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# IPMAT INDORE 2023 OFFICIAL PAPER

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**IPMAT INDORE- 2023**  
**QUANTITATIVE ABILITY - (SA)**

**Questions: 15 (+4/-0)**

**Sectional Time: 40 Minutes**

- Vinita drives a car which has four gears. The speed of the car in the fourth gear is five times its speed in the first gear. The car takes twice the time to travel a certain distance in the second gear as compared to the third gear. In a 100 km journey, if Vinita travels equal distances in each of the gears, she takes 585 minutes to complete the journey. Instead, if the distances covered in the first, second, third, and fourth gears are 4 km, 4 km, 32 km, and 60 km, respectively, then the total time taken, in minutes, to complete the journey, will be \_\_\_\_.
- If three consecutive coefficients in the expansion of  $(x + y)^n$  are in the ratio 1:9:63, then the value of n is \_\_\_\_.
- The total number of positive integer solutions of  $21 \leq a + b + c \leq 25$  is \_\_\_\_.
- The product of the roots of the equation  $\log_2 2^{(\log_2 x)^2} - 5\log_2 x + 6 = 0$  is \_\_\_\_.
- If  $f(1) = 1$  and  $f(n) = 3n - f(n - 1)$  for all integers  $n > 1$ , then the value of  $f(2023)$  is \_\_\_\_.
- If  $f(n) = 1 + 2 + 3 + \dots + (n+1)$  and  $g(n) = \sum_{k=1}^{k=n} \frac{1}{f(k)}$  then the least value of n for which  $g(n)$  exceeds the value  $\frac{99}{100}$  is \_\_\_\_.
- The polynomial  $4x^{10} - x^9 + 3x^8 - 5x^7 + cx^6 + 2x^5 - x^4 + x^3 - 4x^2 + 6x - 2$  when divided by  $x - 1$  leaves a remainder 2. Then the value of  $c + 6$  is \_\_\_\_.
- The remainder when  $1! + 2! + 3! + \dots + 95!$  is divided by 15 is \_\_\_\_.
- Let a, b, c, d be positive integers such that  $a + b + c + d = 2023$ . If  $a : b = 2 : 5$  and  $c : d = 5 : 2$  then the maximum possible value of  $a + c$  is \_\_\_\_.
- In the xy-plane let  $A = (-2,0)$ ,  $B = (2,0)$ . Define the set S as the collection of all points C on the circle  $x^2 + y^2 = 4$  such that the area of the triangle ABC is an integer. The number of points in the set S is \_\_\_\_.
- Amisha can complete a particular task in twenty days. After working for four days she fell sick for four days and resumed the work on the ninth day but with half of her original work rate. She completed the task in

another twelve days with the help of a co-worker who joined her from the ninth day. The number of days required for the co-worker to complete the task alone would be \_\_\_\_.

- In an election with only two contesting candidates, 15% of the voters did not turn up to vote, and 50 voters cast invalid votes. It is known that 44% of all the voters in the voting list voted for the winner. If the winner got 200 votes more than the other candidate, then the number of voters in the voting list is \_\_\_\_.

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- Assume it is the beginning of the year today. Ankita will earn INR 10,000 at the end of the year, which she plans to invest in a bank deposit immediately at a fixed simple interest of 0.5% per annum. Her yearly income will increase by INR 10,000 every year, and the fixed simple interest offered by the bank on new deposits will also increase by 0.5% per annum every year. If Ankita continues to invest all her yearly income in new bank deposits at the end of each year, the total interest earned by her, in INR, in five years from today will be \_\_\_\_.
- In a chess tournament, there are four groups, each containing an equal number of players. Each player plays
  - against every other player belonging to one's own group exactly once;

- against each player belonging to one of the remaining three groups exactly twice;
- against each player belonging to one of the remaining two groups exactly three times; and
- against each player belonging to the remaining group exactly four times.






If there are more than 1000 matches being played in the tournament, the minimum possible number of players in each group is\_\_\_\_\_.


15. The length of the line segment joining the two intersection points of the curves  $y = 4970 - |x|$  and  $y = x^2$  is\_\_\_\_\_.




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**QUANTITATIVE ABILITY - (MCQ)**

Questions: 30 (+4/-1)

Sectional Time: 40 Minutes

16. If a three-digit number is chosen at random, what is the probability that it is divisible neither by 3 nor by 4?

- (a)  $\frac{1}{4}$  (b)  $\frac{2}{3}$   
(c)  $\frac{1}{2}$  (d)  $\frac{1}{3}$

17. A goldsmith bought a large solid golden ball at INR 1,000,000 and melted it to make a certain number of solid spherical beads such that the radius of each bead was one-fifth of the radius of the original ball. Assume that the cost of making golden beads is negligible. If the goldsmith sold all the beads at 20% discount on the listed price and made a total profit of 20%, then the listed price of each golden bead, in INR, was

- (a) 12000 (b) 9600  
(c) 48000 (d) 24000

18. Let a, b, c be real numbers greater than 1, and n be a positive real number not equal to 1. If  $\log_n(\log_2 a) = 1$ ,  $\log_n(\log_2 b) = 2$  and  $\log_n(\log_2 c) = 3$ , then which of the following is true?

- (a)  $a^n + b^n = c^n$  (b)  $(a^n + b)^n = ac$   
(c)  $a + b = c$  (d)  $(b - a)^n = (c - b)$

19. If the harmonic mean of the roots of the equation  $(5 + \sqrt{2})x^2 - bx + 8 + 2\sqrt{5} = 0$  is 4 then the value of b is

- (a)  $4 - \sqrt{5}$  (b) 2  
(c)  $4 + \sqrt{5}$  (d) 3

20. Consider an  $8 \times 8$  chessboard. The number of ways 8 rooks can be placed on the board such that no two rooks are in the same row and no two are in the same column is

- (a) 7 (b) 8  
(c)  $7!$  (d)  $8!$

21. The set of all real values of x satisfying the inequality  $\frac{x^2(x+1)}{(x-1)(2x+1)^3} > 0$  is

- (a)  $(-1, -\frac{1}{2}) \cup (0, +\infty)$   
(b)  $(-\infty, -1) \cup (-\frac{1}{2}, 0) \cup (1, +\infty)$   
(c)  $(-1, 0) \cup (1, +\infty)$   
(d)  $(-1, -\frac{1}{2}) \cup (1, +\infty)$

22. If  $A = \begin{bmatrix} 1 & 2 \\ 3 & a \end{bmatrix}$  where a is a real number and  $\det(A^3 - 3A^2 - 5A) = 0$  then one of the values of a can be

- (a) 1 (b) 6  
(c) 4 (d) 5

23. If the difference between compound interest and simple interest for a certain amount of money invested for 3 years at an annual interest rate of 10% is INR 527, then the amount invested in INR is

- (a) 170000 (b) 15000  
(c) 150000 (d) 17000

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24. In a group of 120 students, 80 students are from the Science stream and the rest are from the Commerce stream. It is known that 70 students support Mumbai Indians in the Indian Premier League; all the other students support Chennai Super Kings. The number of Science students who are supporters of Mumbai Indians is

- (a) Exactly 20 (b) Between 15 and 25  
(c) Between 20 and 25 (d) 30 or more

25. The minimum number of times a fair coin must be tossed so that the probability of getting at least one head exceeds 0.8 is

- (a) 5 (b) 7  
(c) 3 (d) 6

26. A polynomial  $P(x)$  leaves a remainder 2 when divided by  $(x - 1)$  and a remainder 1 when divided by  $(x - 2)$ . The remainder when  $P(x)$  is divided by  $(x - 1)(x - 2)$  is  
 (a)  $x - 3$  (b)  $3 - x$   
 (c) 3 (d) 2
27. Let  $[x]$  denote the greatest integer not exceeding  $x$  and  $\{x\} = x - [x]$ . If  $n$  is a natural number, then the sum of all values of  $x$  satisfying the equation  $2[x] = x + n\{x\}$  is  
 (a)  $n$  (b)  $\frac{n(n+1)}{2}$   
 (c)  $\frac{3}{2}$  (d)  $\frac{n(n+2)}{2}$
28. If  $\frac{a+b}{b+c} = \frac{c+d}{d+a}$ , which of the following statements is always true?  
 (a)  $a = c$   
 (b)  $a = c$ , and  $b = d$   
 (c)  $a + b + c + d = 0$   
 (d)  $a = c$ , or  $a + b + c + d = 0$
29. If  $\log_{\cos x}(\sin x) + \log_{\sin x}(\cos x) = 2$ , then the value of  $x$  is  
 (a)  $n\pi + \frac{\pi}{4}$ ,  $n$  is an interger  
 (b)  $2n\pi + \frac{\pi}{4}$ ,  $n$  is an interger  
 (c)  $\frac{n\pi}{4} + \frac{\pi}{4}$ ,  $n$  is an interger  
 (d)  $\frac{4\pi}{4}$ ,  $n$  is an interger
30. A helicopter flies along the sides of a square field of side length 100 kms. The first side is covered at a speed of 100 kmph, and for each subsequent side the speed is increased by 100 kmph till it covers all the sides. The average speed of the helicopter is  
 (a) 184 kmph (b) 200 kmph  
 (c) 250 kmph (d) 192 kmph
31. In a triangle ABC, let D be the mid-point of BC, and AM be the altitude on BC. If the lengths of AB, BC and CA are in the ratio of 2:4:3, then the ratio of the lengths of BM and AD would be  
 (a) 11:12 (b) 11:  $4\sqrt{10}$   
 (c) 12:11 (d)  $4\sqrt{10}$ : 11
32. In a chess tournament there are 5 contestants. Each player plays against all the others exactly once. No game results in a draw. The winner in a game gets one point and the loser gets zero point. Which of the following sequences cannot represent the scores of the five players?  
 (a) 3, 2, 2, 2, 1 (b) 4, 4, 1, 1, 0  
 (c) 2, 2, 2, 2, 2 (d) 3, 3, 2, 1, 1
33. A rabbit is sitting at the base of a staircase which has 10 steps. It proceeds to the top of the staircase by climbing either one step at a time or two steps at a time. The number of ways it can reach the top is  
 (a) 34 (b) 55  
 (c) 144 (d) 89
34. Let  $a_1, a_2, a_3$  be three distinct real nubers in geometric progression. If the equations  $a_1x^2 + 2a_2x + a_3 = 0$  and  $b_1x^2 + 2b_2x + b_3 = 0$  have a common root, then which of the following is necessarily true?  
 (a)  $\frac{b_1}{a_1}, \frac{b_2}{a_2}, \frac{b_3}{a_3}$  are in arithmetic progression  
 (b)  $b_1, b_2, b_3$  are in arithmetic progression  
 (c)  $\frac{b_1}{a_1}, \frac{b_2}{a_2}, \frac{b_3}{a_3}$  are in geometric progression  
 (d)  $b_1, b_2, b_3$  are in geometric progression
35. Which of the following straight lines are both tangent to the circle  $x^2 + y^2 - 6x + 4y - 12 = 0$   
 (a)  $4x + 3y + 19 = 0, 4x + 3y - 31 = 0$ .  
 (b)  $4x + 3y + 19 = 0, 4x + 3y + 31 = 0$ .  
 (c)  $4x + 3y - 19 = 0, 4x + 3y - 31 = 0$ .  
 (d)  $4x + 3y - 19 = 0, 4x + 3y + 31 = 0$ .
36. A person standing at the center of an open ground first walks 32 meters towards the east, takes a right turn and walks 16 meters, takes another right turn and walks 8 meters, and so on. How far will the person be from the original starting point after an infinite number of such walks in this pattern?  
 (a)  $64/\sqrt{5}$  meters (b) 64 meters  
 (c) 32 meters (d)  $32/\sqrt{5}$  meters
37. The equation  $x^2 + y^2 - 2x - 4y + 5 = 0$  represents  
 (a) a point (b) a pair of straight lines  
 (c) an ellipse (d) a circle
38. If  $\cos\alpha + \cos\beta = 1$ , then the maximum value of  $\sin\alpha - \sin\beta$  is  
 (a) 1 (b) 2  
 (c)  $\sqrt{3}$  (d)  $\sqrt{2}$
39. "Let  $p$  be a positive integer such that the unit digit of  $p^3$  is 4. What are the possible unit digits of  $(p+3)^3$ ?  
 (a) 1, 7, 9 (b) 4, 7  
 (c) 1, 3, 7 (d) 3
40. The probability that a randomly chosen positive divisor of  $10^{2023}$  is an integer multiple of  $10^{2001}$  is  
 (a)  $\frac{23}{2024}$  (b)  $\frac{23^2}{2023^2}$   
 (c)  $\frac{23}{2023}$  (d)  $\frac{23^2}{2024^2}$

**Directions (Q.41-Q.45):** A pharmaceutical company has tested five drugs on three different organisms. The following incomplete table reports if a drug works on the given organism. For example, drug A works on organism R while B and C work on Q.

		Organism		
		P	Q	R
Drug	A			✓
	B		✓	
	C		✓	
	D			
	E			

Following additional information is available:

- Each drug works on at least one organism but not more than two organisms.
- Each organism can be treated with at least two and at most three of these five drugs.
- On whichever organism A works, B also works. Similarly, on whichever organism C works, D also works.

- D and E do not work on the same organism.
41. Organism R can be treated with  
 (a) Only A and E                      (b) A, B and E  
 (c) A, B and C                        (d) Only A and B
  42. Drug E works on  
 (a) Only R                                (b) Q and R  
 (c) Only P                                (d) P and R
  43. The organism(s) that can be treated with three of these five drugs is(are)  
 (a) Only Q                                (b) Only P  
 (c) P and Q                               (d) Q and R
  44. Drug D works on  
 (a) Only Q                                (b) P and Q  
 (c) Q and R                               (d) Only P
  45. Organism P can be treated with  
 (a) B, C and D                          (b) Only C and D  
 (c) Only B and D                        (d) A, B, and D



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**VERBAL ABILITY****Questions: 45 (+4/-1)****Sectional Time: 40 Minutes**

**Passage (Q.46-Q.51):** Read the following passage and choose the answer that is closest to each of the questions that are based on the passage.

The general idea of being fit is usually assumed to be exercising regularly and having a healthy diet. It's true to some extent. But this is not always the case. People don't realise that sleep also plays a crucial part when it comes to physical and mental well-being. It's a restorative process, which shouldn't be negotiable.

Hectic working hours, increasing stress levels, and an unhealthy lifestyle can cause irregular sleep patterns. These not only disturb one's daily routine, but can also hamper one's health, leading to lifestyle conditions like deranged cholesterol and diabetes. It's a preconceived notion that cholesterol and diabetes are usually genetic diseases, and unhealthy eating patterns and lifestyle exacerbate them. It is not generally known that sleep deprivation can put a person at risk of both deranged cholesterol and diabetes.

Sleep helps your body and mind repair and recharge themselves. But things can go awry if one is sleep-deprived. Insomnia can generally make the body work abnormally. It affects the mental and physical abilities to prepare the body for the next day. It leaves the brain exhausted, affecting the natural functioning of the body.

