beta)p^2x - (\alpha/p)^2 - (\beta/p) = 0$

(a) 5, 4 (b) 4, –5
(c) –4, –5 (d) 5, –4

60. The sum of the possible values of x in the equation $2|e^{3x}| - 4|e^{2x}| - 46|e^x| + 120 = 0$ is In k. Then, what is the number of divisors of k?

(a) 5 (b) 6
(c) 7 (d) 8

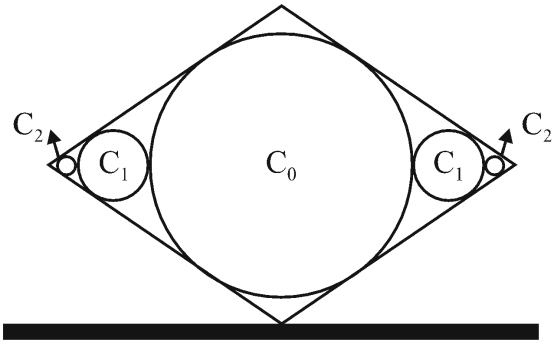
61. In a class of 20 students, all students have a different weight. 60% of the students in the class are boys and the rest of the students are girls. The weight of the boy who weighs the most is 82 kg and the weight of the boy who weighs the least is 53 kg. The weight of the girl who weighs the most is 65 kg and the weight of the girl who weighs the least is 47 kg. What is the maximum possible difference between the average weight of the boys and the average weight of the girls? (Round off to nearest possible integer) It is known that all the weights are natural numbers.

62. In an examination, Musk's score was one-third of the sum of the scores of Depp and Dwayne. After a review, the score of each of them increased by 8. The revised scores of Dwayne, Depp, and Musk were in the ratio 13 : 12 : 9. Then Dwayne's score exceeded Musk's score by

63. A world-famous Chinese martial arts competition was organized for 4 weeks. The number of seats covered in the 2nd week, decreased by 12%, but increased by 14% in the 3rd work week and again decreased by 20% in the 4th week. Find the number of seats covered in the third week if in the last week 80256 seats were covered.

(a) 100320 (b) 90320
(c) 80320 (d) 70320S

64. In a Rhombus of side length of 8 cm and area $32\sqrt{3}$ cm^2 circular holes are punched as shown in the diagram below. C_0 is the largest possible circle inside the Rhombus. C_1 circles are tangent to 2 sides of the Rhombus and C_0. C_2 are circles are tangent to one of the C_1 circles and 2 sides of the rhombus and so on. Find out the remaining area of the Rhombus which is left after punching these infinite circles.



(a) 7.5 cm^2 (b) 8.3 cm^2
(c) 9 cm^2 (d) 9.5 cm^2

65. If $S = 3^{\left(\sin^2 p+\sin^4 p+\sin^6 p+...\infty\right)}$, $0 < p < 1$ satisfies the quadratic equation $x^2 - 6x - 27 = 0$. Then, what is the value of $\frac{(2\sin p - 5\cos p)}{(4\cos p - 5\sin p)}$?

(a) $\sqrt{2}$ (b) $2-\sqrt{3}$
(c) $\frac{1}{\sqrt{2}}$ (d) $\frac{\sqrt{3}}{2}$

66. Let the solution of $\frac{2x^2+x-5}{\left(2x^2+x-3\right)\left(2x^2+x-1\right)} \geq 1$ is $x \in (-a, 1, -1) \cup (a, 1)$, then what is the value of $\log_{2048}[3a/(1+a)]$?

VARC

1.	(b)	5.	(b)	9.	(c)	13.	(b)	17.	(3412)	21.	(c)
2.	(b)	6.	(a)	10.	(b)	14.	(a)	18.	(4132)	22.	(b)
3.	(c)	7.	(b)	11.	(c)	15.	(d)	19.	(2413)	23.	(1)
4.	(a)	8.	(c)	12.	(d)	16.	(a)	20.	(2413)	24.	(1)

LRDI

25.	(b)	29.	(a)	33.	(31)	37.	(b)	41.	(b)
26.	(a)	30.	(a)	34.	(46)	38.	(a)	42.	(a)
27.	(b)	31.	(51)	35.	(c)	39.	(c)	43.	(d)
28.	(d)	32	(33)	36.	(b)	40.	(8)	44.	(16)

QUANT

45.	(15)	50.	(41)	55.	(7)	60.	(b)	65.	(c)
46.	(b)	51.	(15)	56.	(d)	61.	(23)	66.	(0)
47.	(2)	52	(9)	57.	(c)	62.	(16)		
48.	(4)	53.	(a)	58.	(800)	63.	(a)		
49.	(a)	54.	(2)	59.	(d)	64.	(b)		

Hints & Solutions

VARC

1. (b)

Using the BANE theory, we can eliminate options that are too broad, alien, narrow, or extreme.

(a) Sole Proprietorships and Partnerships: Although the passage discusses the advantages and disadvantages of changing from a Sole Proprietorship or Partnership to a Corporation, the primary focus is on the comparison between Sole Proprietorships and Corporations. Therefore, this option is too narrow.

(b) Sole Proprietorships and Corporations: This option correctly identifies the central theme of the passage, which is comparing the choice between operating a business as a Sole Proprietorship or a Corporation. It captures the essence of the passage without being too broad, alien, narrow, or extreme.

(c) Sole Proprietorships, Partnerships, and Joint Ventures: This option is too broad and alien. While the passage briefly mentions Joint Ventures, it does not focus on comparing them to the other business structures.

(d) Sole Proprietorships, Partnerships, and Corporations: This option is also too broad. Although Partnerships are mentioned in the passage, the primary focus is on the choice between Sole Proprietorships and Corporations.

The correct answer is B because it accurately captures the central theme of the passage, which is about the choice between operating a business as a Sole Proprietorship or a Corporation. While the passage mentions Partnerships, they are not the main focus of the comparison. Options A, C, and D can be eliminated using the BANE theory, leaving option B as the best answer.

2. (b)

(a) The passage does mention the prevalence of Sole Proprietorships in the American business landscape, but this is not the main focus of the passage. This option is too narrow, as it does not encompass the entire scope of the passage.

(b) This option is correct, as the passage discusses the pros and cons of transforming a Sole Proprietorship or Partnership into a Corporation, as well as the reasons behind this decision.

(c) Although the passage does cover some disadvantages of Corporations, it is not the primary focus. The passage is more about the process of transforming a business into a Corporation and the considerations involved. This option is too narrow.

(d) This option is extreme, as the passage does not argue that Corporations are the ideal business model for all types of businesses. Instead, it discusses the advantages and disadvantages of transforming a business into a Corporation. This option is too extreme.

Options A and C can be eliminated based on the BANE Theory, as they are both too narrow in scope. Option D can be eliminated as it is too extreme. Option B is the best choice because it accurately reflects the essence of the passage, discussing the advantages and disadvantages of transforming a Sole Proprietorship or Partnership into a Corporation

3. (c)

Option (a): Sole Proprietorships are the most common type of business in America.

Explanation: The passage states, "According to the Foundations of Business 73% or 31 million of the businesses operating today are run as a Sole Proprietorship." This information supports the inference, so option A can be eliminated.

Option (b): Corporations offer more protection for personal assets than Sole Proprietorships.

Explanation: The passage states, "One of the most important advantages is liability to the owner and/or partners. This is huge, because it helps to protect the personal assets of the owner and/or

partners." This information supports the inference, so option b can be eliminated.

Option (c): The corporate tax rate is usually higher than the individual income tax rate.

Explanation: The passage states, "The corporate tax rate is usually lower than the individual income tax rate, according to the SBA." This statement contradicts the inference, so option C is a valid answer.

Option (d): Corporations have more options for raising money than Sole Proprietorships.

Explanation: The passage states, "The Corporation operates as its own entity and this makes raising money come with more options. The company can still borrow for banks or lending institutions, but they can also raise money by selling stock." This information supports the inference, so option D can be eliminated.

Answer: (c). The corporate tax rate is usually higher than the individual income tax rate.

Option (c) is the correct answer as it is not a valid inference from the passage. The passage states the opposite, that the corporate tax rate is usually lower than the individual income tax rate. Options (a), (b), and (d) are all supported by the passage and are therefore not the correct answer.

4. (a)

Detailed Explanation: The passage mentions that one of the key advantages of transforming a Sole Proprietorship or Partnership into a Corporation is the protection it offers to the owner's personal assets (Paragraph 3). In the case of a Corporation, the business is responsible for its own debts, thus shielding the owner from creditors. Hence, the fundamental purpose of transitioning from a Sole Proprietorship to a Corporation would be negated if the liability of a Corporation were to extend to the personal assets of its board members and directors, as stated in option A.

Option B reiterates the advantage of a Corporation, which is explicitly mentioned in the passage, and thus, does not invalidate the purpose of the transition.

Option C is too narrow and somewhat alien as it assigns all liability to the CEO, which isn't discussed or implied in the passage. The structure of a Corporation distributes the responsibility and doesn't exclusively rely on the CEO for the company's debts.

Option D, although seems plausible, it doesn't directly invalidate the purpose of the transition. It adds a condition (depending on the type of debt) which isn't discussed in the passage, making it broad and somewhat extreme.

Therefore, option A is the correct answer.

5. (b)

(a) The development of the Indian money market has been largely successful due to RBI's deregulation of interest rates.

This option is too narrow. While the passage does mention the deregulation of interest rates as one of the measures taken by RBI, it is not the fundamental conclusion. There are several other measures and developments mentioned throughout the passage that contributed to the development of the Indian money market.