Lack of sleep can lead to higher cholesterol and blood pressure. Sleep deprivation can lower levels of leptin, a hormone that stabilises metabolism and appetite. This can also lead to obesity, if left unchecked. Sleep deprivation has been found to raise levels of ghrelin, the hunger hormone, and decrease levels of leptin, the satiety hormone. That's why people seek relief in foods that raise blood sugar. The American Academy of Sleep Medicine recommends that adults should get a minimum of seven to eight hours of sleep each night. Staying up late can lead to consuming unhealthy snacks and junk food high in carbs and sugar. All this increases the risk of Type 2 diabetes and is equally connected to obesity.

Just like any other routine, having a definite sleeping pattern can help a person maintain a cycle of rest and activity. Sleeping at the same time every day and waking up on time will encourage quality sleep. Proper relaxation of body and mind before sleeping means that one should keep the mobile phone aside for at least half an hour before bed. It helps if the room is dark and quiet. Plus, one can always read a good book or listen to soothing music which can lull one into deep sleep.

46. Being deprived of sleep can result in  
 (a) mental exhaustion. (b) terminal illness.  
 (c) hunger satiation. (d) metabolism loss.
47. In what way does sleep contribute to a person's well-being?  
 (a) By helping the body replenish its resources.  
 (b) By adding power and strength to the muscles.  
 (c) By increasing a person's appetite.  
 (d) By regularising a person's daily routine.
48. In order to remain physically fit one must  
 (a) maintain a set sleep pattern.  
 (b) snack frequently.  
 (c) raise levels of ghrelin.  
 (d) read a good book every night.
49. The main focus of the passage is on the  
 (a) perils of insomnia and irregular sleep patterns.  
 (b) stability of leptin and ghrelin in the human body.  
 (c) ill effects of junk food high in carbs and sugars.  
 (d) dangers of high levels of cholesterol and diabetes.
50. As per the passage which of these sentences is not correct?  
 (a) One's body and mind should be properly relaxed to ensure good sleep.  
 (b) Insufficient sleep can lead to obesity.  
 (c) Irregular sleep patterns can result in health problems.  
 (d) Regular exercising and eating healthy food alone ensure fitness.
51. The objective of the passage is to  
 (a) provide medical input to the reader.  
 (b) advise the reader.  
 (c) present psychological insights to the reader.  
 (d) expose the reader to disinformation.

**Passage (Q.52-Q.57):** Read the following passage and choose the answer that is closest to each of the questions that are based on the passage.

Two Apple stores in Delhi and in Mumbai - opened in April 2023. Until now, Indians could buy Apple products in the country either online or through a vast network of what the company calls 'premium resellers'. Will the new-found ability to sell products directly to customers in India - the world's second largest smartphone market - impact its fortunes here? Apple has long tried to open physical retail stores in India. In 2019, the Indian government relaxed some investment rules, exempting companies selling 'cutting-edge' items, such as Apple's iPhones and iPads, from restrictions.

Apple first launched an online store in India through a website which allows users to request for customised products. Apple's decision to open physical stores in India could be the next step in its branding strategy. It is not as if this will change Apple's sales in any dramatic way, but it is still a key milestone, one that will allow Apple to deliver to Indian customers the full Apple experience. The iPhone is still an aspirational product in the price-sensitive Indian market. When you launch an Apple store, you are basically giving a premium experience to your premium consumers. It might not pull up sales, but it pulls more people into the Apple ecosystem.

Setting up an Apple store in India is also a statement that the country is now big enough for Apple to be actually interested in expanding operations here, and comes at a time when India is rising fast as a manufacturing base for the iPhone. Apple first began making a lower-end model of the iPhone in India in 2017. Last year, it began producing its latest model of iPhone 14 in the country, which now accounts for 5 percent of total iPhone production.

For years, Apple had relied on China's sophisticated manufacturing network to produce the bulk of its products. But analysts predict that by 2025, a quarter of all iPhones the company makes could be produced in India. Apple was already making between 5-7 percent of its products in India, and they are targeting to go up to 25 percent of their manufacturing capacity.

In 2022, Apple had a 60 percent market share in the Indian 'premium smartphone' market - which refers to mobiles that cost INR 40,000 or more, ahead of Samsung's 21 percent share. Apple is doing well across categories. The real issue will be to pull consumers to these flagship centres without alienating the partner sellers.

Apple has finally understood that India's premium market is growing, so why not be serious about it.

52. Apple's challenge while opening physical stores is to
- (a) provide stimulation that draws customers away from other sellers.
  - (b) offer parallel products packaged more attractively.
  - (c) retain links with their partner sellers while drawing customers to their stores.
  - (d) subtly alienate customers away from competitors.
53. The Apple retail stores in India will
- (a) bring in more customers and increase sales.
  - (b) not have any impact on Apple's image.
  - (c) drive healthy competition in the smartphone market.
  - (d) not materially impact sales of iPhones.
54. "Apple's aim is not only to increase sales of its iPhones, but to draw people into Apple's ecosystem." In the context of the passage, this statement means that Apple seeks to
- (a) attract customers to buy its phones through innovative means.
  - (b) attract customers by displaying a wide range of aesthetically designed products.
  - (c) be the market leader in the world of premium smartphones.
  - (d) bring customers into a network of related products which it offers.



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55. The main point the passage makes is that Apple
- has realised the strategic importance of the Indian market.
  - needs physical stores to expand sales to more buyers of premium products.
  - iPhone was already popular in India.
  - needs new branding and marketing strategies to compete with Samsung.
56. India is now the focus of Apple operations because
- it offers the benefit of a manufacturing base in addition to a market.
  - it has the world's second largest population.
  - American technology companies want to reduce their reliance on China.
  - no other country has the same ease of doing business.
57. Based on the passage which one of the following is not true?
- iPhone 14 is being manufactured in India.
  - Regulatory restrictions were eased in 2023.
  - Manufacturing of iPhones in India commenced in 2017.
  - Currently 5 to 7 percent of all iPhones are manufactured in India.
58. If you ask me to give you a rough estimate for the cost of the project, \_\_\_\_\_ I would say thirty lakhs.
- off-the-mark
  - off-the-grid
  - off-the-cuff
  - off-the-mike
59. The nasty comments made by strangers on the social media platforms about the actor made him \_\_\_\_\_.
- ill at heart
  - ill and ache
  - ill in heart
  - ill at ease
60. The new car has disappointed its buyers in many ways, and good mileage is its only \_\_\_\_\_.
- saving grace
  - saving face
  - saving praise
  - saving case
61. Meena is very arrogant and class-conscious; she refuses to acknowledge Sunil because she feels he is a man \_\_\_\_\_.
- of no importance
  - of great importance
  - of less importance
  - of some importance
62. Some big shots know how to escape the law even after they violate it. It is, however, the \_\_\_\_\_ who are more often apprehended and punished.
- small fry
  - tiny shots
  - tiny fish
  - small fish
63. A few brands tailor their pants in such a way that it is easy for people with prosthetic legs to put them on. This is how they \_\_\_\_\_.
- go to the extra level
  - go to the extreme level
  - go the extra mile
  - go the entire mile
64. It grieved me \_\_\_\_\_ my friend's serious illness.
- to hear regarding
  - hearing regarding
  - in hearing
  - to hear of
65. My aunt Seema was the most generous of all the members of our family. Whenever we went out for dinner, she always insisted to pay for the meal.
- that she will be paying for the meal.
  - that she pay for the meal.
  - that she had paid for the meal.
  - on and paid for the meal.
66. Listening to the recording of cricket commentary from the past can be great fun. Especially, the last few overs, when the best players are gone, and the tailenders try their best to run between the wickets without getting out. This is when you realise that nothing much has changed, hasn't it?
- nothing much has changed, hasn't it?
  - nothing much has changed, would it?
  - nothing much is changed, isn't it?
  - nothing much has changed, has it?
67. When you play the 'Secret Santa', you are expected to buy a gift for whoever you are assigned, without letting them know that you are the one buying the gift.
- whomever you are assigned
  - who you are assigned
  - whoever you are assigned
  - whom you are assigned
68. Justin couldn't understand why his friend had refused to work in a company that offered him a huge salary. If it had been him in his friend's place, he would definitely accepted such an offer.
- have definitely have accepted such an offer.
  - definitely accepted such an offer.
  - have definitely accepted such an offer.
  - have definitely accept such an offer.
69. The setting of a story affects the story's plot.
- affect the story's plot.
  - affects the stories' plot.
  - affects the story's plot.
  - affects the story plots.

70. \_\_\_\_\_ . Conflicts are now brewing over rivers and river basins shared by many countries around the world. This is not unexpected, given the fact that more than two hundred water bodies are shared by two or more countries. Strife over water, for example, is erupting throughout the Middle East, from the watersheds of the Nile to the Tigris and Euphrates Rivers.
- (a) With water becoming increasingly scarce and development of new sources of water extremely costly, international water tensions are expected to rise
  - (b) It might be a cliché, but given how scarce it is, water is the new oil of the 21st century
  - (c) Fresh water is increasingly in short supply, with nearly two-thirds of the global population living in water-stressed conditions
  - (d) The world does not consider water to be the scarce resource it is


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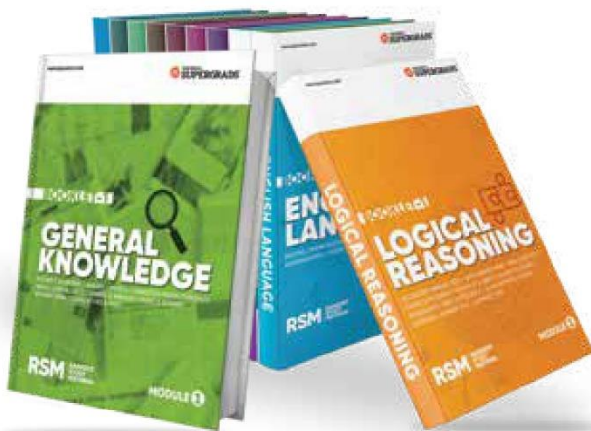
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71. A study of the social and cultural context of Indian poetry in English reveals several important insights into its origin. Indian poetry in English began in Bengal, the province where the British first gained a stronghold. In addition, this poetry was a largely urban phenomenon, centered in Calcutta. \_\_\_\_\_. Then, gradually, it moved to other urban centres such as Madras and Bombay. Even today, Indian poetry in English remains largely urban. Moreover, because English was an elite language, Indian poets writing in English came from the upper classes.
- The rulers encouraged the natives to write poetry about India only if their mother tongue was English
  - English was seen as an elite language and so the British felt that only they could use it for poetry
  - The British had decided that poetry about India could reach a larger audience if written in Calcutta
  - In fact, poetry writing for the first fifty years was confined to a few families who were residents of Calcutta
72. In the late 1960s, architect Charles Correa began his career as an urban planner, creating New Bombay (now Navi Mumbai), an urban area that provided housing and job opportunities for many who lived across the harbour from the original city. In the midst of overpopulated cities, he tried to create quasi-rural housing environments. In all of his urban planning commissions, Correa avoided high-rise housing solutions. \_\_\_\_\_.
- His early work combined traditional architectural values with the Modernist use of materials
  - He is particularly noted for his sensitivity to the needs of the urban poor
  - He focused on low-rise dwelling solutions that emphasized the human scale and created a sense of community
  - Considerations of the Indian climate drove many of his decisions
73. The concept of the 'Villa' and other European ideas came to Lucknow with foreign soldiers, travellers and adventurers. For the Nawabs of Lucknow, architecture became the physical manifestation of their new status, and a way of proclaiming their alignment to the new power bloc. \_\_\_\_\_. Villas, hence, provided an ideal substitute. Europeans sold to the Nawabs the idea of villas, based on designs in publications carried by them, and often aided by memory. The building chosen as the prototype for the famous Dilkusha Kothi was a country house in Northumberland.
- The Villa became the backdrop to both the private as well as the court life of the Nawabs
  - The Nawabs chose to live in Villas because they were easier to construct than palaces
  - The Nawabs were attracted to European ideas in architecture because of their 'foreignness'
  - The Nawabs of Lucknow fancied building palaces that resembled British ancestral homes
74. \_\_\_\_\_ have to label their \_\_\_\_\_ posts in order to bring about transparency and \_\_\_\_\_ the interests of the customers.
- Influencers; promotional; safeguard
  - Promoters; social media; incite
  - Distributors; Facebook; multiply
  - Advertisers; commercials; capture
75. Working from home requires that you may have to put your \_\_\_\_\_ life on \_\_\_\_\_. Some people find this very \_\_\_\_\_ as they like to keep their work and home lives separate.
- actual; video; uncomfortable
  - private; screen; disconcerting
  - family; microscope; disturbing
  - entire; camera; complicated
76. In its early stages, dementia is often \_\_\_\_\_ from normal ageing, in which the older brain may naturally begin to show signs of cognitive impairment. Neither dementia nor cognitive ageing is currently \_\_\_\_\_, though they may be slowed through diet, exercise, and keeping the mind agile with social and intellectual activity.
- indistinguishable; reversible
  - irreversible; manageable
  - differentiated; visible
  - distinguishable; permanent
77. The culture of the 21<sup>st</sup> century – on an increasingly \_\_\_\_\_ scale – is oriented around the practical principles of utility, effectiveness, and impact. Things are good to the extent that they are instrumental, with instrumentality usually defined as the capacity to produce money or things. The worth of anything – an idea, an activity, an artwork, a \_\_\_\_\_ with another person – is determined \_\_\_\_\_.
- global; relationship; pragmatically
  - nominal; dinner; meaningfully
  - conspicuous; dialogue; diligently
  - ordinal; conversation; imaginatively



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78. The human resource chief said that the company will not \_\_\_\_\_ on investing in people and has \_\_\_\_\_ spending on employee needs in order to \_\_\_\_\_ them and provide them with a sense of stability and certainty.
- debate; assured; confront
  - compromise; prioritised; reassure
  - delay; assured; empower
  - prioritise; compromised; include
79. In the alleyways of old Cairo, in its cafes, warehouses and barbershops, framed portraits of Egyptian icons are \_\_\_\_\_. Kings, presidents, religious and political figures are all \_\_\_\_\_ on fading walls, held up as symbols of a glorious past.
- ubiquitous; immortalised
  - fashionable; confounded
  - rare; abundant
  - substantial; dispersed
80. One of the statements below contains a word used incorrectly or inappropriately. Choose the option which has the incorrect or inappropriate usage of the word.
- The musician would hear a cord in his head and play each note individually.
  - Teenagers may feel a need to cut the umbilical cord tying them to their homes.
  - To keep the key safe, she wore it on a cord around her neck.
  - He purchased a cord of wood from the market.

81. One of the statements below contains a word used incorrectly or inappropriately. Choose the option which has the incorrect or inappropriate usage of the word.
- To catch the terrorist the security forces formed a ring around the house where he was hiding.
  - They were all soaking wet and their mother told them to ring their clothes first and then put them out to dry.
  - The witch waved her wand, recited a magical verse, pressed the blue stone on her ring and vanished into thin air.
  - She had left home for the first time, so her parents made her promise that she would ring them up every day.
82. One of the statements below contains a word used incorrectly or inappropriately. Choose the option which has the incorrect or inappropriate usage of the word.
- Under certain climatic conditions, hailstorms are formed in the atmosphere, resulting in unexpected accidents.
  - Our products have to function in extreme weather conditions, which is why we put them through climatic testing.
  - The passengers in the bus were sweating profusely because of the hot climatic conditions.
  - The climatic moment of the match was when the captain got caught behind the wicket.
83. One of the statements below contains a word used incorrectly or inappropriately. Choose the option which has the incorrect or inappropriate usage of the word.
- It was a full moon night and the tied was high, but he went boating and, unfortunately, he drowned.
  - The bags placed on the carrier were not securely tied, which led to an unfortunate accident.
  - After many years of knowing one another, they eventually tied the knot.
  - I have a good chance of a promotion since my firm has recently tied up with a global conglomerate.
84. One of the statements below contains a word used incorrectly or inappropriately. Choose the option which has the incorrect or inappropriate usage of the word.
- The politician was so flustered by the animosity of the crowd that he refused to answer further questions.

- (b) I live farther away from college than all my classmates.
- (c) If you need to farther your career, you should avoid all kinds of distractions.
- (d) We need to discuss this problem right away and avoid letting it fester any further.
- 85.** One of the statements below contains a word used incorrectly or inappropriately. Choose the option which has the incorrect or inappropriate usage of the word.
- (a) When the witness was summoned by the lawyer, he made grave allegations against the accused.
- (b) The landlord issued a warning to the tenants that non-payment of rent was a grave matter and would lead to a court case.
- (c) They found that all the flowers placed on their mother's grave had withered within a week.
- (d) The pet dog could not come to terms with his master's death and went to grave for him, even refusing to eat for several days.
- 86.** The sentences given below, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the most logical order and enter the sequence of numbers in the space provided. Only numbers are to be entered in the space provided for the answer, and no letters, characters, or spaces should be entered. For example, a response such as 3412 is valid, and responses such as 3412. or 3 41 2 are invalid.
1. But the mutiny of Visakhapatnam predates this.
  2. Instead of going against their heroic leader, the sepoys attacked the British soldiers and managed to escape from the town.
  3. The Sepoy Mutiny of 1857 in the garrison town of Meerut is regarded as the First War of Independence.
  4. It happened in 1780 when the British officers asked the local sepoys to join the fight against Hyder Ali.
- 87.** The sentences given below, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the most logical order and enter the sequence of numbers in the space provided. Only numbers are to be entered in the space provided for the answer, and no letters, characters, or spaces should be entered. For example, a response such as 3412 is valid, and responses such as 3412. or 3 41 2 are invalid.
1. Yet, even as TikTok delights consumers and advertisers, others believe the sunny app has a dark side.
  2. Since launching just five years ago, the app has brought a warm glow to its 1 billion plus users, as well as an icy dash of competition to the social media incumbents of Silicon Valley.
  3. ByteDance, its owner, has its headquarters in China, whose government is addicted to surveillance and propaganda- making it a worrying place for a media app to be placed.
  4. With its wholesome dancing and lip-syncing videos, TikTok once billed itself as the "last sunny corner on the Internet."
- 88.** The sentences given below, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the most logical order and enter the sequence of numbers in the space provided. Only numbers are to be entered in the space provided for the answer, and no letters, characters, or spaces should be entered. For example, a response such as 3412 is valid, and responses such as 3412. or 3 41 2 are invalid.
1. What is more shocking to observe is how often such strokes lead to death.
  2. When the body temperature rises, our vital organs swell, and this causes death.
  3. One main reason for this is that people underestimate how badly heat can affect the body.
  4. Heat strokes have become more common in our country than ever before.
- 89.** The sentences given below, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the most logical order and enter the sequence of numbers in the space provided. Only numbers are to be entered in the space provided for the answer, and no letters, characters, or spaces should be entered. For example, a response such as 3412 is valid, and responses such as 3412. or 3 41 2 are invalid.
1. Once they reach a high altitude, they manage to travel all over the world.
  2. An expert from the team explained that the bacteria usually lived on the surface of vegetation, such as leaves.
  3. The wind carries them off the surface and into the atmosphere.
  4. A group of researchers were surprised to find that clouds had carried drug resistant bacteria over a long distance.
- 90.** The sentences given below, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the most logical order and enter the sequence of numbers in the space provided. Only

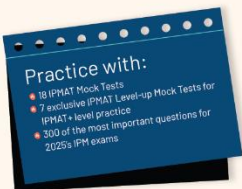
numbers are to be entered in the space provided for the answer, and no letters, characters, or spaces should be entered. For example, a response such as 3412 is valid, and responses such as 3412. or 3 41 2 are invalid.

1. This instance highlights how young people from different backgrounds can make important contributions to climate change.

2. Participation in environmental education programmes can motivate children to act responsibly towards the environment.
3. They were motivated to act in ways that would help the environment, like using a reusable water bottle or refusing to use plastic straws.
4. Six hundred elementary school children from varied social and linguistic groups participated in an ocean pollution education programme.



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**ANSWER KEY AND EXPLANATIONS**

1. (312) Let the speed of car in gear1, gear2, gear 3, and gear 4, be  $s_1, s_2, s_3$  and  $s_4$ .  
 Given that,  $s_4 : s_1 = 5 : 1$   
 So let  $s_4 = 5x$  and  $s_1 = x$   
 Also,  $t_2 : t_3 = 2 : 1$  (where  $t_2$  &  $t_1$ , be the time taken by car to travel that certain distance)  
 $\therefore$  We can say,  
 $s_2 : s_3 = \frac{1}{2} : \frac{1}{1} = 1 : 2$   
 Let  $s_2 = y$  and  $s_3 = 2y$   
 According to the question,  
 $t_1 + t_2 + t_3 + t_4 = 585$  min.  
 $\frac{25}{x} + \frac{25}{y} + \frac{25}{2y} + \frac{25}{5x} = 525$  min [ $\because$  time =  $\frac{\text{distance}}{\text{time}}$ ]  
 $\Rightarrow \frac{6}{5x} + \frac{3}{2y} = \frac{585}{25}$  min  
 $\Rightarrow \frac{1.2}{x} + \frac{1.5}{y} = \frac{585}{25}$  ----- (1)  
 We have to find the total time, when Vinita travels 4 km in gear 1, 4 km in gear 2, 32 km in gear 3 and 60km in gear 4.  
 i.e. the value of  $\frac{4}{x} + \frac{4}{y} + \frac{32}{2y} + \frac{60}{5x} =$   
 total time required  
 $\frac{4}{x} + \frac{4}{y} + \frac{16}{y} + \frac{12}{x} = ?$   
 or  $\frac{16}{x} + \frac{20}{y} = ?$   
 Multiply eqn. (1) by 10, we get  $\frac{12}{x} + \frac{15}{y} = \frac{5850}{25} = 234$  min. ---(2)  
 Multiply eqn. (2) by  $\frac{4}{3}$ , we get  $\frac{16}{x} + \frac{20}{y} = 234 \times \frac{4}{3} = 78 \times 4 = 312$  min. Ans.

2. (39) Let the coefficients of three consecutive terms in the expansion of  $(x + y)^n$  be  ${}^nC_r, {}^nC_{r+1}$  and  ${}^nC_{r+2}$ .  
 Given  $\frac{{}^nC_r}{{}^nC_{r+1}} = \frac{1}{9}$   
 $\Rightarrow \frac{\frac{n!}{(n-r)!r!}}{\frac{n!}{(n-r-1)!(r+1)!}} = \frac{1}{9}$   
 $\Rightarrow \frac{(r+1)}{(n-r)} = \frac{1}{9}$   
 $\Rightarrow 9r + 9 = n - r$   
 $\Rightarrow 10r + 9 = n \dots \dots \dots (1)$   
 Also  $\frac{{}^nC_{r+1}}{{}^nC_{r+2}} = \frac{9}{7} = \frac{1}{7}$   
 $\Rightarrow \frac{\frac{n!}{(n-r-1)!(r+1)!}}{\frac{n!}{(n-r-2)!(r+2)!}} = \frac{1}{7}$   
 $\frac{r+2}{(n-r-1)} = \frac{1}{7}$   
 $\Rightarrow 7r + 14 = n - r - 1$   
 $8r + 15 = n \dots \dots \dots (2)$   
 From equations (1) and (2), we get  
 $10r + 9 = 8r + 15$   
 $2r = 6$   
 $r = 3$   
 Put  $r = 3$  in equation (1), we get  
 $n = 10(3) + 9 = 39$ . Ans

3. (1160) We have to find number of positive integral solutions of  $21 \leq a + b + c \leq 25$  or, we can say, we have to find number of positive integral solution of the following five equations,  
 $a + b + c = 21,$   
 $a + b + c = 22,$   
 $a + b + c = 23,$   
 $a + b + c = 24,$  and  
 $a + b + c = 25.$   
 We know that, number of positive integral solutions of the equation  $A+B+C = n$  (a constant) is given by  ${}^{n-1}C_{r-1}$ , where  $r =$  number of variables (which is 3 in this case)  
 $\therefore$  The equation  $a + b + c = 21$  will have  ${}^{21-1}C_{3-1} = {}^{20}C_2$   
 Similarly, for other 4 equation, we will have number of positive integral solutions as  ${}^{21}C_2, {}^{22}C_2, {}^{23}C_2$  and  ${}^{24}C_2$ .  
 Adding all  ${}^{20}C_2 + {}^{21}C_2 + {}^{22}C_2 + {}^{23}C_2$  and  ${}^{24}C_2$   
 We get  $\frac{20 \times 19}{2} + \frac{21 \times 20}{2} + \frac{22 \times 21}{2} + \frac{23 \times 22}{2} + \frac{24 \times 23}{2}$   
 $= \frac{1}{2} [380 + 420 + 462 + 506 + 552]$   
 $= \frac{1}{2} [2320] = 1160$  Ans.


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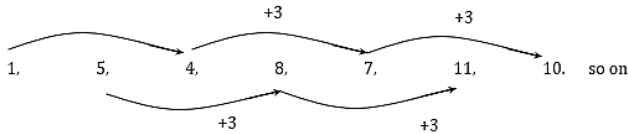


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4. (32) Given equation is  
 $\log_2 2^{(\log_2 x)^2} - 5 \log_2 x + 6 = 0$   
 put  $\log_2 x = y$ , we get  
 $\log_2 2^{y^2} - 5y + 6 = 0$   
 $\Rightarrow y^2 \cdot \log_2 2 - 5y + 6 = 0$  [ $\because \log_a a = 1$ ]  
 Solving above quadratic equation, we get,  
 $y = 2$  or  $3$   
 $\therefore \log_2 x = 2$  or  $\log_2 x = 3$   
 $\Rightarrow x = 2^2$  or  $x = 2^3$

⇒  $x = 4$  or  $x = 8$   
 ∴ Roots of the given equation are 4 & 8.  
 ∴ Product of the roots will be 32. Ans.

5. **(3034)** Given  $f(1) = 1$   
 and  $f(n) = 3n - f(n-1)$  | for all integers  $n > 1$   
 Put  $n = 2$  in the given functional equation we get,  
 $f(2) = 3 \times 2 - f(1) = 6 - 1 = 5$ .  
 Put  $n = 3$ , we get,  
 $f(3) = 3 \times 3 - f(2) = 9 - 5 = 4$   
 Put  $n = 4$ , we get,  
 $f(4) = 3 \times 4 - f(3) = 12 - 4 = 8$   
 Similarly,  $f(5) = 3 \times 5 - f(4) = 15 - 8 = 7$  and so on.  
 $f(1), f(2), f(3), f(4)$  etc.  
 Arrange these values in a sequence, we observe...



...them as terms of 2 ways Arithmetic Progressions,  
 each with common difference = 3.  
 As we have to find value of  $f(2023)$ , let's take the  
 first AP.

$f(1), f(3), f(5)$  ..... where  $n$  is odd.  
 ⇒ 1, 4, 7 .....  
 The position of  $f(1023)$  in this AP will be 1012  
 $(\frac{2023+1}{2} = 1012)$

Using the formula of general term  
 $a_n = a + (n-1)d$ , where 'a' is the first term & 'd'  
 the common difference.  
 $f(2023) = a_{1012} = 1 + (1012-1)3$   
 $= 1 + 1011 \times 3$   
 $= 1 + 3033$

6. **(199)** If  $f(n) = 1 + 2 + 3 + \dots + (n+1)$

$g(n) = \sum_{k=1}^n \frac{1}{f(k)}$   
 Put  $n = 1, f(1) = 1 + 2 = 3$   
 Put  $n = 2, f(2) = 1 + 2 + 3 = 6$ ,  
 Put  $n = 3, f(3) = 1 + 2 + 3 + 4 = 10$ .  
 $\sum_{k=1}^n \frac{1}{f(k)} = \frac{1}{f(1)} + \frac{1}{f(2)} + \frac{1}{f(3)} + \dots + \frac{1}{f(n)}$   
 As per the question,  
 $\frac{1}{f(1)} + \frac{1}{f(2)} + \frac{1}{f(3)} + \dots + \frac{1}{f(n)} > \frac{99}{100}$   
 $\Rightarrow \frac{1}{1+2} + \frac{1}{1+2+3} + \frac{1}{1+2+3+4} + \dots + \frac{1}{1+2+3+\dots+n+(n+1)} >$   
 $\frac{99}{100}$   
 $\frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \dots + \frac{1}{\frac{(n+1)(n+2)}{2}} > \frac{99}{100}$

Adding 1 to both sides, we get  
 $1 + \frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \dots + \frac{1}{\frac{(n+1)(n+2)}{2}} > \frac{99}{100} + 1$   
 $\frac{2}{2} \left[ 1 + \frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \dots + \frac{1}{\frac{(n+1)(n+2)}{2}} \right] > \frac{199}{100}$   
 $2 \left[ \frac{1}{2} + \frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \dots + \frac{1}{(n+1)(n+2)} \right] > \frac{199}{100}$

$$2 \left[ \left(1 - \frac{1}{2}\right) + \left(\frac{1}{2} - \frac{1}{3}\right) + \left(\frac{1}{3} - \frac{1}{4}\right) + \dots + \left(\frac{1}{n+1} - \frac{1}{n+2}\right) \right] > \frac{199}{100}$$

$$1 - \frac{1}{n+2} > \frac{199}{200}$$

$$\frac{n+1}{n+2} > \frac{199}{200}$$

⇒  $200n + 200 > 199n + 398$   
 $n > 198$ . ∴ least value of  $n = 199$ . Ans.

7. **(5)** According to the Remainder Theorem, the remainder obtained when a polynomial  $P(x)$  is divided by  $x-a$  is given by  $P(a)$ .

Using above theorem we get,  
 $P(1) = 4(1)^{10} - (1)^9 + 3(1)^8 - 5(1)^7 + c(1)^6 + 2(1)^5 - 1^4 + 1^3 - 4(1)^2 + 6(2) - 2$   
 Equating the above expression with 2, which is the remainder, we get

$$\Rightarrow 4 - 1 + 3 - 5 + c + 2 - 1 + 1 - 4 + 6 - 2 = 2$$

$$\therefore c + 6 = 5. \text{ Ans}$$

8. **(3)** From  $5!$  onwards, every term will be a have multiple of 15.