(b) The transformation of the call money market into a pure interbank market was essential for improving the monetary transmission mechanism.

This option is accurate and aligned with the passage. The author emphasizes the importance of the call money market and the various measures taken by the RBI, including recommendations from the Narasimham committee, to transform it into a pure interbank market for the purpose of improving the monetary transmission mechanism.

(c) Financial innovations were the primary drivers of growth in the Indian money market.

According to BANE theory, this option is too Broad. While the passage mentions financial innovations as a contributing factor in the development of the Indian money market, it does not imply that they were the primary drivers of

growth. The passage also discusses the broadening of participants' base, strengthening of institutional infrastructure, and various measures taken by the RBI as essential components of the market's development. Thus, this option does not capture the fundamental conclusion of the author.

(d) The introduction of the Negotiated Dealing System (NDS) and the Real Time Gross Settlement (RTGS) system were the most significant factors in the development of the money market.

This option is too Narrow according to BANE theory. While the passage mentions the introduction of NDS and RTGS as measures taken to improve efficiency in the money market, it does not claim that they were the most significant factors in its development. The passage discusses various other factors and measures, such as the transformation of the call money market into a pure interbank market and the introduction of new money market instruments, which were also crucial to the development of the Indian money market. By focusing only on NDS and RTGS, this option does not encompass the author's fundamental conclusion.

6. (a)

(a) Money market, Indian money market, financial instruments, monetary policy, deregulation, RBI, Vaghul Committee, Narasimham Committee, LAF, call money market.

This option captures the core concepts and key elements of the passage. It mentions the money market, its development, the role of the RBI, and the importance of the Vaghul and Narasimham Committees. It also refers to LAF and the call money market, which are crucial aspects of the passage. This option is neither too broad, nor too narrow, and does not include any alien or extreme terms.

(b) Sukhamoy Chakravarty, N. Vaghul, Narasimham, DFHI, CD, RTGS, CCIL, NDS, primary dealers, corporate participation

This option is too narrow and alien, as it focuses primarily on specific names, acronyms, and participant types. While these terms are present in the passage, they don't capture the essence of the passage as a whole. The BANE theory suggests eliminating this option.

(c) Short-term liquidity, interest rates, financial innovations, 1980s, 1990s, 2000s, market efficiency, market depth, repo market, interbank market

This option is too broad and lacks specificity. While it does mention relevant terms like short-term liquidity, interest rates, and market efficiency, it does not mention the central role of RBI, the Vaghul Committee, and the Narasimham Committee, which are essential to understanding the passage. According to the BANE theory, this option should be eliminated.

(d) Overnight funds, borrowing and lending, certificates of deposits, commercial paper, payment system infrastructure, prudential considerations, collateralised borrowing, average daily turnover, interbank market transformation

This option is too narrow, as it focuses on specific aspects of the money market like instruments, payment systems, and collateralized borrowing. It does not capture the overall development of the Indian money market, the role of the RBI, and the recommendations of the Vaghul and Narasimham Committees. Based on the BANE theory, this option should be eliminated.

Answer: (a) Money market, Indian money market, financial instruments, monetary policy, deregulation, RBI, Vaghul Committee, Narasimham Committee, LAF, call money market

7. (b)

(a) Broad - Option A is too broad as it claims that the call money market is the "sole focus" of the RBI's efforts, which is not supported by the paragraph. The passage mentions various segments and instruments in the money market, and the call money market is just one of them.

(b) This option is accurate and well-aligned with the information provided in the sixth paragraph. It mentions the importance of the call money market, the widening of its participation, and the improvement of the monetary transmission mechanism, all of which are discussed in the paragraph.

(c) Alien - Option C is alien to the information provided in the passage. The sixth paragraph clearly states that the call money market is an important segment, and the RBI has taken several measures to develop it, which directly contradicts this option.

(d) Extreme - Option D is extreme and not supported by the passage. The paragraph explains that the call money market was transformed into a pure interbank market in August 2005, following the recommendations of the Narasimham committee. Therefore, it has not always been a pure interbank market.

Answer: B. The call money market has been a significant segment of the Indian money market, and the RBI has taken measures to widen its participation and improve the monetary transmission mechanism

8. **(c)**

Option (a): The passage explicitly states that "Teaching these topics in isolation of each other should be strictly avoided as this may destroy a child's deep mathematical understanding." Therefore, this option is Alien and can be eliminated.

Option (b) : The passage suggests that "This method [rules and recipes] is not the most reliable to children but can be a quick alternative for teachers to teach their class, if they are not fully confident in the topic themselves." This option is not too extreme, but it does mention that it is not the most reliable way. Thus, this option is not the correct answer, but it is not easily eliminated.

Option (c) : The passage states, "However, these theorists also agree that understanding percentages requires no more new skills or concepts beyond those used in identifying fractions, decimals, ratios and proportions." This option is the opposite of what is mentioned in the passage, making it the correct answer. It is an Extreme option.

Option (d) : The passage indicates that "If the teaching is effective, then the child will become more confident and develop more links revolving the topic of percentages. This will result in the child having a high level of understanding." This option is in line with the passage's content and is not easily eliminated.

Using the BANE Theory, we can eliminate option A for being Alien, and option D for being in line with the passage's content. Option B is not easily eliminated, but option C is the correct answer because it is an Extreme option that contradicts the passage's content.

9. **(c)**

Using the BANE theory, we can eliminate options as follows:

(a) A strong understanding of fractions, decimals, ratios, and proportions is necessary for mastering percentages.

This statement can be inferred from the passage as it discusses the importance of linking decimals, fractions, and percentages to children's knowledge of the number system and operations. It also mentions that percentages are closely linked with ratios and proportions in mathematics. Thus, this option is neither Broad, Alien, Narrow, nor Extreme.

(b) Misconceptions in mathematical concepts can be more damaging for children than difficulties in calculations.

This statement can be inferred from the passage as Ryan and Williams (2007) are quoted, stating that it is more damaging for children to have misconceptions of mathematical concepts than difficulties calculating them. Thus, this option is neither Broad, Alien, Narrow, nor Extreme.

(c) Teaching percentages in isolation can improve a child's mathematical understanding.
This statement is Alien and Extreme compared to the passage. The passage explicitly mentions that teaching these topics in isolation should be strictly avoided as it may destroy a child's deep mathematical understanding. Hence, this option is not a valid inference from the passage.
(d) Teachers who are not confident in teaching percentages may rely on rules and recipes, which can lead to misconceptions.
This statement can be inferred from the passage as it discusses how teachers who are not fully confident with percentages may use rules and recipes, which can lead to misconceptions if the child forgets or misapplies the rule. Thus, this option is neither Broad, Alien, Narrow, nor Extreme.
Answer: (c) Teaching percentages in isolation can improve a child's mathematical understanding.
Option C is not a valid inference from the passage, as it contradicts the idea that teaching percentages, fractions, and decimals in isolation should be avoided. The passage emphasizes the importance of linking these topics to develop a deep mathematical understanding in children.

10. (b)

(a) This option is too narrow. The passage mentions the importance of understanding the relationship between percentages, fractions, and decimals but also includes ratios and proportions as being related, as stated by Reys et al. (2010).
(b) This option correctly captures the relationship between percentages, fractions, decimals, ratios, and proportions as described in the passage. Reys et al. (2010) believe that percentages are more closely linked with ratios and proportions, and understanding percentages requires no new skills beyond those used in identifying fractions, decimals, ratios, and proportions.
(c) This option is alien to the passage. The passage emphasizes the importance of understanding the relationship between percentages, fractions, decimals, ratios, and proportions and does not suggest that they are unrelated.
(d) This option is too extreme. The passage explicitly states that understanding percentages requires no new skills beyond those used in identifying fractions, decimals, ratios, and proportions, as mentioned by Reys et al. (2010).
Option (a) and (d) can be eliminated using the BANE Theory, as they are too narrow and too extreme, respectively. Option (c) is alien to the passage and can also be eliminated. Option (b) is the most accurate representation of the passage's viewpoint on the relationship between percentages, fractions, decimals, ratios, and proportions

11. (c)

The main argument of the fourth paragraph is about misconceptions that can occur due to the use of rules and recipes in teaching percentages, especially by teachers who are not fully confident with the topic. The paragraph also states that effective teaching can lead to better understanding and confidence in children.
(a) Misconceptions in mathematics are more damaging than difficulties in calculation - This statement is Alien to the main argument of the fourth paragraph, as it is a statement made in the third paragraph, not the fourth.
(b) Effective teaching of percentages is the sole responsibility of the teacher - This statement is too Extreme. The paragraph does mention that it is the teacher's responsibility for children's success in the subject area. However, it does not state that it is the sole responsibility of the teacher.
(c) The use of rules and recipes in teaching percentages can lead to misconceptions and is not a reliable method - This statement closely reflects the main argument of the fourth paragraph. The paragraph discusses how using rules and recipes can cause misconceptions if children forget or

misapply them and that this method is not the most reliable for children.

(d) Teaching percentages in isolation can hinder children's deep mathematical understanding - This statement is Alien to the main argument of the fourth paragraph, as it is a statement made in the second paragraph, not the fourth.

Hence, the correct answer is option C: The use of rules and recipes in teaching percentages can lead to misconceptions and is not a reliable method.

12. (d)

The correct answer is (d). The passage identifies several potential difficulties children might encounter when learning percentages, such as misunderstanding the terms 'of' and 'out of', struggling to comprehend the percentage of a quantity, and finding it challenging to make the linkage between percentages and fractions or decimals. However, the passage does not suggest that children might prefer to learn percentages in isolation of fractions and decimals. Instead, it warns against teaching these topics in isolation to maintain a child's deep mathematical understanding.