Reason: Each term will have a minimum of one 3 and one 5 as its factors.

Thus, 15 will be a factor of every term from  $5!$  onwards, thus we will not get any remainder (or zero remainder) when they are divided by 15.

∴ Thus, only the sum of first 4 terms of the expression will give the final remainder.

Adding first 4 terms, we get

$$\Rightarrow 1! + 2! + 3! + 4! = 1 + 2 + 6 + 24 = 33.$$

So, when 33 is divided by 15, the remainder obtained will be 3. Ans.

9. **(1442)** Given that  $a, b, c$  and  $d$  are positive integer such that  $a + b + c + d = 2023$

Also,  $a : b = 2 : 5$  &  $c : d = 5 : 2$

Let  $a = 2x$  & let  $b = 5x$

and  $c = 5y$  and  $d = 2y$ .

Putting these values in the given equation, we get

$$2x + 5x + 5y + 2y = 2023$$

$$7x + 7y = 2023$$

$$7(x + y) = 2023$$

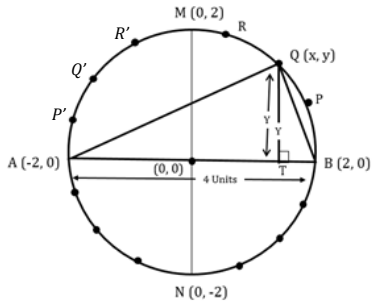
$$(x + y) = 289 \quad \text{----- (1)}$$

We have to find maximum value of  $a + c$  i.e.  $2x + 5y$   
 As the coefficient of  $y$  is 5 (which is greater than the coefficient of  $x$ ), the value of  $y$  should be as high as possible, from eqn....(1),  $y$  can be as high as 288 &  $x$  can be 1.

Substituting these values in  $2x + 5y$ , we get

$$2 \times 1 + 5 \times 288 = 1442. \text{ Ans.}$$

10. **(14)** is the correct answer.



Equation of circle is  $x^2 + y^2 = 4$   
 $\therefore$  Coordinate of the centre is  $(0, 0)$  and radius is 2.  
 Consider a right angle  $\Delta AQB$ ,  
 $\text{Area} = \frac{1}{2} \times AB \times QT$   
 $= \frac{1}{2} \times 4 \times y = 2y$   
 $2y$  should be an integer. (given)  
 If is only possible when,  
 $y = \frac{1}{2}$  or  $1$  or  $\frac{3}{2}$  or  $2$  Since,  $y \leq 2$  (given)  
 So, in each quadrant we will get 3  $\Delta$ s, with altitude  $\frac{1}{2}$ ,  $1$  and  $\frac{3}{2}$  units.  
 $\therefore 3 \times 4 = 12 \Delta$ s.  
 And with  $y = 2$ , we have only 2  $\Delta$ s, with vertex at M & N.  
 $\therefore$  Total  $\Delta$ s =  $12+2 = 14$ . Ans.

11. (24) Let the total work be 20 units.

Given that Amisha can complete the work in 20 days.

$\therefore$  Her efficiency =  $\frac{\text{work}}{\text{time}} = \frac{20 \text{ units}}{20 \text{ days}} = 1 \text{ unit/day}$ .

In 4 days, she will complete  $1 \times 4 = 4$  units of work. She returns on 9th day, work with half the original efficiency i.e.,  $\frac{1}{2}$  units/day.

Along, with her co-worker, she completes the work in 12 days.

$\therefore$  Total work done =  $(1 \text{ unit/day} \times 4 \text{ days}) + (\frac{1}{2} + x) \text{ unit/day} \times 12 \text{ days} = 20 \text{ units}$ ,

where,  $x$  is taken as efficiency of her co-worker.

Solving the equation, we get  $x = \frac{5}{6}$  unit/day

$\therefore$  Time taken by co-worker to complete the work

alone =  $\frac{\text{work}}{\text{efficiency}} = \frac{20 \text{ units}}{5/6 \text{ units/day}}$

= 24 days. Ans

12.

(5000) Let total voters in

the list =  $x$ .

Total votes polled =  $85\% x$

Invalid votes = 50.

Votes received by the winner =  $44\%x$

Votes received by the loser =  $44\%x - 200$

$\therefore$  Winner's votes + Loser's vote + Invalid = Total votes polled

$44\%x + (44\%x - 200) + 50 = 85\%x$

Solving, we get  $x = 5000$  votes. Ans.



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13. (2500)

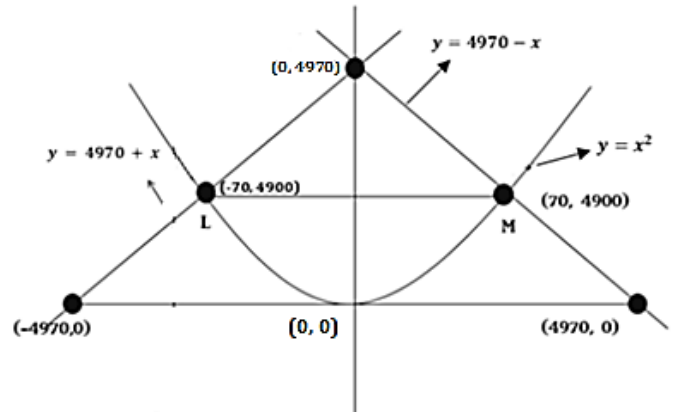
End of 1 <sup>st</sup> year	End of 2 <sup>nd</sup> year	End of 3 <sup>rd</sup> year	End of 4 <sup>th</sup> year	End of 5 <sup>th</sup> year	Sum Total
Deposited ₹ 10,000 @ 0.5% p.a.	Interest received +₹50	Interest received +₹50	Interest received +₹50	Interest received +₹50	+ ₹200
	Deposited ₹ 20,000 @ 1% p.a.	+ ₹200	+ ₹200	+ ₹200	+ ₹600
		Deposited ₹ 30,000 @ 1.5% p.a.	+ ₹450	+ ₹450	+ ₹900
			Deposited ₹ 40,000 @ 2% p.a.	+ ₹800	+ ₹800
<b>Total interest earned</b>					<b>+ ₹2500</b>

14. (8)  $G_2 \overline{x}$   $\overline{x} G_3$   
 $G_1 \overline{x}$   $\overline{x} G_4$   
 Let us assume there are  $x$  players in each of the four groups.  
 Let us consider a player from group-1( $G_1$ )  
 He will play  $(x - 1)$  matches within  $G_1$ .  
 He will play  $2x$  matches with players in  $G_2$ .  
 He will play  $3x$  matches with players in  $G_3$ .  
 He will play  $4x$  matches with players in  $G_4$ .  
 Total matches played by this player  
 $= [x - 1 + 2x + 3x + 4x] = 10x - 1$   
 According to the question, every player played matches in the similar manner.  
 Therefore, the total matches played by all the players  
 $= [10x - 1] \times 4x$   
 $\therefore$  Total unique matches played between any two players  
 $= \frac{1}{2} [10x - 1] \times 4x$   
 $= [10x - 1] \times 2x$   
 $= 20x^2 - 2x$   
 According to the question,  
 $20x^2 - 2x > 1000$   
 or  $10x^2 - x > 500$   
 or  $10x^2 - x - 500 > 0$   
 Solving the above inequality we get,  $x > 7$

16. (c) Number of 3-digits numbers divisible by 3, i.e. multiples of 3  
 $m(3) = [999/3] - [99/3] = [333] - [33] = 333 - 33 = 300$   
 Number of 3-digits numbers divisible by 4, i.e. multiples of 4  
 $m(4) = [999/4] - [99/4] = [249.75] - [24.75] = 249 - 24 = 225$   
 Number of 3-digits numbers divisible by 12 (LCM of 3 & 4) i.e. multiples of 12  
 $m(12) = [999/12] - [99/12] = [83.25] - [8.25] = 83 - 8 = 75$   
 Total number of 3-digits divisible by 3 or 4 =  $m(3) + m(4) - m(12)$   
 $= 300 + 225 - 75 = 450$   
 So, the number which are neither divisible by 3 nor 4 =  $900 - 450 = 450$

17. (a) Let the radius of large ball = 'R'  
 Let the radius of each bead =  $\frac{R}{5}$   
 Number of beads =  $\frac{\text{Volume of large ball}}{\text{Volume of one bead}}$   
 $= \frac{\frac{4}{3}\pi R^3}{\frac{4}{3}\pi (\frac{R}{5})^3} = 125$   
 Given, cost price of the large ball = INR 1,000,000  
 So, the cost price of each ball = INR 1,000,000/125 = INR 8000  
 Profit earned on each bead is 20%. (given)  
 So, the selling price of each bead = INR 8000x1.2 = INR 9600....eq.(1)  
 Let the list price of each bead = INR 'x'.

- $\therefore x_{\text{minimum}} = 8$  Ans.  
 15. (140)  $y = 4970 - |x|$  represents set of two line whose equations is given by  
 $y = 4970 - x$  when  $x \geq 0$  ... (1)  
 $y = 4970 + x$  when  $x < 0$  ... (2)  
 Plotting the graph of given curves we get,



Put  $y = x^2$  in eqn. (1)  
 $x^2 + x = 4970$   
 $x^2 + 71x - 70x - 4970 = 0$   
 $x(x + 71) - 70(x + 71) = 0$   
 $x = 70$  or  $-71$   
 $\therefore x = 70$  (acceptable) as  $x \geq 0$   
 $\therefore$  The length of line segment LM =  $70 + 70 = 140$ .

- After giving 20% discount on  $x$ , the selling price of each bead = 80% of  $x = 0.8x$ ....eq.(2)  
 Equating equations (1) and (2),  
 $0.8x = 9600$   
 $x = 12000$   
 Thus, list price of each bead = INR 12000. Ans.

18. (b)  $\log_n(\log_2 a) = 1$   
 $\Rightarrow \log_2 a = n^1$   
 $\Rightarrow a = (2)^n$  .....(i)  
 $\log_n(\log_2 b) = 2$   
 $\Rightarrow \log_2 b = n^2$   
 $\Rightarrow b = (2)^{n^2}$  .....(ii)  
 $\log_n(\log_2 c) = 3$   
 $\Rightarrow \log_2 c = n^3$   
 $\Rightarrow c = (2)^{n^3}$  .....(iii)  
 We have,  $a = 2^n$ ,  $b = 2^{n^2}$  and  $c = 2^{n^3}$   
 Now, let us substitute these values of  $a$ ,  $b$  and  $c$  in each option and check the equality.  
 Option (a)  $a^n + b^n = c^n$   
 LHS =  $a^n + b^n = (2^n)^n + (2^{n^2})^n = 2^{n^2} + 2^{n^3}$   
 RHS =  $c^n = (2^{n^3})^n = 2^{n^4}$   
 We can see **LHS  $\neq$  RHS**  
 Option (b)  $(a^n + b^n)^n = ac$   
 LHS =  $(a^n + b^n)^n = ((2^n)^n + 2^{n^2})^n = (2^{n^2} + 2^{n^3})^n = (2 \cdot 2^{n^2})^n = 2^{n(n^2+1)}$   
 RHS =  $ac = 2^n \cdot 2^{n^3} = 2^{n+n^3} = 2^{n(1+n^2)} = 2^{n(n^2+1)}$   
 Here **LHS = RHS**  
 Thus option (b) is right. We need not to check the other options.

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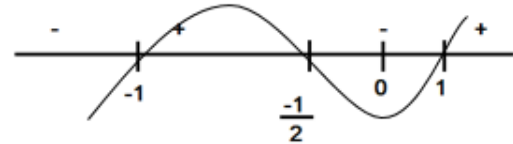
19. (c) Let the roots of the equation be  $\alpha$  and  $\beta$ .  
 Sum of roots,  $\alpha + \beta = \frac{-(-b)}{5+\sqrt{2}}$   
 Product of roots,  $\alpha\beta = \frac{8+2\sqrt{5}}{5+\sqrt{2}}$   
 Harmonic mean = 4  
 $\Rightarrow \frac{2\alpha\beta}{\alpha+\beta} = 4$   
 $\Rightarrow \frac{\alpha\beta}{\alpha+\beta} = 2$   
 $\Rightarrow \frac{\frac{8+2\sqrt{5}}{5+\sqrt{2}}}{\frac{-(-b)}{5+\sqrt{2}}} = 2$   
 $\Rightarrow \frac{8+2\sqrt{5}}{b} = 2$   
 $\Rightarrow b = \frac{2(4+\sqrt{5})}{2}$   
 $\Rightarrow b = 4+\sqrt{5}$  Ans.
20. (d) First rook can be placed in 64 ways i.e.  $8^2$  ways. (place it at any of the 64 squares of the chessboard).  
 Now the second rook should be placed such that it should not lie in the same row or column in which the first is placed.  
 Placing first rook in any of the 64 squares will block 15 squares for other rooks.  
 So, the second rook can be placed in remaining 49 ways i.e.  $7^2$  ways. This will block 13 more squares of the chessboard for remaining rooks.  
 Third rook can be placed in  $6^2$  i.e. 36 ways and so on.  
 Total number of ways =  $8^2 \times 7^2 \times 6^2 \times 5^2 \times 4^2 \times 3^2 \times 2^2 \times 1^2 = (8!)^2$   
 As all the 8 rooks will be identical, final number of ways =  $(8!)^2/8! = 8!$  Ans.
21. (d)  $\frac{x^2(x+1)}{(x-1)(2x+1)^3} > 0$   
 As, denominator can't be equal to zero.  
 $\therefore x \neq 1, \frac{-1}{2}$

Multiplying both side of inequality by an expression  $\frac{(x-1)^2(2x+1)^4}{x^2}$ , a perfect square whose value is always positive, we get

$$\frac{x^2(x+1)}{(x-1)(2x+1)^3} \times \frac{(x-1)^2(2x+1)^4}{x^2} > 0 \times \frac{(x-1)^2(2x-1)^4}{x^2}$$

$$\Rightarrow (x+1)(x-1)(2x+1) > 0$$

Solving the above inequality using Wavy Curve method,



$$x \in (-1, \frac{-1}{2}) \cup (1, +\infty)$$
 Ans.

22. (b)  $|A^3 - 3A^2 - 5A| = 0$  (given)  
 $\Rightarrow |A(A^2 - 3A - 5)| = 0$   
 $\Rightarrow |A||A^2 - 3A - 5| = 0$   
 $\Rightarrow |A| = 0$   
 $\Rightarrow |A| = a \times 1 - 2 \times 3 = 0$   
 $\Rightarrow$  Therefore,  $a = 6$  Ans.
23. (d) Let the Principal be INR 'P'  
 Difference of CI & SI for 3 years is given by the formula,  
 $CI - SI = P[(R\%)^3 + 3(R\%)^2]$   
 $527 = P[(10\%)^3 + 3(10\%)^2]$   
 Solving the equation we get,  $P = \text{INR } 17,000$ . Ans.
24. (d) Total students = 120  
 Science students = 80 & Commerce students = 40  
 Total Mumbai Indians supporters = 70  
 Maximum number of Commerce students who can support MI will be 40.  
 It means rest of the 30 supporters of MI will be from the Science stream, in this case.  
 If number of Commerce students who supported MI reduces from 40, then the Science students will increase to reach total of 70 supporters.  
 Thus, Science students who are MI supporters is 30 or more. Ans.
25. (c) Let the fair coin be tossed 'n' number of times.  
 Probability of getting NO heads in 'n' successive tosses =  $(\frac{1}{2}) \times (\frac{1}{2}) \dots n \text{ times} = (\frac{1}{2})^n = \frac{1}{2^n}$   
 Probability of getting AT LEAST ONE head =  $1 - \text{Probability of getting NO heads} > 0.8$   
 $\Rightarrow 1 - \frac{1}{2^n} > 0.8$   
 $\Rightarrow 1 - 0.8 > \frac{1}{2^n}$   
 $\Rightarrow 0.2 > \frac{1}{2^n}$   
 $\Rightarrow \frac{1}{5} > \frac{1}{2^n}$   
 $\Rightarrow 5 < 2^n$  or  $2^n > 5$   
 So, the minimum value of n that meets the above inequality = 3.

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26. (b) We know, Dividend = Divisor x Quotient + Remainder.

$$P(x) = (x-1).Q + 2 \dots \dots \dots \text{eq.(1)}$$

$$P(x) = (x-2).K + 1 \dots \dots \dots \text{eq.(2)}$$

Multiply eq.(1) by (x-2) and eq.(2) by (x-1) we get,

$$P(x).(x-2) = (x-1).(x-2).Q + 2(x-2) \dots \dots \dots \text{eq.(3)}$$

$$P(x).(x-1) = (x-1).(x-2).K + 1(x-1) \dots \dots \dots \text{eq.(4)}$$

Subtracting eq.(3) from eq.(4) we get,

$$P(x) = [(x-1).(x-2)](K-Q) + 3-x$$

From above relation, it is evident that when P(x) is divided by (x-1).(x-2), the remainder obtained will be 3-x. Ans.

27. (d) Let  $[x] = I$ , an Integer &  $\{x\} = f$ , a proper fraction

$$\text{Given: } \{x\} = x - [x]$$

$$\text{Or, } x = [x] + \{x\}$$

$$\text{Or, } x = I + f$$

Also given that:  $2[x] = x + n\{x\}$ , where n is a natural number.

We can write:

$$2I = I + f + n.f$$

$$\Rightarrow I = f(n+1)$$

$$\Rightarrow f = \frac{I}{(n+1)}$$

$\Rightarrow$  We know that:  $0 < f < 1$

$$\Rightarrow 0 < \frac{I}{(n+1)} < 1$$

$$\Rightarrow 0 < I < (n+1)$$

'I' can have values 1, 2, 3, ... n & corresponding values of

'f' can be  $\frac{1}{n+1}, \frac{2}{n+1}, \frac{3}{n+1}, \dots, \frac{n}{n+1}$ .

Thus, there can be 'n' possible values of x which are:

$$x_1 = 1 + \frac{1}{n+1} = \frac{n+2}{n+1}$$

$$x_2 = 2 + \frac{2}{n+1} = 2 \left( \frac{n+2}{n+1} \right)$$

$$x_3 = 3 + \frac{3}{n+1} = 3 \left( \frac{n+2}{n+1} \right)$$

$$\vdots$$

$$\vdots$$

$$x_n = n + \frac{n}{n+1} = n \left( \frac{n+2}{n+1} \right)$$

Sum of all these values of x =  $\frac{n+2}{n+1} [1 + 2 + 3 + \dots + n]$

$$= \frac{n+2}{n+1} \left[ \frac{n(n+1)}{2} \right]$$

$$= \frac{n(n+2)}{2} \text{ Ans}$$

28. (d)  $\frac{a+b}{c+d} = \frac{c+d}{a+d}$  (given)

$$\begin{aligned} \Rightarrow (a+b)(a+d) &= (c+d)(c+d) \\ \Rightarrow a^2 + a(b+d) + bd &= c^2 + c(b+d) + bd \\ \Rightarrow a^2 - c^2 + a(b+d) - c(b+d) &= 0 \\ \Rightarrow (a+c)(a-c) + (b+d)(a-c) &= 0 \\ \Rightarrow (a-c)(a+c+b+d) &= 0 \\ \Rightarrow a-c = 0 \text{ or } a+b+c+d &= 0 \\ \Rightarrow a = c \text{ or } a+b+c+d &= 0 \text{ Ans.} \end{aligned}$$

29. (b)  $\log_{\cos x} \sin x + \log_{\sin x} \cos x = 2$

$$\log_{\cos x} \sin x + \frac{1}{\log_{\cos x} \sin x} = 2$$

let  $\log_{\cos x} \sin x = k$

$$k + \frac{1}{k} = 2 \quad [\because k > 0]$$

$$k = 1$$

$$\log_{\cos x} \sin x = k = 1$$

$$\sin x = (\cos x)^1$$

$$\sin x = \cos x$$

Above relation is possible only in 1<sup>st</sup> quadrant.

$$\therefore x = \frac{\pi}{4} \text{ or } 2\pi + \frac{\pi}{4} \text{ or } 4\pi + \frac{\pi}{4} \text{ \&.... so on}$$

$$\therefore x = 2n\pi + \frac{\pi}{4} \text{ Ans.}$$

30. (d) Time taken to cover first side =  $\frac{100}{100} = 1$  hr.  
Similarly, time taken to cover the second, third and fourth side will be  $\frac{1}{2}$  hr,  $\frac{1}{3}$  hr and  $\frac{1}{4}$  hr.

$$\text{Total time taken to cover all 4 sides} = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4}$$

$$= \frac{12+6+4+3}{12}$$

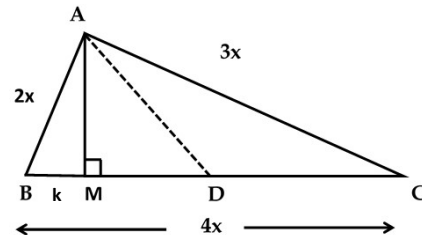
$$= \frac{25}{12} \text{ hrs.}$$

$$\text{Total distance} = 4 \times 100 \text{ km} = 400 \text{ km}$$

$$\text{Average Speed} = \frac{\text{Total distance travelled}}{\text{Total time taken}} = \frac{400}{25/12}$$

$$= 16 \times 12 \text{ km} = 192 \text{ km/hr}$$

31. (b)



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As per the Apollonius theorem for a triangle ABC where D is mid-point of side BC,

$$AB^2 + AC^2 = 2[BD^2 + 4D^2]$$

$$(2x)^2 + (3x)^2 = 2[(2x)^2 + AD^2]$$

$$\frac{13x^2}{2} - (2x)^2 = AD^2$$

$$\frac{5x^2}{2} = AD^2$$

$$\therefore AD = \sqrt{\frac{5}{2}}x$$

Applying Pythagoras theorem in right angled  $\triangle AMB$  and  $\triangle AMC$  we get

$$AM^2 = AB^2 - BM^2 \quad \dots (1)$$

$$AM^2 = AC^2 - MC^2 \quad \dots (2)$$

Now since LHS is equal, RHS should also be equal.

$$\therefore AB^2 - BM^2 = AC^2 - MC^2$$

$$\Rightarrow (2x)^2 - k^2 = (3x)^2 - (4x - k)^2$$

$$\Rightarrow 4x^2 - k^2 = 9x^2 - 16x^2 - k^2 + 8xk$$

$$\Rightarrow 8xk = 11x^2$$

$$\therefore BM = k = \frac{11}{8}x$$

$$\Rightarrow \text{Thus, } \frac{BM}{AD} = \frac{\frac{11x}{8}}{\sqrt{\frac{5}{2}}x} = \frac{11}{4\sqrt{10}} \text{ Ans.}$$

32. (b) Five players playing with each other exactly once. It means every player will play exactly 4 games. If a player wins 4 games straight against the other players, it means other players must have lost one game to him. So, if he gets 4 points, no one else can score the same points. So, option (b) is wrong.
33. (d) Rabbit can climb 10 steps of the staircase by climbing in various combinations of single and two steps. Possible combinations are:

No. of single steps	No. of two steps	No. of arrangements of single & two steps
0	5	1 way
2	4	$\frac{6!}{2!4!} = 15$ ways
4	3	$\frac{7!}{4!3!} = 35$ ways
6	2	$\frac{8!}{6!2!} = 28$ ways
8	1	$\frac{9!}{8!1!} = 9$ ways
10	0	1 way
		Total ways = 89 ways

**Note:** All the single steps & two steps used by the rabbit are considered identical among themselves.  
Ans. 89 ways

34. (a)  $\therefore a_1, a_2, a_3$  are in geometric progression.

$$\frac{a_2}{a_1} = \frac{a_3}{a_2} = r$$

$$a_2 = a_1 r \quad \text{--- (i)}$$

$$a_3 = a_2 r = a_1 r^2 \quad \text{--- (ii)}$$

$$\text{Given: } a_1 x^2 + 2a_2 x + a_3 = 0$$

Putting the values of  $a_2$  and  $a_3$  in above equation, we get

$$a_1 x^2 + 2a_1 r x + a_1 r^2 = 0$$

$$a_1 (x^2 + 2r \cdot x + r^2) = 0$$

$$a_1 (x + r)^2 = 0$$

$$a_1 \neq 0 \therefore x + r = 0$$

$$x = -r.$$

Let  $-r$  be the common root of given two equations.

Then  $b_1 x^2 + 2b_2 x + b_3 = 0$  can be written as:

$$b_1 r^2 - 2b_2 r + b_3 = 0$$

$$b_1 r^2 + b_3 = 2b_2 r \quad \text{--- (ii)}$$

$$b_1 \cdot \frac{a_3}{a_1} + b_3 = 2b_2 \cdot \frac{a_3}{a_2}$$

$$\frac{b_1 a_3}{a_3 a_1} + \frac{b_3}{a_3} = \frac{2b_2 a_3}{a_3 a_2}$$

$$\frac{b_1}{a_1} + \frac{b_3}{a_3} = 2 \frac{b_2}{a_2}$$

$\frac{b_1}{a_1}, \frac{b_2}{a_2}, \frac{b_3}{a_3}$  are in arithmetic progression. Ans.

**Note:** If  $x, y, z$  are in A.P. then  $x + z = 2y$

35. (a) Equation of circle  $x^2 + y^2 - 6x + 4y - 12 = 0$

Comparing above equation with general equation of circle  $x^2 + y^2 + 2gx + 2fy + c = 0$

$$g = -3, f = 2, c = -12$$

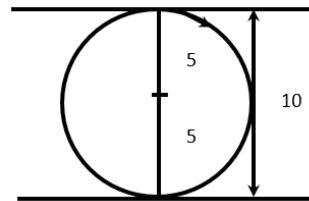
Coordinate of center  $(-g, -f) \Rightarrow C(3, -2)$

$$\text{Radius} = \sqrt{g^2 + f^2 - c} = \sqrt{(-3)^2 + (2)^2 - (-12)}$$

$$= \sqrt{9 + 4 + 12} = \sqrt{25} = 5$$

Now looking at the option, equation of lines in all the option represents the equation of parallel lines. (same slope)

Distance between 2 parallel lines (tangents) should be equal to the diameter of the circle =  $2 \times \text{radius} = 5 \times 2 = 10$



Distance between two parallel lines  $ax + by + c_1 = 0$  &  $ax + by + c_2 = 0 = \frac{|c_1 - c_2|}{\sqrt{a^2 + b^2}}$

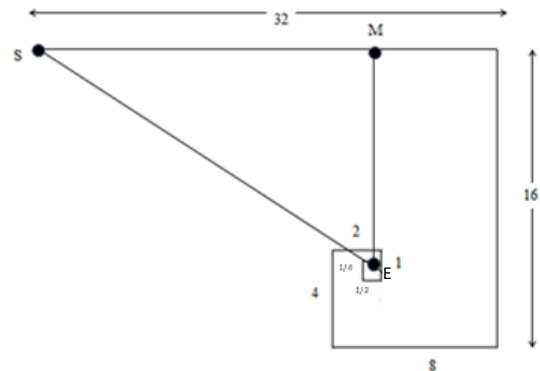
Checking option (a)

$$\therefore \text{Distance between the two parallel lines} = \frac{|19 - (-31)|}{\sqrt{4^2 + 3^2}}$$

$$= \frac{|50|}{5} = 10$$

Only equation of lines given in option (a) satisfies the condition and no other. Ans.

36. (a) is the correct answer.



Let S and E be the start and end point of the person.  $\triangle SME$  will be a right angle triangle.

We have to find SE.

Using Pythagoras theorem,

$$SE^2 = SM^2 + ME^2 \dots\dots\dots (i)$$

Here, SM= net distance travelled in east direction (towards right).

& ME = net distance travelled in south direction (downwards).

$$SM = 32 - 8 + 2 - \frac{1}{2} + \dots \infty = \frac{32}{1 - (-\frac{1}{4})} =$$

$$\frac{32 \times 4}{5} \quad \left( \text{using } S_{\infty} = \frac{a}{1-r} \right) \quad ME = 16 - 4 + 1 - \frac{1}{4} + \dots - \infty$$

$$= \frac{16}{1 - (-\frac{1}{4})} = \frac{16 \times 4}{5} \quad \left( \text{using } S_{\infty} = \frac{a}{1-r} \right)$$

Substitute the value of SM & ME in eqn.(i), we get,

$$SE = \sqrt{\left(\frac{32 \times 4}{5}\right)^2 + \left(\frac{16 \times 4}{5}\right)^2}$$

$$= \frac{4 \times 16}{5} \sqrt{4 + 1}$$

$$= \frac{64}{5} \cdot \sqrt{5} = \frac{64}{\sqrt{5}} \cdot \text{Ans.}$$

$$\sin^2 \alpha + \sin^2 \beta - 2 \sin \alpha \sin \beta = x^2$$

$$(\cos^2 \alpha + \sin^2 \alpha) + (\cos^2 \beta + \sin^2 \beta) + 2(\cos \alpha \cdot \cos \beta - \sin \alpha \cdot \sin \beta)$$

$$= 1 + x^2$$

$$1 + 1 + 2 \cos(\alpha + \beta) = 1 + x^2$$

$$x^2 = 1 + 2 \cos(\alpha + \beta)$$

$$x = \sqrt{1 + 2 \cos(\alpha + \beta)}$$

$$x_{\max} = \sqrt{1 + 2[\cos(\alpha + \beta)]_{\max}}$$

$$x_{\max} = \sqrt{1 + 2 \times 1} = \sqrt{3} \text{ Ans.}$$

Note:  $\cos A \cos B - \sin A \sin B = \cos(A + B)$

&  $-1 \leq \cos \theta \leq 1$

39. (d) Its given that the unit digit of  $p^3 = 4$

$\therefore$  Unit digits of p must be = 4

Unit digit of  $(p+3) = 7$

Unit digit of  $(p + 3)^3 = 7^3 = 343$

$\therefore$  3 Ans.