Analyzing the incorrect options: Option (a) is suggested in the first paragraph: "Research has shown that there has been one difficulty which is more common than others; the meaning of the terms 'of' and 'out of'."

Option (b) is found in the second paragraph: "Killen and Hindhaugh (2018) state that a difficulty could occur when they are asking for a percentage of a quantity."

Option (c) is discussed in the third paragraph: "Hansen also comments that the key to succession in the understanding of percentages is the relationship and understanding the children have with fractions and decimals."

While options (a), (b), and (c) are potential difficulties presented in the passage, option (d) is not, hence, making it the correct answer.

13. (b)

(a) Ultrasonography and X-ray are the only prenatal checkups available for pregnant women.

This choice is too narrow. The passage mentions other types of prenatal checkups, such as amniocentesis and chronic villus sampling. These additional methods show that there are more options than just ultrasonography and X-rays for prenatal checkups.

(b) The risks of X-ray exposure during pregnancy are exaggerated and ultrasonography is the safest diagnostic method.

This choice closely aligns with the main idea of the passage. The passage explains that ultrasonography is the safest diagnostic method for pregnant women, as it is non-invasive and does not expose them to radiation. Additionally, the passage highlights that the risks associated with X-ray exposure during pregnancy are often exaggerated, as the dosages used in normal X-ray scans are low and generally safe for both the mother and the fetus.

(c) Prenatal checkups can both diagnose and treat anomalies in fetuses.

This choice is alien. The passage specifically states that ultrasonography can only give an early diagnosis, but it cannot treat anomalies or genetic diseases. The passage does not suggest that prenatal checkups can treat any fetal conditions.

(d) X-ray exposure during pregnancy is completely safe and no precautions are necessary.

This choice is extreme. While the passage explains that the risks of X-ray exposure during pregnancy are often exaggerated and that normal X-ray scans use low dosages that are generally safe, it does not imply that no precautions are necessary. The passage acknowledges that very high doses of radiation from X-ray can cause problems for both the mother and the fetus.

In summary, option (b) is the best answer as it captures the main idea of the passage regarding the safety of ultrasonography and the exaggerated risks of X-ray exposure during pregnancy. The

other options can be eliminated based on the BANE Theory, as they are either too narrow (a), alien (c), or extreme (d).

14. (a)

Explanation: Understanding the question: The question is asking us to identify a view that the author of the passage is least likely to support or agree with. The focus of the passage is primarily on the effects and uses of different medical imaging techniques like X-ray, ultrasonography, and Doppler sonography, especially when used during pregnancy.

Let's analyze each option:

a) High dosage of radiation from X-ray in a short period is benign to pregnant women and their fetus.

The passage in paragraph four clearly states that a very high dose of radiation from X-ray can lead to radiation sickness and in pregnant women, there may also be a risk for the fetus to develop childhood cancer or even miscarriage. This implies that the author would not support the view that a high dosage of radiation from an X-ray in a short period is harmless to pregnant women and their fetuses.

b) Amniocentesis and chronic villus sampling pose risk of miscarriage during the tests.

The second paragraph of the passage directly supports this statement as it mentions that these methods require mechanical penetration and sampling inside the mother's uterus or abdomen, thus increasing the risk of miscarriage during the tests. So, the author would agree with this view.

c) Doppler sonography is capable of detecting the heartbeat of a fetus.

The passage in the first paragraph mentions that the Doppler sonography can be used by mothers who want to see the heartbeat of their babies, thus the author would support this view.

d) Ultrasonography cannot treat anomalies or genetic diseases in fetuses.

In the second paragraph, the author explicitly states that ultrasonography can only give an early diagnosis of the mothers and fetuses, it cannot treat anomalies or genetic diseases. Thus, the author would agree with this statement.

In conclusion, option (a) is the correct answer as it is the view that the author is least likely to support according to the information in the passage.

15. (d)

Using the BANE Theory, we can eliminate options A, B, and C for the following reasons:

(a) Broad - The passage mentions that ultrasonography is a non-invasive procedure involving a transducer placed outside the mother's abdomen. It also states that transvaginal sonography, a type of ultrasonography, involves placing a probe inside the woman's vagina. Doppler sonography is based on the same principle as ultrasonography, implying that it is also non-invasive. This option is too broad and imprecise to describe the primary difference between the two types of sonography.

(b) Alien - The passage does not mention the use of X-rays in Doppler sonography. In fact, the passage discusses X-rays separately from ultrasonography and Doppler sonography. Therefore, this option is alien and unrelated to the primary difference between ultrasonography and Doppler sonography.

(c) Narrow - The passage states that the heartbeat of the fetus can be detected using Doppler sonography, but it does not mention that ultrasonography cannot detect the heartbeat. In fact, ultrasonography can detect various aspects of fetal development. This option is too narrow and does not accurately describe the primary difference between ultrasonography and Doppler sonography.

(d) This option correctly identifies the primary difference between ultrasonography and Doppler sonography. While both types of sonography use ultrasound waves to create images of the fetus,

Doppler sonography further enhances the ultrasound with the Doppler effect. This allows for the detection of changes in the direction of blood flow and the assessment of the fetus's circulation.

16. (a)

Option A is LEAST likely to be supported by the author because the passage mentions that "the risk of the fetus having eye abnormalities or mental retardation increases only when the dosage exceeds 10 rads" and "according to radiologists, no single diagnostic x-ray has a radiation dose significant enough to cause adverse effects in a developing embryo or fetus." Therefore, the author suggests that X-ray imaging is generally safe for pregnant women, as long as the dosage is within acceptable limits. This option can be considered too extreme according to the BANE theory.

Option B is supported by the author, as the passage states that "ultrasonography can only give an early diagnosis of the mothers and fetuses, it cannot treat anomalies or genetic diseases." Thus, the author agrees with the idea that ultrasonography is useful for detecting fetal health issues but not for treating them.

Option C is also supported by the author, as the passage explains that "in case that the pregnant woman is in early pregnancy or obese, she can undergo transvaginal sonography." This suggests that transvaginal sonography is a viable option for certain pregnant women.

Option D is supported by the author as well, as the passage describes that "the Doppler sonography can thus detect the change in directions of blood flow by Doppler effect and see if the circulation is normal or not." This indicates that Doppler sonography can be useful for observing fetal blood flow and heartbeat.

By using the BANE theory, we can eliminate options B, C, and D as they are in line with the author's views, leaving option A as the least likely view that the author would support.

17. (3412)

The correct sequence is 3,4,1,2 because it presents a logical flow of information:

3) The paragraph begins by explaining that governments impose limits on companies' emissions to reduce greenhouse gas emissions.

4) The concept of carbon credits is introduced as a market-based mechanism to encourage companies to reduce their emissions.

1) It then explains that carbon credits can be traded on various markets, providing companies with the opportunity to offset their emissions.

2) Finally, the paragraph highlights that companies exceeding their emissions allowances can purchase carbon credits from those with surplus credits, thus promoting a balance in the market.

18. (4132)

The logical order of the sentences is 4132. Sentence 4 provides the context, discussing the importance of Brazil's forests for biodiversity conservation and climate change mitigation. Sentence 1 then introduces the Brazilian Forest Code, which mandates the protection of a portion of privately-owned lands. Sentence 3 introduces the Environmental Reserve Quota (CRA) as a tool to help landowners meet their obligations under the Forest Code. Finally, sentence 2 explains how landowners can use the CRA to offset their environmental obligations by purchasing or leasing land in protected areas.

19. (2413)

Explanation:

The correct sequence of the sentences is 2413, as this sequence presents a coherent and meaningful paragraph. The sentences in this order follow a logical flow of information about the Uprising of the 20,000:

2) First, the paragraph introduces the event, the Uprising of the 20,000, which took place in 1909 in New York City.

4) The paragraph then presents a crucial detail about the event, that the majority of the strikers were young immigrant women who faced harsh working conditions and low wages.

1) Next, the paragraph introduces the person behind the movement, Pauline Newman, who organized the protest and coordinated with other labor leaders.

3) Finally, the paragraph concludes with the significance of the strike, as it was an important step in the fight for better working conditions and wages for female garment workers.

20. (2413)

Explanation: The correct sequence of the sentences is 2413, as this sequence presents a coherent and meaningful paragraph. The sentences in this order follow a logical flow of information about the conservation movement in the United States:

2) First, the paragraph introduces the time frame of the conservation movement, which took place in the late 19th and early 20th centuries in the United States.

4) Next, the paragraph outlines the main goal of the movement: to protect natural resources from industrialization and overexploitation.

1) The paragraph then presents the outcome of the movement, which led to the establishment of national parks and the preservation of wildlife and natural habitats.

3) Finally, the paragraph highlights the contributions of influential figures like John Muir and Theodore Roosevelt, who played a key role in the movement's success.

21. (c)

(a) Alien - This option focuses on nonstate actors and suggests that they are the key players, while the passage is more about questioning the role of nation-states and the confusion around governance due to multiple actors.

b) Narrow - Although the passage does mention that the role of the nation-state is being questioned, it doesn't emphasize their importance but rather the confusion around their role and other actors in global health governance.

c) Correct Answer - This option accurately reflects the passage's focus on the challenges in understanding the role of nation-states in global health governance due to the involvement of multiple nonstate and transnational actors.

d) Extreme - The passage doesn't argue that the international community should solely rely on nation-states; instead, it questions their role and highlights the complexity of global health governance with multiple actors involved.

According to the BANE Theory:

Broad: There is no option that is too broad.

Alien: Option 'a' can be eliminated as it is alien to the main focus of the passage.