40. (d)  $10^{2023} = 2^{2023} \times 5^{2023}$

Total positive divisors =  $(2023+1) \times (2023+1)$

$$= 2024 \times 2024 = (2024)^2$$

Now the number of divisors of  $10^{2023}$  which are also the multiple of  $10^{2001}$  can be find out by counting the total number of divisors of  $10^{22}$  in  $10^{2023}$  i.e.  $10^{2001 \times 10^{22}}$

$\therefore$  Total number of divisors of  $10^{22}$  i.e.  $5^{22} \times 2^{22}$  will be equal to  $(22+1) \times (22+1) = 23 \times 23 = (23)^2$

So, Probability =  $\frac{23^2}{2024^2} \text{ Ans.}$

**Hint [41-45]:** We have been provided with following information.

- i. Each drug works on at least one organism but not more than two organisms.
- ii. Each organism can be treated with at least two and at most three of these five drugs.
- iii. On whichever organism A works, B also works. Similarly, on whichever organism C works, D also works.
- iv. D and E do not work on the same organism.

From point (iii), if A works on a particular organism then B we will also work on it. Also if C works on a particular organism then D we will also work on it.

From point (iv) if D works on a particular organism then E will not work on it.

We can conclude the following:

- 1) A works on R, so B must also work on R. Therefore B works on Q and R, so it cannot work on P. As B is not working on P, A would not have worked on it.
- 2) C works on Q, so D must also work on Q. As D works on Q, E will not work on it. As B, C and D three drugs working on Q, then two drugs A & E will not work on Q.
- 3) As A & B are not working on it, both C and D should work on P (E will not work on P, as D is working)
- 4) E is not working on P and Q. Means it must work on R (from point i, given in the question). A, B and E is working on R, means C and D must not be working on it (from point ii, given in the question).

This way we will be able to complete the table and answer the questions.

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37. (a) Comparing the given equation of circle with the general form  $x^2 + y^2 + 2gx + 2fy + c = 0$  we get,  $g = -1, f = -2$  and  $c = 5$

Radius of the given circle can be calculated using the formula:

$$\text{Radius} = \sqrt{g^2 + f^2 - c} = \sqrt{(-1)^2 + (-2)^2 - 5} = 0$$

So the radius of given circle is 0.

We know circle with radius zero is called a point.

Thus, the equation represent a point. Ans.

38. (c)  $\cos \alpha + \cos \beta = 1 \dots (i)$

Let  $\sin \alpha - \sin \beta = x \dots\dots (ii)$

Squaring & adding - (i) & (ii) we get,

$$\cos^2 \alpha + \cos^2 \beta + 2 \cos \alpha \cos \beta = 1$$

		Organism		
		P	Q	R
Drug	A	× 1)	× 2)	✓
	B	× 1)	✓	✓ 1)
	C	✓ 3)	✓ 2)	× 4)
	D	✓ 3)	✓ 2)	× 4)
	E	× 3)	× 2)	✓ 4)

41. (b) is the correct answer.
42. (a) is the correct answer.
43. (d) is the correct answer.
44. (b) is the correct answer.
45. (b) is the correct answer.
46. (a) Option 1, "By helping the body replenish its resources," is correct because the passage emphasizes the restorative nature of sleep and its role in physical and mental well-being.
- The passage mentions that sleep is a crucial part of physical and mental well-being, describing it as a "restorative process" that should not be negotiable. It explains that during sleep, the body and mind undergo repair and recharge. The restorative functions of sleep contribute to the replenishment of various bodily resources, including the rejuvenation of physical and mental abilities.
- Additionally, the passage highlights the negative consequences of sleep deprivation, such as abnormal body functioning, exhaustion of the brain, and the impact on metabolism and appetite-regulating hormones. Lack of sleep can lead to higher cholesterol, blood pressure, and an increased risk of conditions like obesity and Type 2 diabetes.
- Therefore, the correct answer is option 1, as it accurately reflects the passage's emphasis on sleep as a process that helps the body replenish its resources for overall well-being. The other options (2, 3, and 4) are not directly supported by the information provided in the passage.
47. (a) The correct answer is option 3, "Maintain a set sleep pattern." The passage emphasizes the importance of having a definite sleeping pattern for maintaining physical and mental well-being.
- The passage suggests that, just like any other routine, having a specific sleeping pattern can help an individual maintain a cycle of rest and activity. It recommends sleeping at the same time every day and waking up on time to encourage quality sleep. Consistency in sleep patterns contributes to the overall effectiveness of the restorative process during sleep.
- The passage also provides tips for proper relaxation of the body and mind before sleeping, such as keeping the mobile phone aside at least half an hour before bed, ensuring a dark and quiet room, and engaging in activities like reading a good book or listening to

soothing music to induce deep sleep. All these recommendations point towards the importance of maintaining a regular sleep pattern for physical well-being.

Option 3 aligns with the passage's emphasis on the positive impact of a consistent sleep routine on overall health, making it the correct answer.

Explanation for other options: Option 1, "read a good book every night": Reading a good book is not mentioned as a requirement for remaining physically fit in the passage. While reading before bedtime may be a good practice for relaxation, it is not explicitly connected to physical fitness.

Option 2, "snack frequently": The passage does not promote the idea of snacking frequently as a means to remain physically fit. In fact, it suggests that staying up late can lead to consuming unhealthy snacks and junk food high in carbs and sugar, which increases the risk of Type 2 diabetes and obesity.

Option 4, "raise levels of ghrelin": The passage indicates that sleep deprivation can raise levels of ghrelin, the hunger hormone. However, this is presented as a negative consequence of sleep deprivation, and the overall message is to emphasize the importance of maintaining a proper sleep routine. It does not suggest intentionally raising ghrelin levels as a strategy for physical fitness.

48. (a) The primary objective of the passage is to provide information and create awareness about the importance of sleep for physical and mental well-being. While it does offer advice on maintaining a proper sleep routine, the broader focus is on educating the reader about the role of sleep in overall health. Therefore, option 1, "advise the reader," can be considered a valid interpretation. The passage aims to guide the reader toward understanding the significance of sleep and adopting healthy sleep habits.
- Option 2, "present psychological insights to the reader": While the passage discusses the impact of sleep on mental health, it does not primarily focus on presenting detailed psychological insights. The primary emphasis is on the importance of sleep for overall well-being.
- Option 3, "expose the reader to disinformation": The passage does not aim to expose the reader to disinformation. Instead, it provides factual information about the effects of sleep on health and advises the reader on healthy sleep practices.
- Option 4, "provide medical input to the reader": While the passage contains information related to health and well-being, its primary goal is to offer general advice rather than provide detailed medical input. It emphasizes the importance of sleep for overall well-being without delving into complex medical details.

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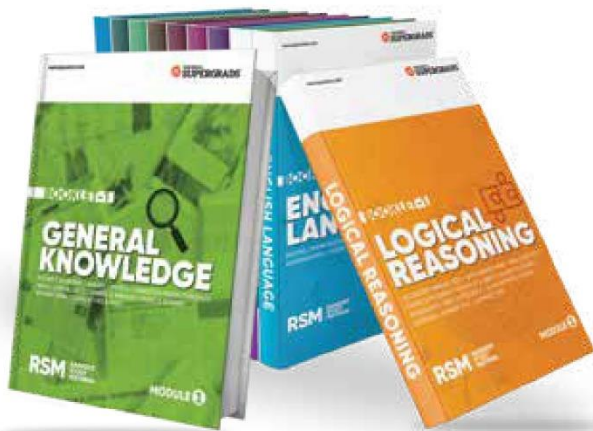
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49. (a) The passage discusses the negative consequences of sleep deprivation, and one of the highlighted outcomes is mental exhaustion. Sleep deprivation adversely affects both the mental and physical well-being of an individual.

The passage mentions that insomnia, which is a form of sleep deprivation, can make the body work abnormally. It affects both mental and physical abilities, leaving the brain exhausted. The exhaustion of the brain, in turn, affects the natural functioning of the body. Therefore, mental exhaustion is a significant consequence of being deprived of sleep, as indicated in the passage.

Option 1, "mental exhaustion," aligns with the information provided in the passage, making it the correct answer. The passage does not specifically mention hunger satiation, terminal illness, or metabolism loss as direct consequences of sleep deprivation.

Explanation for other options:

Option 2, "hunger satiation": The passage discusses how sleep deprivation can lead to an increase in the hunger hormone (ghrelin) and a decrease in the satiety hormone (leptin), which can result in increased appetite and potential overeating. However, it does not mention "hunger satiation."

Option 3, "terminal illness": The passage does not suggest that lack of sleep directly leads to terminal illness. While it mentions the consequences of sleep deprivation on health, it does not specify terminal illnesses.

Option 4, "metabolism loss": The passage mentions that sleep deprivation can lower levels of leptin, a hormone that stabilizes metabolism. However, it does not explicitly state "metabolism loss" as a consequence of sleep deprivation.

50. (d) The correct answer is option 1, "Regular exercising and eating healthy food alone ensure fitness," as the passage suggests that while regular exercise and a healthy diet contribute to fitness to some extent, they are not the sole factors. The passage emphasizes that

sleep is also a crucial component of physical and mental well-being, and its role should not be overlooked. Explanation for other options:

Option 2, "Irregular sleep patterns can result in health problems": This statement is correct according to the passage, which highlights the negative impact of irregular sleep patterns on health. Option 3, "Insufficient sleep can lead to obesity": This statement is correct according to the passage, which mentions that lack of sleep can raise levels of the hunger hormone (ghrelin) and decrease levels of the satiety hormone (leptin), potentially leading to obesity.


Option 4, "One's body and mind should be properly relaxed to ensure good sleep": This statement is consistent with the passage's recommendation for proper relaxation of the body and mind before sleeping to encourage quality sleep.

51. (b) The main focus of the passage is on the importance of sleep for physical and mental well-being, particularly highlighting the perils associated with insomnia and irregular sleep patterns. The passage discusses how sleep deprivation can lead to various health problems, including deranged cholesterol, diabetes, obesity, and disturbances in appetite-regulating hormones like leptin and ghrelin.

While the passage briefly mentions the ill effects of an unhealthy lifestyle, including junk food high in carbs and sugars, it primarily addresses the consequences of inadequate sleep on overall health. It emphasizes the significance of maintaining a regular sleep pattern and the adverse effects of sleep deprivation.

Therefore, option 3, "Perils of insomnia and irregular sleep patterns," accurately reflects the central theme and focus of the passage


Ill effects of junk food high in carbs and sugars: While the passage briefly mentions unhealthy snacks and junk food in connection to staying up late, it is not the main focus. The primary emphasis is on sleep and its impact on health.



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Dangers of high levels of cholesterol and diabetes: While cholesterol and diabetes are discussed in relation to sleep deprivation, the passage's main focus is on the role of sleep in preventing these conditions rather than detailing the dangers. Stability of leptin and ghrelin in the human body: Leptin and ghrelin are mentioned in the context of sleep deprivation, but the primary focus is on how sleep deprivation affects these hormones rather than their stability. The broader focus is on the consequences of irregular sleep patterns and insomnia

52. (c) The main point the passage makes is that Apple has realized the strategic importance of the Indian market. The passage discusses the significance of Apple's decision to open physical stores in India, highlighting it as a key milestone in Apple's branding strategy. The opening of physical stores in India allows Apple to deliver the full Apple experience to Indian customers and is seen as a statement that India is now big enough for Apple to be genuinely interested in expanding its operations there.

While the passage mentions that the iPhone is still considered aspirational in the price-sensitive Indian market and that setting up Apple stores provides a premium experience to premium consumers, the central focus is on Apple recognizing the strategic value of the Indian market and taking steps to establish a stronger presence. Therefore, option 1, "Has realized the strategic importance of the Indian market," accurately captures the main point conveyed in the passage.

Needs physical stores to expand sales to more buyers of premium products: While the passage mentions that Apple opening physical stores in India is a part of its branding strategy and provides a premium experience, it doesn't explicitly state that Apple needs physical stores to expand sales to more buyers of premium products. The focus is on delivering the full Apple experience to Indian customers. iPhone was already popular in India. The passage doesn't explicitly state that the iPhone was already popular in India. It mentions that the iPhone is still an aspirational product in the price-sensitive Indian market, and opening Apple stores aims to provide a premium experience to premium consumers.

Needs new branding and marketing strategies to compete with Samsung: The passage doesn't suggest that Apple is opening physical stores in India as a response to competition with Samsung or that it needs new branding and marketing strategies to compete. The focus is on recognizing the strategic importance of the Indian market and providing a premium experience to consumers.

53. (d) The statement "Apple's aim is not only to increase sales of its iPhones but to draw people into Apple's ecosystem" implies that Apple is not solely focused on

selling individual iPhones; instead, it wants to create a broader consumer base that engages with multiple Apple products and services. The term "Apple's ecosystem" refers to the interconnected network of Apple devices, software, and services.

In the context of the passage, Apple aims to provide a complete and integrated experience to its customers. This includes not only purchasing an iPhone but also becoming part of the broader Apple ecosystem, which may include products like iPads, MacBooks, Apple Watches, and services like iCloud, the App Store, and more. The strategy is to build a loyal customer base that uses a range of Apple products, fostering brand loyalty and increasing the overall engagement with the Apple ecosystem.

Therefore, option 3, "Bring customers into a network of related products which it offers," best captures the meaning of the statement in the passage.

**Attract customers to buy its phones through innovative means:** This option is not supported by the passage. The focus is not solely on selling phones through innovative means; rather, it emphasizes providing a complete Apple experience and bringing customers into the Apple ecosystem.

**Attract customers by displaying a wide range of aesthetically designed products:** While the passage mentions the premium experience offered by Apple stores, it does not explicitly state that the aim is to attract customers by displaying a wide range of aesthetically designed products. The emphasis is on the overall Apple experience.

**Be the market leader in the world of premium smartphones:** The passage does mention Apple's market share in the premium smartphone market in India, but the main point is not about becoming the market leader. Instead, it emphasizes Apple's realization of the strategic importance of the Indian market and its interest in expanding operations in the premium segment.

54. (d) The passage mentions that the opening of physical Apple stores in India is a key milestone, and it acknowledges that while this development is significant, it may not lead to a dramatic change in Apple's sales. The passage focuses more on the idea that the Apple stores will provide a premium experience to customers, attracting them to the Apple ecosystem. In summary, option 3 aligns with the passage's emphasis on the premium experience and the broader goal of engaging customers in the Apple ecosystem, rather than a direct expectation of a substantial increase in iPhone sales due to the opening of physical stores.

"Not have any impact on Apple's image": This option is not supported by the passage. The passage suggests that opening physical stores is a key milestone and part

of Apple's branding strategy, indicating that it is likely to have some impact on Apple's image.

"Drive healthy competition in the smartphone market": The passage does not provide information on the impact of Apple's retail stores on competition in the smartphone market. It primarily focuses on Apple's branding strategy and the significance of physical stores in India.