Narrow: Option 'b' can be eliminated as it is too narrow and doesn't capture the complexity of the issue.

Extreme: Option 'd' can be eliminated as it is an extreme statement that doesn't reflect the passage's content.

Thus, the correct answer is option 'c,' which captures the essence of the passage and highlights the challenges in understanding the role of nation-states in global health governance due to the involvement of multiple nonstate and transnational actors.

22. (b)

(a) Broad - This choice is too broad because it only focuses on the definition of bullying provided by the U.S. Department of Health and Human Services and Trevor Noah's book. It fails to capture the main argument of the passage about the negative effects of bullying and the need for zero tolerance policies in schools.

(b) Correct - This choice accurately summarizes the passage by discussing the detrimental effects of bullying on children's mental health and

self-esteem. It also highlights the author's opinion that schools should have a zero tolerance policy to address bullying.

(c) Alien - This choice introduces an idea that is not central to the passage's main argument. While it mentions parents' differing opinions on bullying, it does not emphasize the key points of the passage, such as the negative effects of bullying and the need for zero tolerance policies in schools.

(d) Narrow - This choice is too narrow because it focuses only on substance abuse and suicidal tendencies as consequences of bullying. Although these are mentioned in the passage, the main argument is about the overall negative impact of bullying on mental health, self-esteem, and the importance of zero tolerance policies in schools.

23. **(1)**

Statements 2, 3, 4, and 5 can be logically connected as they all discuss aspects related to the impact of climate change on ecosystems, particularly focusing on coral reefs. They collectively present a scenario where, despite human-induced climate alterations, the ecosystems demonstrate resilience and adaptability. Furthermore, they hint at possible future scenarios of ecosystems, specifically the changes expected in coral reefs.

Statement 2 highlights the resilience and adaptability of coral reefs. Statement 3 expands the scope to major ecosystems on the planet demonstrating similar traits. Statement 4 introduces the idea of contemplating future conditions of these ecosystems amidst the ongoing climate crisis. Lastly, statement 5 provides a potential future outlook specifically for coral reefs.

Statement 1, on the other hand, does not fit into this narrative as it does not concern climate change or ecosystems. Instead, it discusses the application of a philosophical aphorism to the field of sports training, making it the odd one out in this context.

Hence, statement 1 is the odd one out.

24. **(1)**

Statements 2, 3, 4, and 5 can be logically connected as they discuss the impact and influence of the BBC Radiophonic Workshop and Delia Derbyshire's role in creating the Doctor Who theme music. They collectively present the significance of the workshop in various music realms and its pioneering role in the creation of new sounds.

Statement 2 introduces the role of Delia Derbyshire and the significance of the Doctor Who theme music. Statement 3 discusses the broad influence of the workshop beyond the realm of radio. Statement 4 adds an example of the innovative techniques used at the workshop, and statement 5 rounds off the narrative by discussing the workshop's impact on the electronic music scene of the 1960s.

Statement 1, however, stands out from this group because it goes back to the creation of the workshop, a point in time earlier than the others. While it provides relevant historical context, it does not seamlessly fit into the narrative formed by the other four statements, which mainly focus on the workshop's influence and outputs. Hence, statement 1 is the odd one out.

LRDI

25. **(b)**

Q1 cost is \$15 Million.

So, Q1 profit is (\$20 - \$15) Million = \$5 Million.

Thus, the profits are \$5 Million, \$10 Million, \$15 Million and \$10 Million respectively in Q1, Q2, Q3 & Q4 as per the ratio (1 : 2 : 3 : 2).

The cost in Q2 = (\$18 - \$ 10) Million = \$8 Million

The cost in Q3 = (\$22 - \$ 15) Million = \$7 Million

The cost in Q4 = (\$24 - \$ 10) Million = \$14 Million

Thus, total cost in Q2 & Q4 is \$22 Million

26. **(a)**

Q1 cost is \$15 Million.
So, Q1 profit is (\$20 - \$15) Million = \$5 Million.
Thus, the profits are \$5 Million, \$10 Million, \$15 Million and \$10 Million respectively in Q1, Q2, Q3 & Q4.
The cost in Q2 = (\$18 - \$ 10) Million = \$8 Million
The cost in Q3 = (\$22 - \$ 15) Million = \$7 Million
The cost in Q4 = (\$24 - \$ 10) Million = \$14 Million

Thus, the answer is $\frac{6}{8}\times 100\% = 75\%$

27. (b)

Total revenue in 2022 is \$(20 + 18 + 22 + 24) Million = \$ 84 Million.
The projected revenue for 2023 is \$84 Million

$\times\frac{6}{7} = \$72$ Million

The ratio of the projected revenues in Q1, Q2, Q3 & Q4 is 2 : 3 : 3 : 4

So, the revenue in Q1 $= 2\times\frac{72}{2+3+3+4} = \$12$ Million.

The revenue in Q2 = revenue in Q3 $= 3\times\frac{72}{12}$

= \$ 18 Million.
The revenue in Q4 = \$72 - \$12 - \$18 - \$18 = \$24 Million.
Thus, the answer is \$24 Million.

28. (d)

Total revenue in 2022 is \$(20 + 18 + 22 + 24) Million = \$ 84 Million.
The projected revenue for 2023 is \$84 Million

$\times\frac{6}{7} = \$72$ Million.

The ratio of the projected revenues in Q1, Q2, Q3 & Q4 is 2 : 3 : 3 : 4

So, the revenue in Q1 $= 2\times\frac{72}{2+3+3+4}$

= \$ 12 Million.

The revenue in Q2 = revenue in Q3 $= 3\times\frac{72}{12}$

= \$ 18 Million.
The revenue in Q4 = \$72 - \$12 - \$18 - \$18 = \$24 Million.
Let's assume that the cost for quarter 1 is \$x Million, then we can say that
=> (18 – x) = (24 – 2x)
=> x = 6
So, the savings in Q1 = \$12 Million - \$ 6 Million
= \$ 6 Million.
The savings in Q2 = \$18 Million - \$ 12 Million
= \$ 6 Million
The savings in Q3 = \$18 Million - \$ 6 Million
= \$ 12 Million
The savings in Q4 = \$24 Million - \$ 12 Million
= \$ 12 Million
Total savings from Q1 & Q4 = \$(6 + 12) Million
= \$18 Million.

29. (a)

Total profit for Q1 + Q2 + Q3 = Total loss in Q4
= (\$40 - \$24) Million
= \$16 Million
Let's assume that the profits in Q1, Q2 & Q3 are \$4x Million, \$3x Million & \$x Million.
So,
8x = 16
x = 2
4x = 8
3x = 6
Thus, the cost in Q1 = (\$20 - \$8) Million
= \$ 12 Million
The cost in Q3 = (\$22 - \$2) Million = \$20 Million.
Thus, the total cost in Q1 & Q3 = (\$12 + \$20) Million = \$32 Million.

30. (a)

Let's understand the logic of on and off.
A bulb is on/off if J_n divides that bulb number. For example, Bulb number B_{45} is on/off by J_1, J_3, J_5, J_9, J_{15}, and J_{45} Scientist. Here J_1 Switched on the bulb

and J_3 Switched off the bulb then J_5 and J_{15} on the switch and J_9 and J_{45} switched off the bulb. So we can conclude that even number of factors of a number results in an off scenario and an odd number of factors results in on scenarios.

If all the bulbs remain working then only those bulbs will be in "on mode" whose subscripts are perfect square as perfect square has an odd number of factors.

So, B_1, B_4, B_9, B_{16}, B_{25}, B_{36}, B_{49}, B_{64}, B_{81}, B_{100} will be in on mode.

The respective code visible on the screen is -

B_1 - a_1, B_4 - d_1, B_9 - i_1, B_{16} - p_1, B_{25} - y_1, B_{36} - J_2, B_{49} - w_2, B_{64} - l_3, B_{81} - c_4, B_{100} - v_4.

Hence the right answer is a_1, d_1, i_1, p_1, y_1, j_2, w_2, l_3, c_4, v_4 option a.

31. (51)

A bulb is on/off if J_n divides that bulb number. For example, Bulb number B_{45} is on/off by J_1, J_3, J_5, J_9, J_{15}, and J_{45} Scientist. Here J_1 Switched on the bulb and J_3 Switched off the bulb then J_5 and J_{15} on the switch and J_9 and J_{45} switched off the bulb. So we can conclude that even number of factors of a number results in an off scenario and an odd number of factors results in on scenarios.

Here q_1, y_2, g_4 is visible on the screen along with the normal code; it means that B_{17}, B_{51} and B_{85} are in on position.

Factors of 17 = 1 and 17

J_1 on the Bulb and J_{17} switch off the bulb.

If screen 17th is not short circuited then bulb B_{17} must be in off position but it is in on position it means J_1 on this bulb but J_{17} screen short circuited so J_{17} is not able to change the status so it is showing on position.

J_{17} is not able to change the position of B_{17} then one can say that J_{17} screen is short circuited.

Factors of 34 = 1(on), 2(off), 17(Short circuited), 34(Short circuited)

But B_{34}'s code is not visible on the main screen it means that J_{34}'s screen is also short circuited so it will be in the off position.

Factors of 51 = 1(On), 3(off), 17(Short circuited), 51(on) technically this needs to be in off position but J_{17}'s screen is short circuited so J_{51}'s scientist will change the status as on.

Factors of 68 = 1(on), 2(off), 4(on), 17(Short circuited), 34(Short circuited), 68(off)

As B_{68}'s code is not visible on the screen then it must be in the off position.

Factors of 85 = 1(on), 5(off), 17(Short circuited), 85(On) technically this needs to be in off position but J_{17}th screen is short circuited so J_{85}th r will change the status as On.

So, J_{17} and J_{34}'s screens were short circuited.

Thus, the sum of the subscripts is (17 + 34) = 51

32. (33)

Let's understand the logic of on and off.

A bulb is on/off if J_n divides that bulb number. For example, Bulb number B_{45} is on/off by J_1, J_3, J_5, J_9, J_{15}, and J_{45} Scientist. Here J_1 Switched on the bulb and J_3 Switched off the bulb then J_5 and J_{15} on the switch and J_9 and J_{45} switched off the bulb. So we can conclude that even number of factors of a number results in an off scenario and an odd number of factors results in on scenarios.

If all the screens in the Gamma group are short circuited then J_{51} to J_{75} can not change the status of bulbs.

So, The number of bulbs which will remains on are = number of perfect squares from 1 to 50 + Number of perfect square from 76 to 100 + number of non perfect square from 51 to 75 = 7 + 2 + (25 - 1) = 33.

33. (31)

Let's understand the logic of on and off.

A bulb is on/off if J_n divides that bulb number. For example, Bulb number B_{45} is on/off by J_1, J_3, J_5, J_9, J_{15}, and J_{45} Scientist. Here J_1 Switched on the bulb and J_3 Switched off the bulb then J_5 and J_{15} on the switch and J_9 and J_{45} switched off the bulb. So we can conclude that even number of factors of a

number results in an off scenario and an odd number of factors results in on scenarios.

If all the screen in the Pi group are short circuited, then the number of on switches are = Number of perfect squares from 1 to 75 + Number of non perfect squares from 76 to 100

= 8 + (25 - 2)

= 8 + 23

= 31

34. (46)

A bulb is on/off if J_n divides that bulb number. For example, Bulb number B_{45} is on/off by J_1, J_3, J_5, J_9, J_{15}, and J_{45} Scientist. Here J_1 Switched on the bulb and J_3 Switched off the bulb then J_5 and J_{15} on the switch and J_9 and J_{45} switched off the bulb. So we can conclude that even number of factors of a number results in an off scenario and an odd number of factors results in on scenarios.

Here t_2, n_4 is visible on the screen along with the normal code; it means that B_{46} and B_{92} are in on position.

Factors of 46 = 1, 2, 23, 46.

Factors of 92 = 1, 2, 4, 23, 46, 92.

As one can observe that these are supposed to be off but these are on it means out of these some screens are short circuited.

1, 2, and 4 can not be the short circuited screen because if these are the ones than it will hamper the position of other bulbs as well.

So out of 23, 46 and 92 may be one or two are short circuited.

Factors of 23 = 1 and 23

J_1 switched on the bulb and J_{23} switched off the bulb. If one of the two is short circuited then it will end up as On switch and the corresponding code will be shown on the screen but it is not visible it means that B_{23} is off.

Factors of 46 = 1(on), 2(off), 23(on), 46(Short circuited)

As code corresponding to 46 is visible on screen so it must be in On.

So one can say that J_{46}'s Screen is short circuited.

Factors of 92 = 1(on), 2(off), 4(on), 23(off), 46(short circuited), 92(on)

As the code corresponding to B_{92} is visible on the screen then it must be on. So B_{92} cannot be short circuited.

So only J_4's screen is short circuited so the final answer is 46.

35. (c)

Let the number of points scored by the 7 top scorers be S1, S2, S3, S4, S5, S6 and S7. So, we have 7 equations:

S1 + S2 + S3 + S4 + S5 + S6 = 447 --------(1)

S1 + S2 + S3 + S4 + S5 + S7 = 440.6 --------(2)

S1 + S2 + S3 + S4 + S6 + S7 = 460.4 --------(3)

S1 + S2 + S3 + S5 + S6 + S7 = 465.8 --------(4)

S1 + S2 + S4 + S5 + S6 + S7 = 442.2 --------(5)

S1 + S3 + S4 + S5 + S6 + S7 = 455 --------(6)

S2 + S3 + S4 + S5 + S6 + S7 = 451 --------(7)

Adding all these equations = 6(S1 + S2 + S3 + S4 + S5 + S6 + S7) = 3162

S1 + S2 + S3 + S4 + S5 + S6 + S7 = 527

S1 = 76

S2 = 72

S3 = 84.8

S4 = 61.2

S5 = 66.6

S6 = 86.4

S7 = 80

The minimum score is 61.2.

36. (b)

Let the number of points scored by the 7 top scorers be S1, S2, S3, S4, S5, S6 and S7. So, we have 7 equations:

S1 + S2 + S3 + S4 + S5 + S6 = 447 --------(1)

S1 + S2 + S3 + S4 + S5 + S7 = 440.6 --------(2)

S1 + S2 + S3 + S4 + S6 + S7 = 460.4 --------(3)

S1 + S2 + S3 + S5 + S6 + S7 = 465.8 --------(4)

S1 + S2 + S4 + S5 + S6 + S7 = 442.2 --------(5)

S1 + S3 + S4 + S5 + S6 + S7 = 455 --------(6)

S2 + S3 + S4 + S5 + S6 + S7 = 451 --------(7)

Adding all these equations = 6(S1 + S2 + S3 + S4 + S5 + S6 + S7) = 3162
S1 + S2 + S3 + S4 + S5 + S6 + S7 = 527
S1 = 76
S2 = 72
S3 = 84.8
S4 = 61.2
S5 = 66.6
S6 = 86.4
S7 = 80
The maximum score is 86.4.
Hence option b will be the correct choice.

37. (b)

Let the number of points scored by the 7 top scorers be S1, S2, S3, S4, S5, S6 and S7. So, we have 7 equations:
S1 + S2 + S3 + S4 + S5 + S6 = 447 --------(1)
S1 + S2 + S3 + S4 + S5 + S7 = 440.6 --------(2)
S1 + S2 + S3 + S4 + S6 + S7 = 460.4 --------(3)
S1 + S2 + S3 + S5 + S6 + S7 = 465.8 --------(4)
S1 + S2 + S4 + S5 + S6 + S7 = 442.2 --------(5)
S1 + S3 + S4 + S5 + S6 + S7 = 455 --------(6)
S2 + S3 + S4 + S5 + S6 + S7 = 451 --------(7)
Adding all these equations = 6(S1 + S2 + S3 + S4 + S5 + S6 + S7) = 3162
S1 + S2 + S3 + S4 + S5 + S6 + S7 = 527
S1 = 76
S2 = 72
S3 = 84.8
S4 = 61.2
S5 = 66.6
S6 = 86.4
S7 = 80
As we can observe here, 76 is the average of 72 and 80 and 66.6 is the average of 61.2 and 72.
Now in the question, both equations have Chaman as a common entity and in our case 72 is common so the score of Chaman must be 72.

38. (a)

Let the number of points scored by the 7 top scorers be S1, S2, S3, S4, S5, S6 and S7. So, we have 7 equations:
S1 + S2 + S3 + S4 + S5 + S6 = 447 --------(1)
S1 + S2 + S3 + S4 + S5 + S7 = 440.6 --------(2)
S1 + S2 + S3 + S4 + S6 + S7 = 460.4 --------(3)
S1 + S2 + S3 + S5 + S6 + S7 = 465.8 --------(4)
S1 + S2 + S4 + S5 + S6 + S7 = 442.2 --------(5)
S1 + S3 + S4 + S5 + S6 + S7 = 455 --------(6)
S2 + S3 + S4 + S5 + S6 + S7 = 451 --------(7)
Adding all these equations = 6(S1 + S2 + S3 + S4 + S5 + S6 + S7) = 3162
S1 + S2 + S3 + S4 + S5 + S6 + S7 = 527
S1 = 76
S2 = 72
S3 = 84.8
S4 = 61.2
S5 = 66.6
S6 = 86.4
S7 = 80
As we can observe here, 76 is the average of 72 and 80 and 66.6 is the average of 61.2 and 72.
Now in the question, both equations have Chaman as a common entity and in our case 72 is common so the score of Chaman must be 72.
Now here it is given that gaurav scored the minimum points it means 61.2 is scored by Gaurav and 80 is scored by Eesh
Score of Deepesh becomes 76 and the score of Aman becomes 66.6

Required average $= \frac{76 + 66.6}{2} = 71.3$

39. (c)

Let the number of points scored by the 7 top scorers be S1, S2, S3, S4, S5, S6 and S7. So, we have 7 equations:
S1 + S2 + S3 + S4 + S5 + S6 = 447 --------(1)
S1 + S2 + S3 + S4 + S5 + S7 = 440.6 --------(2)
S1 + S2 + S3 + S4 + S6 + S7 = 460.4 --------(3)
S1 + S2 + S3 + S5 + S6 + S7 = 465.8 --------(4)
S1 + S2 + S4 + S5 + S6 + S7 = 442.2 --------(5)
S1 + S3 + S4 + S5 + S6 + S7 = 455 --------(6)
S2 + S3 + S4 + S5 + S6 + S7 = 451 --------(7)

Adding all these equations = 6(S1 + S2 + S3 + S4 + S5 + S6 + S7) = 3162

S1 + S2 + S3 + S4 + S5 + S6 + S7 = 527

S1 = 76

S2 = 72

S3 = 84.8

S4 = 61.2

S5 = 66.6

S6 = 86.4

S7 = 80

The Average of the top seven scorer

$$= \frac{76 + 72 + 84.8 + 61.2 + 66.6 + 86.4 + 80}{7} = 75.28$$

Here S2, S4, S5 is less than 75.28 Hence 3 will be the correct choice.