"Bring in more customers and increase sales": While the passage mentions that opening stores will pull more people into the Apple ecosystem, it doesn't explicitly state that it will significantly increase iPhone sales. Therefore, option 4 is not directly supported by the passage.

55. (a) The passage suggests that India is now a focus of Apple operations for a combination of reasons, and option 3, "It offers the benefit of a manufacturing base in addition to a market," aligns with the information presented in the passage. No other country has the same ease of doing business: This is not explicitly mentioned in the passage. The focus on manufacturing in India is emphasized more than the ease of doing business. It has the world's second-largest population: While the population size is mentioned, the passage primarily emphasizes India's role as a manufacturing base for Apple products. American technology companies want to reduce their reliance on China: While this is a global trend due to geopolitical considerations, the passage doesn't explicitly state that this is the primary reason for Apple's focus on India. The emphasis is more on India's growing importance as both a market and a manufacturing base.

**Manufacturing Base:** The passage mentions that Apple began making a lower-end model of the iPhone in India in 2017. Furthermore, by 2025, a quarter of all iPhones the company makes could be produced in India. This indicates that India provides a significant manufacturing base for Apple, and the company is increasing its manufacturing capacity in the country.

**Market Potential:** While not explicitly stated in the options, the passage also implies that India's market potential is a factor in Apple's focus. The passage notes that India is rising fast as a manufacturing base for the iPhone and mentions Apple's significant market share in the Indian premium smartphone market.

Option 3 captures the dual advantage of India being both a manufacturing base and a market of strategic importance to Apple. The other options do not comprehensively address both aspects mentioned in the passage.

56. (a) The passage discusses Apple's challenge in opening physical stores in India and emphasizes the importance of not alienating partner sellers while establishing their own retail presence. This is reflected in option 2:

**Retaining Links with Partner Sellers:** The passage mentions, "The real issue will be to pull consumers to these flagship centers without alienating the partner sellers." This indicates that Apple's challenge is to attract customers to their own stores (flagship centers) without negatively impacting their relationships with partner sellers.

**Balancing Act:** The use of the term "real issue" suggests that managing this delicate balance between establishing Apple's retail presence and maintaining positive relationships with partner sellers is a critical challenge for the company. Option 2, "Retain links with their partner sellers while drawing customers to their stores," best captures the challenge discussed in the passage. It highlights the need for Apple to navigate the situation in a way that benefits their own retail operations without adversely affecting the partnerships they have with other sellers.

57. (b) Option 2, "Regulatory restrictions were eased in 2023," is not supported by the information in the passage. The passage mentions that in 2019, not 2023, the Indian government relaxed some investment rules. Specifically, companies selling 'cutting-edge' items like Apple's iPhones and iPads were exempted from certain restrictions. This facilitated Apple's efforts to open physical retail stores in India and contributed to the country's role as a manufacturing base for iPhones. Currently 5 to 7 percent of all iPhones are manufactured in India: This is mentioned in the passage. The passage states that Apple began making a lower-end model of the iPhone in India in 2017. Regulatory restrictions were eased in 2023: This is not explicitly mentioned in the passage. If the passage does

not provide information about the specific year when regulatory restrictions were eased, then option 2 could be considered "not true" based on the absence of information.

iPhone 14 is being manufactured in India: This is mentioned in the passage. Last year, Apple began producing its latest model of iPhone 14 in India, which now accounts for 5 percent of total iPhone production. Manufacturing of iPhones in India commenced in 2017: This is partially true. The passage mentions that Apple began making a lower-end model of the iPhone in India in 2017.

58. (c) The phrase "off-the-cuff" means to speak or perform without preparation or rehearsal, often impromptu or extemporaneously. In the given context, if someone is asked to give a rough estimate for the cost of the project "off-the-cuff," it means providing an estimate without detailed planning or formal preparation.

The other options have different meanings:

**Off-the-mike:** This phrase is not commonly used. It doesn't convey the idea of providing an estimate or speaking without preparation.

**Off-the-grid:** This phrase usually refers to being disconnected from the main public utilities, such as electricity or water. It doesn't fit the context of providing a rough estimate.

**Off-the-cuff:** This phrase aligns with the context, indicating an impromptu or unprepared response, which fits well with giving a rough estimate without formal planning.

**Off-the-mark:** This phrase typically means incorrect or inaccurate. It doesn't convey the idea of providing an estimate without preparation.

Therefore, option 3, "off-the-cuff," is the most appropriate choice to complete the sentence.

59. (d) The phrase "ill at ease" means to feel **uncomfortable** or uneasy. In the given context, the actor may feel uneasy or uncomfortable due to the negative comments made by strangers on social media platforms.

While "ill at heart" could also convey a sense of emotional distress, "ill at ease" emphasizes a feeling of discomfort or unease, which is relevant when discussing the impact of negative comments.

60. (d) The phrase "saving grace" is an **idiomatic** expression that refers to the one positive or redeeming feature of something that is otherwise disappointing or unpleasant. In the given context, the sentence implies that the new car has disappointed its buyers in many aspects, but its good mileage is the one positive or redeeming quality.

The other options have different meanings:

**Saving praise:** This phrase does not convey the idea of a positive aspect redeeming a disappointing situation. "Saving praise" suggests preserving positive feedback rather than being a redeeming quality.

**Saving case:** This phrase is not a standard expression in this context and does not convey the intended meaning.

**Saving face:** This phrase typically means preserving one's dignity or avoiding humiliation in a difficult situation. It does not fit the context of a positive aspect redeeming a disappointing product.

**Saving grace:** This is the correct idiom that fits the context, indicating the one positive feature that redeems the overall disappointing nature of the new car.

Therefore, option 4, "saving grace," is the most appropriate choice to complete the sentence.

61. (a) In the context provided, Meena is **described** as arrogant and class-conscious, leading her to refuse to acknowledge Sunil. If we interpret the statement as "she feels he is a man of no importance," it implies that Meena completely disregards Sunil, considering him as having no significance or value in her perception.

Why the other options are not the most suitable:

**Of great importance:** This option suggests that Meena might acknowledge Sunil if he were of great importance. However, the context implies the opposite - that Meena dismisses Sunil because she considers him of lesser importance.

**Of some importance:** Similar to the first option, this suggests a moderate level of importance. The sentence implies that Meena perceives Sunil as having even less importance.

**Of less importance:** This option does align with the context and could be a valid interpretation, indicating that Meena sees Sunil as of lower importance. However, option 4 takes a more extreme stance, emphasizing that Sunil is considered of absolutely no importance by Meena.

**Of no importance:** This option provides a more definitive and extreme interpretation, suggesting that Meena completely dismisses Sunil and sees him as having no significance or importance whatsoever.

In summary, while both options 3 and 4 can be plausible interpretations, option 4, "of no importance," takes a more extreme stance that aligns with the description of Meena's arrogance and class-conscious behavior.

62. (a) The phrase "small fry" is an idiom used to **refer** to individuals of little importance or influence. In the given context, the sentence suggests that while some influential or powerful people know how to escape the law, it is the "small fry" who are more often apprehended and punished.

The other options have different meanings:

**Small fish:** This option is similar in meaning to "small fry" and could be considered acceptable in some contexts. However, "small fry" is a more common and idiomatic expression.

**Tiny fish:** While this option conveys a similar idea of individuals with less influence, "tiny fish" is not as commonly used as "small fry" in this idiomatic sense.

**Small fry:** This is the correct idiom, referring to individuals of little importance or influence. It is commonly used in the context of legal matters to describe those who are less powerful or influential.

**Tiny shots:** This option does not convey the intended meaning. "Tiny shots" is not a standard expression, and it doesn't fit the context of individuals being apprehended and punished by the law.

Therefore, option 3, "small fry," is the most appropriate choice to complete the sentence.

63. (c) The phrase "go the extra mile" is an idiom that means making a special effort or going above and **beyond** what is required. In the given context, the sentence suggests that a few brands make a special effort to tailor their pants in a way that accommodates people with prosthetic legs, making it easier for them to put the pants on.

The other options have different meanings:

**Go the entire mile:** This phrase is not a standard idiom. The common expression is "go the extra mile."

**Go the extra mile:** This is the correct and commonly used idiom to convey the idea of making an additional effort.

**Go to the extreme level:** While this option suggests going to an extreme, it does not convey the sense of making an extra, special effort.

**Go to the extra level:** This is not a standard expression. The more common phrase is "go the extra mile" to indicate going above and beyond.

Therefore, option 2, "go the extra mile," is the most appropriate choice to complete the sentence.

64. (d) The correct phrase to use in this context is "to hear of." The sentence should read, "It grieved me to hear of my friend's serious illness." This expression is commonly used to convey sadness or sorrow upon learning about someone's unfortunate situation or condition.

The other options are not idiomatic in this context:

**To hear of:** This is the correct and commonly used phrase to express sorrow upon learning about someone's situation.

**In hearing:** This phrase is not the typical way to express grief or sorrow in response to someone's illness.

**To hear regarding:** While "to hear" can be followed by "regarding" in some contexts, it is not the most idiomatic choice in expressing grief.

**Hearing regarding:** This phrase is not commonly used, and it may sound awkward in this context.

Therefore, option 1, "to hear of," is the most appropriate choice to complete the sentence.

65. (b) The original sentence contains an incorrect construction in the second part. The verb "insisted" should be followed by a base form verb, not an infinitive verb. Therefore, the correct structure is:

"My aunt Seema was the most generous of all the members of our family. Whenever we went out for dinner, she always insisted that she pay for the meal."

**that she will be paying for the meal:** This option uses the future continuous tense ("will be paying"), which is not appropriate in this context. The verb following "insisted" should be in the base form, not a future tense.

**that she pay for the meal:** This is the correct choice. It uses the base form "pay," which is the appropriate construction after "insisted."

**that she had paid for the meal:** This option uses the past perfect tense ("had paid"), which is not suitable here. The sentence is discussing a general habit or occurrence in the past, and the use of past perfect is unnecessary.

**on and paid for the meal:** This option introduces an unnecessary conjunction "on" and changes the structure of the sentence. The original sentence uses "insisted to pay," but this option suggests "insisted on and paid for," which alters the meaning and structure of the sentence.

66. (d) The original sentence ends with "hasn't it," **which** is a tag question. However, when the main part of the sentence is positive, as in "nothing much has changed," the correct tag question is "has it?"

**nothing much has changed, has it?** This is the correct choice. When the main part of the sentence is positive, the appropriate tag question is "has it?"

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**nothing much has changed, hasn't it?** This option uses the negative tag question "hasn't it," which is not suitable when the main part of the sentence is positive. It creates a mismatch in the sentence structure.

**nothing much has changed, would it?** This option introduces "would it" as a tag question, which is not appropriate in this context. The correct tag question for a positive statement in present perfect tense is "has it?"

**nothing much is changed, isn't it?** This option changes the verb tense in the main part of the sentence to "is changed," which is not consistent with the original sentence's structure. Additionally, the tag question "isn't it" is not appropriate here; the correct tag for a present perfect tense positive statement is "has it?"

In summary, option 1, "nothing much has changed, has it?" is the correct choice as it maintains the appropriate structure for a positive statement in the present perfect tense.

67. (a) The use of "whomever" in Option 3 is considered correct in traditional grammar because it functions as the object of the preposition "for." The construction involves a prepositional phrase, where "whomever" serves as the object of the preposition and is linked to the verb "assigned."

Here's a breakdown:

Original sentence: "When you play the 'Secret Santa', you are expected to buy a gift for whoever you are assigned, without letting them know that you are the one buying the gift."

In this sentence, "for whoever you are assigned" is a prepositional phrase. The preposition "for" requires the object form of the pronoun, which traditionally is "whomever" when used as an object.

Let's briefly review the other options:

**who you are assigned:** This option uses "who," which is an object pronoun. However, "whoever" is generally preferred in modern usage.

**whoever you are assigned:** This choice uses "whoever," which is the subject form of the pronoun and is considered grammatically incorrect.

**whomever you are assigned:** While "whomever" can be considered correct when following a preposition, some may find it more formal or traditional.

**whom you are assigned:** This option uses "whom," which is an object pronoun and is less common in modern usage. "Whoever" is often preferred for both subject and object positions.

68. (c) The original sentence uses a conditional construction with the past perfect "had refused" in the first part and a hypothetical situation in the **second** part ("If it had been him in his friend's place"). Therefore, the correct structure to use in the second part is the past perfect in the conditional "would have definitely accepted."

The correct sentence is: "If it had been him in his friend's place, he would have definitely accepted such an offer."

Now, let's analyze the incorrect options:

**have definitely have accepted such an offer:** This option incorrectly uses "have" twice. The correct construction is "would have definitely accepted."

**have definitely accept such an offer:** This option lacks the past participle "accepted." The correct structure for the conditional is "would have definitely accepted."

**have definitely accepted such an offer:** This is the correct choice. It uses the past perfect "have accepted" in the hypothetical situation.

**definitely accepted such an offer:** This option lacks the conditional "would have." In the context of a hypothetical situation, the correct structure is "would have definitely accepted."

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69. (c) The original sentence is discussing the impact of the setting on the plot of a story. In this **context**, the correct verb to use is "affects," as it is the appropriate term to indicate influence.

The corrected sentence is: "The setting of a story affects the story's plot."

Now, let's analyze the incorrect options:

**affect the story's plot:** This option uses the incorrect form of the verb "affect." The correct form in this context is "affects."

**effects the stories' plot:** This option uses "effects," which is a noun, not a verb. The correct term for the action of influencing is "affects."

**affects the story's plot:** This is the correct choice. It uses the correct form of the verb "affects" and maintains the proper possessive form "story's."

**affects the story plots:** This option uses the plural "story plots," which changes the intended meaning. The original sentence is discussing the impact of the setting on the plot of a specific story, so the singular form "story's plot" is appropriate.

In summary, option 3, "affects the story's plot," is the correct choice as it uses the correct verb and maintains the proper possessive form.

70. (a) The paragraph introduces the topic of conflicts over rivers and river basins shared by many **countries**. To logically complete the paragraph, it is necessary to provide additional context or information related to the global water situation. Option 3 effectively adds relevant information about the increasing scarcity of water, the high cost of developing new water sources, and the expectation of rising international water tensions. This sentence helps to contextualize the conflicts mentioned in the paragraph and provides a basis for understanding why such tensions are occurring.

**It might be a cliché, but given how scarce it is, water is the new oil of the 21st century:** While this sentence makes a point about the value of water, it does not directly connect with the idea of conflicts over shared rivers and basins. The paragraph seems to be more about the increasing tensions and disputes over water resources, and this option introduces a different concept about the value of water.

**Fresh water is increasingly in short supply, with nearly two-thirds of the global population living in water-stressed conditions:** This sentence provides valuable information about the scarcity of fresh water and its impact on a significant portion of the global population. However, it does not directly address the expectation of rising international water tensions, which is the focus of the paragraph. The completion should seamlessly flow from the previous sentence and build on the idea of conflicts over shared water resources.