40. (8)

Statement (i) says Danish scored equal in round I and round II. Let that score be 'a' and hence a + a = 2a is his score in round 3.

Rounds	I	II	III	Total	Rank
Ciara		6	8	17	
Bakshi	7	5			1
Amit	6	6			2
Danish	a	a	2a		

Ciara's score in round I is 17 – 6 – 8 = 3 and since Bakshi's rank is 1, therefore he must have scored greater than 17. As statement (ii) says score of any individual is not greater than 8,

Possible scores of Bakshi can be

7 + 5 + 8 = 20 and,

7 + 5 + 7 = 19

7 + 5 + 6 = 18 is not possible because Amit scored rank 2, and therefore his total score will be between Bakshi's and Ciara's score.

By statement (iii), since no finalist scored the same in all three rounds, Amit cannot score 18 (6 + 6 + 6). So, he must have scored 19 and hence Bakshi must have scored 20.

No one scores less than 13, and Danish's total score is a + a + 2a = 4a and the only possibility to get an integral value in the required range is a = 4.

Therefore, Danish's score is 16.

Final table will look as shown below:

Rounds	I	II	III	Total	Rank
Ciara	3	6	8	17	3
Bakshi	7	5	8	20	1
Amit	6	6	7	19	2
Danish	4	4	8	16	4

Danish scored 8 in round III.

41. (b)

Statement (i) says Danish scored equal in round I and round II. Let that score be 'a' and hence a + a = 2a is his score in round 3.

Rounds	I	II	III	Total	Rank
Ciara		6	8	17	
Bakshi	7	5			1
Amit	6	6			2
Danish	a	a	2a		

Ciara's score in round I is 17 – 6 – 8 = 3 and since Bakshi's rank is 1, therefore he must have scored greater than 17. As statement (ii) says score of any individual is not greater than 8,

Possible scores of Bakshi can be

7 + 5 + 8 = 20 and,

7 + 5 + 7 = 19

7 + 5 + 6 = 18 is not possible because Amit scored rank 2, and therefore his total score will be between Bakshi's and Ciara's score.

By statement (iii), since no finalist scored the same in all three rounds, Amit cannot score 18 (6 + 6 + 6). So, he must have scored 19 and hence Bakshi must have scored 20.

No one scores less than 13, and Danish's total score is a + a + 2a = 4a and the only possibility to get an integral value in the required range is a = 4.

Therefore, Danish's score is 16.

Final table will look as shown below:

Rounds	I	II	III	Total	Rank
Ciara	3	6	8	17	3
Bakshi	7	5	8	20	1
Amit	6	6	7	19	2

Danish	4	4	8	16	4

Amit total score is 19.

42. (a)

Statement (i) says Danish scored equal in round I and round II. Let that score be 'a' and hence a + a = 2a is his score in round 3.

Rounds	I	II	III	Total	Rank
Ciara		6	8	17	
Bakshi	7	5			1
Amit	6	6			2
Danish	a	a	2a		

Ciara's score in round I is 17 – 6 – 8 = 3 and since Bakshi's rank is 1, therefore he must have scored greater than 17. As statement (ii) says score of any individual is not greater than 8,

Possible scores of Bakshi can be

7 + 5 + 8 = 20 and,

7 + 5 + 7 = 19

7 + 5 + 6 = 18 is not possible because Amit scored rank 2, and therefore his total score will be between Bakshi's and Ciara's score.

By statement (iii), since no finalist scored the same in all three rounds, Amit cannot score 18 (6 + 6 + 6). So, he must have scored 19 and hence Bakshi must have scored 20.

No one scores less than 13, and Danish's total score is a + a + 2a = 4a and the only possibility to get an integral value in the required range is a = 4.

Therefore, Danish's score is 16.

Final table will look as shown below:

Rounds	I	II	III	Total	Rank
Ciara	3	6	8	17	3
Bakshi	7	5	8	20	1
Amit	6	6	7	19	2
Danish	4	4	8	16	4

Required sum = 6 + 5 + 6 + 4 = 21

43. (d)

Statement (i) says Danish scored equal in round I and round II. Let that score be 'a' and hence a + a = 2a is his score in round 3.

Rounds	I	II	III	Total	Rank
Ciara		6	8	17	
Bakshi	7	5			1
Amit	6	6			2
Danish	a	a	2a		

Ciara's score in round I is 17 – 6 – 8 = 3 and since Bakshi's rank is 1, therefore he must have scored greater than 17. As statement (ii) says score of any individual is not greater than 8,

Possible scores of Bakshi can be

7 + 5 + 8 = 20 and,

7 + 5 + 7 = 19

7 + 5 + 6 = 18 is not possible because Amit scored rank 2, and therefore his total score will be between Bakshi's and Ciara's score.

By statement (iii), since no finalist scored the same in all three rounds, Amit cannot score 18 (6 + 6 + 6). So, he must have scored 19 and hence Bakshi must have scored 20.

No one scores less than 13, and Danish's total score is a + a + 2a = 4a and the only possibility to get an integral value in the required range is a = 4.

Therefore, Danish's score is 16.

Final table will look as shown below:

Rounds	I	II	III	Total	Rank
Ciara	3	6	8	17	3
Bakshi	7	5	8	20	1
Amit	6	6	7	19	2
Danish	4	4	8	16	4

Total score: 17 + 20 + 19 + 16 = 72.

44. (16)

From the table below we can state that Danish's total score across all the rounds is 16.

Rounds	I	II	III	Total	Rank
Ciara	3	6	8	17	3
Bakshi	7	5	8	20	1
Amit	6	6	7	19	2

Danish	4	4	8	16	4

QUANT

45. (15)

Let the cost price of 1 kg of Apple be Rs.1.
Selling price of 1 kg Apple packet = Rs.1.3
Selling price of 3kg of Apple packet = Rs.3.9.
But, by paying Rs. 3.9, the customer gets 5 kg of Apples.
Therefore, the selling price of Apples that are not sold as 1 kg packets = 3.9/5
Let the number of 1 kg packets that are sold for a price (not counting the ones given away with the 3 kg packets) be x.
x kg of Apples is sold as 1 kg packets and the remaining are sold as 5 kg combos (3 kg + 2*1kg packets).
It has been given that the net profit percentage is 17%. Therefore, the net revenue = Rs. 117
1.3x + 3.9 (100 – x)/5 = 117
6.5x + 390 – 3.9x = 585
2.6x = 195 x = 75. Therefore, 75 kg of Apples are sold as 1 kg packets.
Remaining 25 kg must be sold as 5 kg combos.
$\frac{25}{5}$ = 5 combos are sold in total. 5 combos will contain 5 packets of 3 kg. Therefore, quantity of Apple sold as 3 kg packets = 5*3 = 15 kg or 15%.

46. (b)

Let the sum = Rs. P
We know, SI = sum × rate × time/100
CI = sum × ((1+rate/100)^{time} – 1)
So, SI = 35% of P × 5 × 2/100 = 0.035P
CI = 65% of P × ((1+ 10/100)² – 1) = 0.1365P
Now, 0.035P+ 0.1365P = 3841.6
0.1715P = 3841.6
P = 22400.
Hence, option (b) is correct

47. (2)

Let $s = \frac{(a+b+c)}{2}$ = Semi-perimeter of the triangle.
Using AM ≥ GM, we get

$$\left[\frac{p\left(\frac{s-r}{p}\right)+q\left(\frac{s-p}{q}\right)+r\left(\frac{s-q}{r}\right)}{p+q+r}\right]$$

$$\geq\left[\left(\frac{s-r}{p}\right)^{p}\left(\frac{s-p}{q}\right)^{q}\left(\frac{s-q}{r}\right)^{r}\right]^{\frac{1}{p+q+r}}$$

$$\Rightarrow\left(\frac{3s-2s}{2s}\right)^{p+q+r}\geq\left[\left(\frac{s-r}{p}\right)^{p}\left(\frac{s-p}{q}\right)^{q}\left(\frac{s-q}{r}\right)^{r}\right]$$

$$\Rightarrow 1\geq\left[\left(\frac{2s-2r}{p}\right)^{p}\left(\frac{2s-2p}{q}\right)^{q}\left(\frac{2s-2q}{r}\right)^{r}\right]$$

$$\Rightarrow\ 1\geq\left(\frac{p+q-r}{p}\right)^{p}\left(\frac{q+r-p}{q}\right)^{q}\left(\frac{r+p-q}{r}\right)^{r}$$

$$\Rightarrow\left(1+\frac{q-r}{p}\right)^{p}\left(1+\frac{r-p}{q}\right)^{q}\left(1+\frac{p-q}{r}\right)^{r}\leq 1$$

Given that,

$$\left(1+\frac{q-r}{p}\right)^{p}\times\left(1+\frac{r-p}{q}\right)^{q}\times\left(1+\frac{p-q}{r}\right)^{r}\geq 1$$

So, $\left(1+\frac{q-r}{p}\right)^{p}\times\left(1+\frac{r-p}{q}\right)^{q}\times\left(1+\frac{p-q}{r}\right)^{r}=1$

This means, (s – r) = (s – p) = (s – q).

$\Rightarrow$ p = q = r.

Given that, in-radius = 1 cm.

So, $\frac{\Delta}{s}=1$

$$\Rightarrow \frac{\frac{p^2\sqrt{3}}{4}}{\frac{3p}{2}} = 1$$

$$\Rightarrow \frac{p}{\sqrt{3}} = 2$$

$$\Rightarrow \quad p = 2\sqrt{3} \ .$$

Therefore, the circumradius = $abc / 4\Delta$

$$\frac{24\sqrt{3}}{\left(12\sqrt{3}\right)}$$

= 2.

48. **(4)**

The last digit of 981^{8789} is same as the last digit of 1^{8789}, which is 1.

The last digit of 782^{54} is same as the last digit of 2^{54}, which is $2^{\text{Rem}\left[\frac{54}{4}\right]}$ i.e., $2^2 = 4$. [Since the cyclicity of 2 is 4.]

Also, the unit digit of 8762^{6759} is same as the unit digit of 2^{6759}, which is the unit digit of $2^{\text{Rem}\left[\frac{6759}{4}\right]}$, i.e., $2^3 = 8$ [Since the cyclicity of 2 is 4.]

The last digit of 564^{5641} is same as the last digit of 4^{5641}, which is 4. [Since 4 to the power any odd number produces a number whose unit digit is always 4.]

The last digit of 987^{453} is same as the last digit of 7^{453}, which is $7^{\text{Rem}\left[\frac{453}{4}\right]}$, i.e. 7. [Since the cyclicity of 7 is 4].

Hence, the last digit of 981^{8789} $(782^{54} + 8762^{6759}) + 564^{5641}$ $(987^{453} + 1)$.

= The last digit of 1 (4 + 8) + 4 (7 + 1).

= 4.

49. **(a)**

Interest = $\frac{40,625 \times 88}{625}$ = Rs. 5720

$1/5^{th}$ money = $\frac{65000}{5}$ = 13,000

Let rate = r %

$$13,000 \times \frac{(1+r)}{100^2 - 1} = 5720$$

r = 20% p.a.

Now, money invested by Adani in business

$$4 \times \frac{65000}{5} - 4000 = 48,000$$

Investment of QIA = m

Ratio of share of profit of Adani and QIA is,

40,625: (87,100 - 40,625) = 125: 143

i.e., (48000 × 7 + 48000 × 1.1 × 5): (m × 5 + (m – 4800) × 7) = 125: 143

We get, m = Rs. 60,000.

50. **(41)**

Let us consider that at least 'a' items must be sold to gain 35% profit.

Total cost price = 30a

Total selling price = 1 + 3 + 5 ... (a terms) = a^2.

Since minimum profit requirement is 35%

Total selling price = 1.35 × Total cost price,

$a^2 = 1.35 \times 30a$,

a = 40.5 = 41 items

Hence, 41 items is the right answer.

51. **(15)**

Given that,

$$\log_3\left(3^{\frac{1}{4x}} + 243\right) = \left(\log_3 2^2\right) + \frac{1}{2x} + 2$$

$$\Rightarrow 3^{\frac{1}{4x}} + 243 = 3^{\left(\log_3 2^2\right) + \frac{1}{2x} + 2}$$

$$\Rightarrow 3^{\frac{1}{4x}} + 243 = 3^{\log_3 2^2} \times 3^{\frac{1}{2x}} \times 3^2$$

$$\Rightarrow 3^{\frac{1}{4x}} - 36\left(3^{\frac{1}{2x}}\right) + 243 = 0$$

$$\Rightarrow \left(3^{\frac{1}{2x}}\right)^2 - 27\left(3^{\frac{1}{2x}}\right) - 9\left(3^{\frac{1}{2x}}\right) + 243 = 0$$

$$\Rightarrow \left(3^{\frac{1}{2x}} - 9\right)\left(3^{\frac{1}{2x}} - 27\right) = 0$$

$$\Rightarrow 3^{\frac{1}{2x}} = 9 \text{ or, } 3^{\frac{1}{2x}} = 27$$

$$\Rightarrow \frac{1}{2x} = 2 \quad \text{or, } \frac{1}{2x} = 3$$

$$\Rightarrow 4x = 1 \text{ or, } 6x = 1.$$

$$\Rightarrow x_1 = \frac{1}{4}, x_2 = \frac{1}{6}$$

Hence, $36P = 36\,(x_1 + x_2) = 36\left(\frac{1}{4} + \frac{1}{6}\right) = 15.$

52. (9)

7	2	3	Divisors
↓	↓		
6	1	2	Remainders

So, the smallest number that satisfy the given condition is $\{(2 \times 2) + 1\} \times 7 + 6 = 41$.

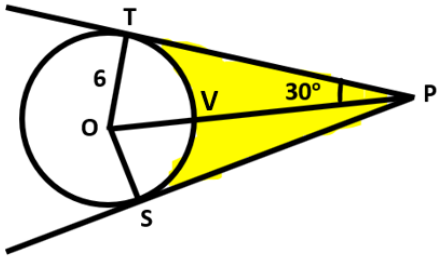
The general form of numbers that satisfy the given condition is got by adding the LCM of divisors, which is 42, to 41.

i.e., the general form is $42k + 41$, $k = 0, 1, 2, 3, \ldots$.

Therefore, the smallest number is 41.

When the number 41 is divided by 32, the remainder is 9.

53. (a)



It is known that, the tangent to a circle makes 90° angle with the radius at the point of contact.

So, ΔOTP is a right angled triangle.

Therefore, $OT/OP = \sin 30° = 1/2$

$OP = 2 \times 6 = 12$ cm

Now, let $\angle TOP = x$

Then, in ΔTOP,

$$\cos x = \frac{OT}{OP}$$

$$\cos x = \frac{6}{12} = \frac{1}{2}$$

$x = 60°$.

So, $\angle TOS = 2 \times 60° = 120°$

Therefore, the area of the sector TOSV

$$= \frac{120°}{360°} \times \frac{22}{7} \times 6^2$$

$$= \frac{264}{7} \text{cm}^2$$

Now, in ΔOTP,

$$\frac{OT}{TP} = \tan 30° = \frac{1}{\sqrt{3}}$$

$$TP = 6\sqrt{3}$$

Therefore, the area of the ΔOTP

$$= \frac{1}{2} \times TP \times OT$$

$$= \frac{1}{2} \times 6\sqrt{3} \times 6$$

$$= 18\sqrt{3} \text{ cm}^2$$

Hence, the area of the quadrilateral OSPT

$= 2 \times$ area of the ΔOTP

$= 2 \times 18\sqrt{3}$

$= 36\sqrt{3}\ cm^2.$

Hence, the area of the yellow portion $= 36\sqrt{3} - \frac{264}{7}$

$= 36 \times 1.73 - \frac{264}{7}$

$= 24.57$ (approx.)

54. (2)

$(b\sin\theta - \sqrt{3})^2 + (b\ \cos\ \theta - 1)^2 = 0$

It is possible only when,

$b\ \sin\theta - \sqrt{3} = 0$ and $b\cos\theta - 1 = 0$

$b\ \sin\theta = \sqrt{3}$ and $b\ \cos\theta = 1$

Now, $b^2\cos^2\ \theta + b^2\sin^2\theta = (\sqrt{3})^2 + 1^2 = 4$

$b^2 = 4.$

Now,

$x^{\frac{5}{6}}x^{\frac{1}{6}}k\left(\frac{x}{k} + \frac{k}{x}\right) = 4$

$\Rightarrow xk\left(\frac{x^2 + k^2}{kx}\right) = 4$

$\Rightarrow\ (x^2 + k^2) = 4$

$\Rightarrow\ x^2 = 4 - k^2$

The maximum value of x will be obtained if $k = 0$.

Then, $x^2 = 4$.

$\Rightarrow\ x = 2$ (maximum value).

55. (7)

Let length of shorter and longer diagonals of the rhombus is 'a' and 'b' respectively.

Height of cylinder $= b \times \left(\frac{100}{40}\right) = 2.5b$

Volume of sphere $= \left(\frac{4}{3}\right)\pi(a)^3$

Volume of cylinder $= \pi(b)^2\ (2.5b)$

Ratio of volumes $= \left(\frac{4}{3}\right)\pi(a)^3 : \pi(b)^2(2.5b) = 9:5$

$\Rightarrow \frac{a^3}{b^3} = \frac{27}{8}$

$\Rightarrow a : b = 3 : 2$

Let length of diagonals of rhombus is 3x and 2x respectively.

Area of rhombus $= \left(\frac{1}{2}\right) \times 3x \times 2x = 147$

$\Rightarrow\ x^2 = 49$

$\Rightarrow\ x = 7$ cm

Difference between the length of both the diagonals of the rhombus

$= 3x - 2x = x$

$= 7$ cm.

56. (d)

Let the number of cows of group A and group B be x and y respectively.

Now, according to the formula used

Cows in group A $= 158x$ ……(i)

Cows in group B $= 176y$ ……(ii)

Cows of both group $= 160\ (x + y)$ …. (iii)

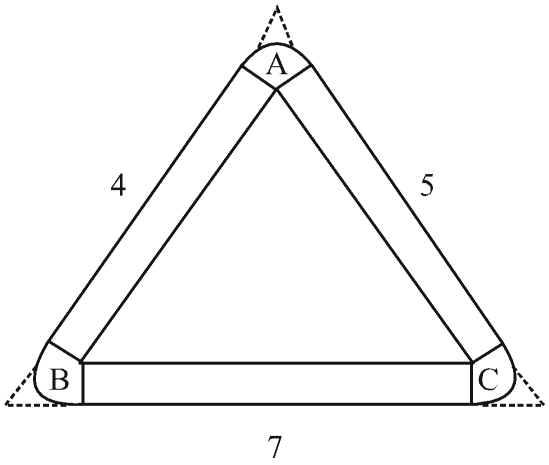
From (1), (ii) and (iii), we get

$158x + 176y = 160\ (x + y)$

$\Rightarrow\ x : y = 8 : 1.$

Hence, option (D) is correct.

57. (c)



Distance travelled by the man is
$= 4 + 5 + 7 + (\pi - A) \times 1 + (\pi - B) \times 1 + (\pi - C) \times 1$
$= 16 + 3\pi - (A + B + C)$
$= 16 + 2\pi$.

58. (800)

Let the number of headphones purchased be n. Then the cost price is 7n. The total expenses incurred would be 7n + W, where W refers to the wage.

Then SP in the first case = $11 \times 100 + 10 \times (n - 100)$

Given profit is \$200.

In this case:

$1100 + 10n - 1000 - 7n - W = 200$

$\Rightarrow 3n - W = 100$

In second case:

$1100 + 8n - 800 - 7n - W = -200$ (Loss).

$\Rightarrow W - n = 500.$

Adding the two equations: $2n = 600$
$n = 300$.
Thus, $W = 500 + 300 = \$800$.

59. (d)

It is given that α, β are the real roots of the quadratic equation $(px^2 - 4px + 2p + 1) = 0$

So, for $(px^2 - 4px + 2p + 1) = 0$ to have a real solution, the discriminant should be greater than or equal to 0.

So,

$(4p)^2 \geq 4p(2p + 1)$

$\Rightarrow 4p \geq 2p + 1$ [As $p \neq 0$ given that $(px^2 - 4px + 2p + 1) = 0$ is a quadratic equation]

$\Rightarrow p \geq \frac{1}{2}$.

It is given that $p \leq ½$, so $p = ½$
Hence,
$(px^2 - 4px + 2p + 1) = 0$

$\Rightarrow x^2/2 - 2x + 2 = 0$

$\Rightarrow x^2 - 4x + 4 = 0$

$\Rightarrow x = 2, 2$

$\alpha = \beta = 2$

So,
$(\alpha / \beta)^{2023} x^2 - (\alpha + \beta) p^2 x - (\alpha / p)^2 - (\beta / p) = 0$

$\Rightarrow x^2 - x - 16 - 4 = 0$

$\Rightarrow x^2 - 5x + 4x - 20 = 0$

$\Rightarrow x = 5, -4.$

60. (b)

$2|e^{3x}| - 4\,|e^{2x}| - 46|\,|e^x| + 120 = 0$

$\Rightarrow 2|(e^x)^3\,| - 4|\,(e^x)^2| - 46|\,e^x| + 120 = 0$

$\Rightarrow 2\,(|e^x| - 3)\,(|e^x| - 4) = 0$

$\Rightarrow e^x = 3, e^x = 4, e^x \neq -4, e^x \neq -3$

So, $e^x = 3$ and $e^x = 4$.
i.e., $x = \ln 3$ and $x = \ln 4$.
Thus, the sum of the possible values of $x = \ln 3 + \ln 4 = \ln 12 = \ln k$ (given)
i.e., $k = 12$
Now, $12 = 2^2 \times 3^1$
Hence, the number of divisors of 12 is (2+1) (1+1) = 6.

61. (23)

To maximize the difference between the average weight of the boys and the average weight of the girls, we will have to maximize the average weight

of the boys and minimize the average weight of the girls.

The average weight of the boys will be maximum when the weight of the boys is 82, 81, 80, 79, 78, 77, 76, 75, 74, 73, 72 and 53 kg.

Thus, the maximum average weight of the boys =

$$\frac{(82+81+80+79+78+77+76+75+74+73+72+53)}{12=75}$$

The average weight of the girls will be minimum when the weight of the girls is 47, 48, 49, 50, 51, 52, 54 and 65 (53 is not possible as it is the weight of a boy) Thus, the minimum average weight of the girls =

$$\frac{(47+48+49+50+51+52+54+65)}{8=52}$$

Thus, the maximum possible difference between the average weight of the boys and the average weight of the girls = 75 – 52 = 23.

62. (16)

It is given that the scores of Dwayne, Depp and Musk after review were in the ratio 13 : 12 : 9.

So, let their values be 13x, 12x and 9x respectively.

It is known that their score increased by 6 after review.

So, scores before review = 13x – 8, 12x – 8 and 9x – 8 respectively.

Now, from the data given

(13x – 8 + 12x – 8) × 1/3 = 9x – 8.

25x – 16 = 27x – 24

8 = 2x

x = 4.

So, marks after revision are 52, 48 and 36 respectively.

Therefore, Dwayne's score exceeded Musk's by 52 – 36 = 16 marks.

63. (a)

Let the number of seats covered in the first week be 100x.

Then the number of tickets sold in the 2nd work week = 100x – 12% of 100x.

$$= \frac{100x-12}{100\times 100x}$$

= 100x – 12x

= 88x

Then the number of seats covered in the 3rd week

= 88x + 14% of 88x

= 88x + 12.32x

= 100.32x

Then the number of seats covered in the 4th week

= 100.32x – 20% of 100.32x

$$= \frac{100.32x-20}{100\times 100.32x}$$

= 100.32x – 20.064x

= 80.256x.

We are given that 80.256x = 80256

$$\Rightarrow x = \frac{80256}{80.256}$$

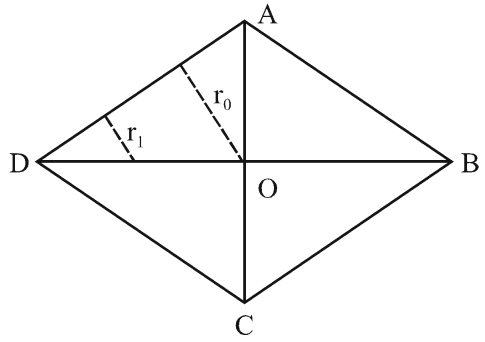
$$\Rightarrow x = 1000.$$

Thus, the number of seats covered in the 3rd week

= 1000 × 100.32 = 100320

Thus, option (A) is the correct answer.

64. (b)



The area of the rhombus is $A = 32\sqrt{3}\ cm^2$

Let, $\angle$ ADC is P.

So,

A = 8*8* sin $P = 32\sqrt{3}$

$\Rightarrow$ P = 60 degree

Let the radius of C_0 is r_0

So,

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OD = $4\sqrt{3}$ cm; $r_0 = 2\sqrt{3}$ cm

Also,

$2r_1 + r_1 + r_0 = OD = 4\sqrt{3}$

$\Rightarrow \quad 3r_1 = 2\sqrt{3}$

$\Rightarrow \quad r_1 = \frac{2}{\sqrt{3}}$

$\Rightarrow \quad \left(\frac{r_1}{r_0}\right) = \left(\frac{r_2}{r_1}\right) = \left(\frac{r_3}{r_2}\right) = \ldots = \left(\frac{1}{3}\right)$

Total shaded area is A*.

Then A*

$= \pi r_0^2 + 2\,(\pi r_1^2 + \pi r_2^2 + \pi r_3^2 + \pi r_4^2 + \ldots)$

$= \pi r_0^2 + 2\,\pi r_0^2 \left(\frac{1}{9} + \frac{1}{9^2} + \frac{1}{9^3} + \ldots\right)$.

$= \left(\frac{5}{4}\right) * \pi_0^2$

$= \left(\frac{5}{4}\right) * \pi * 12$

$= 15\pi$.

Area of the unshaded region is

$32\sqrt{3} - 15\pi = 8.3$ cm^2.

65. **(c)**

$0 < p < 1$. So, $0 < \sin^2 p < 1$

Then, $\sin^2 p + \sin^4 p + \sin^6 p + \ldots\infty$

$= \frac{\sin^2 p}{\left(1 - \sin^2 p\right)} = \tan^2 p.$

Therefore, $S = 3^{\tan^2 p}$

Now, the given quadratic equation is $x^2 - 6x - 27 = 0$

$x = 9, -3$.

Given that, S satisfies the given quadratic equation.

But, $S = 3^{\left(\tan^2 p\right)} \neq -3$

So, $S = 3^{\left(\tan^2 p\right)} = 9 = 3^2$

Therefore, $\tan^2 p = 3$

$\tan p = \sqrt{3}$

Now, $\frac{(2\sin p - 5\cos}{(4\cos p - 5\sin}$

$= \frac{(2\tan p - 5)}{(4 - 5\tan p)}$

$= \frac{\left(2\sqrt{3} - 5\right)}{\left(4 - 5\sqrt{3}\right)}$

$= \frac{1}{\sqrt{2}}.$



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66. **(0)**

Let $2x^2 + x = y$

Then, the inequality becomes

$\frac{y - 5}{(y - 3)(y - 1)} \geq 1$

Rewriting in the standard form, we have

$\frac{-y^2 + 5y - 8}{(y - 3)(y - 1)} \geq 0$

After solving by wavy curvy method, we have

$1 < y < 3$.

Now,

$1 < 2x^2 + x < 3$

$\Rightarrow \; 1 < 2x^2 + x \;\Rightarrow\; x < -1$ or, $x > \frac{1}{2}$

Also, $2x^2 + x < 3 \;\Rightarrow\; \frac{3}{2} < x < 1$

Combining the intervals, we have

$-\frac{3}{2} < x < -1$ or, $\frac{1}{2} < x < 1$

i.e., $x \in \left(-\frac{3}{2}, -1\right) \cup \left(\frac{1}{2}, 1\right) = (-a - 1, -1) \cup (a, 1)$

given

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$\Rightarrow \quad a = \frac{1}{2}$.

Now, $\log_{2048}\left[\frac{3a}{(1+a)}\right]$

$= \log_{2048}\left[3\left(\frac{1}{2}\right)/\left(\frac{1+1}{2}\right)\right]$

$= \log_{2048}(1)$.

$= 0$.