**The world does not consider water to be the scarce resource it is:** This sentence introduces a contrasting idea, suggesting that the world underestimates the scarcity of water. While this may be a relevant point, it doesn't align directly with the theme of increasing conflicts over shared rivers and river basins. The paragraph seems to emphasize the tensions arising from the scarcity of water rather than the world's perception of water scarcity.

71. (d) The paragraph discusses the origin of Indian poetry in English, highlighting its beginnings in Bengal, particularly in Calcutta. Option 2 provides additional information by stating that poetry writing, specifically for the first fifty years, was confined to a few families residing in Calcutta. This sentence adds historical context and specificity to the development of Indian

poetry in English, complementing the information presented in the preceding sentences.

Now, let's analyze the other options and explain why they are not as suitable for completing the paragraph:

**The British had decided that poetry about India could reach a larger audience if written in Calcutta:**

This option introduces a speculative statement about the British deciding where poetry about India could reach a larger audience. However, the paragraph focuses more on the social and cultural context of Indian poetry in English, and the completion should provide insights into its origin rather than British decisions.

**The rulers encouraged the natives to write poetry about India only if their mother tongue was English:**

This option introduces a statement about rulers encouraging natives to write poetry but lacks specificity and does not directly connect with the information in the paragraph about the social and cultural context of Indian poetry in English.

**English was seen as an elite language and so the British felt that only they could use it for poetry:**

This option introduces a general statement about English being seen as an elite language and the British feeling that only they could use it for poetry. While this is relevant to the socio-cultural context, it does not provide specific insights into the origin of Indian poetry in English during the discussed period.

In summary, option 2, "In fact, poetry writing for the first fifty years was confined to a few families who were residents of Calcutta," is the most suitable choice as it adds historical context and specificity to the development of Indian poetry in English in line with the information presented in the preceding sentences.

72. (c) The paragraph provides information about Charles Correa's career as an urban planner, particularly his role in creating New Bombay (Navi Mumbai) with a **focus** on providing housing and job opportunities. Option 1 is the most appropriate continuation as it aligns with the information about Correa avoiding high-rise housing solutions and instead focusing on low-rise dwelling solutions. This sentence adds specificity to Correa's approach and the outcomes of his urban planning initiatives.

Now, let's analyze the other options and explain why they are not as suitable for completing the paragraph:

**He is particularly noted for his sensitivity to the needs of the urban poor:**

While this sentence provides information about Correa's sensitivity to the needs of the urban poor, it does not directly connect with the preceding sentences about his urban planning commissions, focus on low-rise dwelling solutions, and avoidance of high-rise housing solutions.

**His early work combined traditional architectural values with the Modernist use of materials:** This sentence provides information about the combination

of traditional and Modernist elements in Correa's early work, but it does not directly address his focus on low-rise dwelling solutions and the creation of a sense of community.

**Considerations of the Indian climate drove many of his decisions:** This sentence highlights the influence of the Indian climate on Correa's decisions, which is a relevant aspect of his approach. However, it does not specifically address his focus on low-rise dwelling solutions and the emphasis on the human scale and community.

In summary, option 1, "He focused on low-rise dwelling solutions that emphasized the human scale and created a sense of community," is the most suitable choice as it directly connects with the information provided in the paragraph about Correa's urban planning approach.

73. (d) This option aligns with the idea that the Nawabs used architecture as a means of proclaiming their alignment to the new power bloc. Choosing to build palaces resembling British ancestral homes indicates a deliberate effort to adopt European architectural styles. Let's go through the other options and explain why they may be considered less suitable in the context of the paragraph:

**The Nawabs chose to live in Villas because they were easier to construct than palaces:** This option introduces a practical reason for choosing Villas, emphasizing ease of construction. However, the paragraph doesn't provide information about the difficulty of constructing palaces. The focus is more on the symbolic significance of architecture in proclaiming status.

**The Nawabs were attracted to European ideas in architecture because of their 'foreignness':** This option provides a reason for the Nawabs' attraction to European ideas, emphasizing their 'foreignness.' While this is a plausible reason, the paragraph doesn't specifically mention the 'foreignness' as the primary motivation for adopting Villas.

**The Villa became the backdrop to both the private as well as the court life of the Nawabs:** This option introduces the role of the Villa as the backdrop to private and court life, which is a reasonable statement. However, it may not directly align with the emphasis on the Nawabs' use of architecture to proclaim their alignment to a new power bloc.

In summary, while different interpretations are possible, option 4 seems to align more closely with the idea that the Nawabs were using architecture to make a statement about their alignment with the new power bloc. The paragraph does mention the adoption of European ideas, and the focus is on the Nawabs' architectural choices as a means of expressing their status and alignment.

74. (a) The completed sentence would be: "Influencers have to label their promotional posts in order to bring about transparency and safeguard the interests of the customers."

Explanation: "Influencers" is fitting as it refers to individuals who have the potential to impact the opinions and behaviors of their audience." promotional" aligns with the context, indicating that the posts are meant for promotion or advertisement. "safeguard" is suitable as it conveys the idea of protecting or ensuring the interests of customers.

The other options do not fit the context as well:

Option 2 suggests "Distributors" and "multiply," which do not match the context of influencers labeling their posts for transparency.

Option 3 includes "Promoters" and "incite," which may not convey the intended meaning of ensuring transparency and protecting customer interests.

Option 4 mentions "Advertisers" and "commercials," which may not accurately represent the influencer context where personal branding and promotional posts are common. Additionally, "capture" does not align with the intended meaning of safeguarding interests.



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75. (b) The completed sentence would be: "Working from home requires that you may have to put your private life on the screen. Some people find this very disconcerting as they like to keep their work and home lives separate."  
Explanation: "private" fits the context, indicating one's personal or private life. "screen" is suitable as it suggests the display or sharing of one's private life on a digital screen, aligning with the concept of working from home. "disconcerting" accurately captures the sentiment of some people finding the situation uncomfortable or disturbing.  
The other options do not fit the context as well:  
Option 1 includes "entire," "camera," and "complicated," which do not align with the idea of putting private life on a screen.  
Option 2 mentions "actual," "video," and "uncomfortable," which may not convey the sense of sharing private life while working from home.  
Option 4 introduces "family," "microscope," and "disturbing," which may not accurately represent the concept of sharing one's private life on a screen while working from home.
76. (a) The completed sentence would be: "In its early stages, dementia is often **indistinguishable** from normal aging, in which the older brain may naturally begin to show signs of cognitive impairment. Neither dementia nor cognitive aging is currently reversible, though they may be slowed through diet, exercise, and keeping the mind agile with social and intellectual activity."  
Explanation: "indistinguishable" is fitting as it suggests that dementia and normal aging may be difficult to tell apart, especially in their early stages. "reversible" is appropriate, indicating that neither dementia nor cognitive aging can currently be completely reversed.  
The other options do not fit the context as well:  
Option 1 includes "distinguishable" and "permanent," which may not accurately convey the idea that dementia and normal aging can be challenging to distinguish in their early stages.  
Option 3 mentions "irreversible" and "manageable," which is not accurate because the sentence implies that dementia and cognitive aging may be slowed but not completely managed or reversed.  
Option 4 introduces "differentiated" and "visible," which may not convey the intended meaning regarding the difficulty in distinguishing between dementia and normal aging.
77. (a) The completed sentence would be: "The culture of the 21st century — on an increasingly **global** scale — is oriented around the practical principles of utility, effectiveness, and impact. Things are good to the extent that they are instrumental, with instrumentality usually defined as the capacity to produce money or things. The worth of anything — an idea, an activity, an

artwork, a relationship with another person — is determined pragmatically."

Explanation: "global" is fitting as it describes the scale of the 21st-century culture. "relationship" is suitable as it aligns with the context of determining the worth of anything. "pragmatically" accurately captures the idea that the assessment of worth is based on practical considerations of utility, effectiveness, and impact.

The other options do not fit the context as well:

Option 1 includes "conspicuous," "dialogue," and "diligently," which do not align with the theme of utility, effectiveness, and impact.

Option 2 mentions "nominal," "dinner," and "meaningfully," which may not convey the intended meaning of determining the worth of things in a practical and utilitarian manner.

Option 3 introduces "ordinal," "conversation," and "imaginatively," which does not align with the practical principles emphasized in the paragraph.

78. (b) The completed sentence would be: "The human resource chief said that the company will not compromise on investing in people and has **prioritised** spending on employee needs in order to reassure them and provide them with a sense of stability and certainty."

Explanation:

"compromise" fits the context, indicating that the company will not give up or weaken its commitment to investing in people.

"prioritised" is suitable as it indicates that spending on employee needs has been given high importance.

"reassure" accurately conveys the idea of providing employees with a sense of stability and certainty.

The other options do not fit the context as well: Option 1 includes "delay," "assured," and "empower," which do not align with the theme of the company's commitment to investing in people.

Option 2 mentions "debate," "assured," and "confront," which does not accurately represent the positive and proactive approach described in the sentence.

Option 3 introduces "prioritise," "compromised," and "include," which may not convey the intended meaning of unwavering commitment and prioritization of employee needs.

79. (a) The completed sentence would be: "In the alleyways of old Cairo, in its cafes, warehouses, and barbershops, framed portraits of Egyptian icons **are** ubiquitous. Kings, presidents, religious and political figures are all immortalized on fading walls, held up as symbols of a glorious past."

Explanation: "ubiquitous" accurately conveys the idea that framed portraits of Egyptian icons are present everywhere in the mentioned locations. "immortalised" fits the context, indicating that these portraits serve as enduring representations, preserved and celebrated over time.

The other options do not fit the context as well:  
Option 1 includes "substantial" and "dispersed," which may not accurately convey the idea of portraits being present everywhere.

Option 2 mentions "rare" and "abundant," which do not align with the notion of ubiquitousness described in the sentence.

Option 3 introduces "fashionable" and "confounded," which do not fit the context of framed portraits of Egyptian icons in historical settings.

80. (a) The correct spelling and usage in this **context** should be "chord" instead of "cord." A "chord" refers to a group of musical notes played together, while a "cord" typically refers to a thin flexible string or rope. Therefore, option 4 contains an inappropriate usage of the word.
81. (b) In this context, the word "ring" is used incorrectly. The correct word in this context is "wring." The sentence should read, "They were all soaking wet, and their mother told them to wring their clothes first and then put them out to dry." "Wring" means to squeeze or twist something, especially wet clothes, to remove excess liquid. On the other hand, "ring" is unrelated to the action of squeezing or twisting clothes.
82. (d) In this context, the word "climatic" is used incorrectly. The correct word should be "climactic." The sentence should read, "The climactic moment of the match was when the captain got caught **behind** the wicket." "Climactic" refers to the most intense or exciting moment in a sequence of events, while "climatic" pertains to the weather or climate conditions. The sentence is describing a significant moment in a cricket match, making "climactic" the appropriate choice.
83. (a) In this context, the word "tied" is used incorrectly. The correct word should be "tide." The sentence should read, "It was a full moon night, and the tide was high, but he went boating and, unfortunately, he drowned." "Tide" refers to the rise and fall of sea levels caused by the gravitational forces of the moon and the sun. "Tied" is not the appropriate term in this context.
84. (c) In this context, the word "farther" is used incorrectly. The correct word should be "further." The sentence should read, "If you need to further your career, you should avoid all kinds of distractions." "**Further**" is used to indicate additional progress or advancement, while "farther" is typically used to measure physical distance.
85. (d) In this context, the word "grave" is used incorrectly. The correct word should be "grieve." The sentence should read, "The pet dog could not come to terms with his master's death and went to grieve for him, **even** refusing to eat for several days." "Grieve" is the correct term in this context, meaning to feel intense sorrow or sadness, especially in response to a death. "Grave" refers to a place of burial.


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86. (3142) **Sentence 3:** "The Sepoy Mutiny of 1857 in the garrison town of Meerut is regarded as the First War of Independence." This sentence provides an introduction and context to the overall topic of the Sepoy Mutiny and its historical significance.
- Sentence 1:** "But the mutiny of Visakhapatnam predates this." This sentence introduces a historical event in Visakhapatnam that occurred before the more well-known Sepoy Mutiny of 1857, contributing to the historical context.
- Sentence 4:** "It happened in 1780 when the British officers asked the local sepoys to join the fight against Hyder Ali." This sentence provides details about the Visakhapatnam mutiny, explaining its occurrence in 1780 and the British officers' request to local sepoys.
- Sentence 2:** "Instead of going against their heroic leader, the sepoys attacked the British soldiers and managed to escape from the town." This sentence follows up on the events described in Sentence 4, highlighting the sepoys' actions during the Visakhapatnam mutiny, creating a logical flow in the narrative.
- The sequence aims to present a chronological and thematic progression, starting with the broader historical context and then delving into a specific event that predates the more widely recognized Sepoy Mutiny of 1857.
87. (4213) **Sentence 4:** "With its wholesome dancing and lip-syncing videos, TikTok once billed itself as the "last sunny corner on the Internet." This sentence introduces TikTok and its initial perception as a positive and entertaining platform.
- Sentence 2:** "Since launching just five years ago, the app has brought a warm glow to its 1 billion plus users, as well as an icy dash of competition to the social media

incumbents of Silicon Valley." This sentence provides additional information about TikTok's rapid growth and its impact on the social media landscape.

**Sentence 1:** "Yet, even as TikTok delights consumers and advertisers, others believe the sunny app has a dark side." This sentence introduces a contrasting perspective, suggesting that there are concerns or criticisms about TikTok despite its popularity.

**Sentence 3:** "ByteDance, its owner, has its headquarters in China, whose government is addicted to surveillance and propaganda- making it a worrying place for a media app to be placed." This sentence elaborates on the potential dark side of TikTok by highlighting its association with ByteDance and expressing concerns about China's government influence on a media app.

The sequence aims to present TikTok's positive aspects initially and then introduce a contrasting viewpoint, gradually leading to concerns related to its ownership and potential influence.

88. (4132) **Sentence 4:** "Heat strokes have become more common in our country than ever before." This sentence introduces the main topic of heat strokes becoming more prevalent.

**Sentence 1:** "What is more shocking to observe is how often such strokes lead to death." This sentence adds a shocking aspect to the discussion, emphasizing the severity of heat strokes.

**Sentence 3:** "One main reason for this is that people underestimate how badly heat can affect the body." This sentence provides a reason for the increasing prevalence of heat strokes, highlighting the underestimation of the impact of heat on the body.

**Sentence 2:** "When the body temperature rises, our vital organs swell, and this causes death." This sentence explains the physiological consequences of a rising body temperature, linking it back to the discussion of heat strokes and their potential fatality. The sequence now progresses from introducing the topic, emphasizing its severity, providing a reason, and explaining the physiological consequences, creating a coherent paragraph.

89. (4231) **Sentence 4:** "A group of researchers were surprised to find that clouds had carried drug-resistant bacteria over a long distance." This sentence introduces the main idea of researchers being

surprised by the long-distance travel of drug-resistant bacteria.

**Sentence 2:** "An expert from the team explained that the bacteria usually lived on the surface of vegetation, such as leaves." This sentence provides additional information about where the bacteria usually live, setting the context for their unexpected long-distance travel.

**Sentence 3:** "The wind carries them off the surface and into the atmosphere." This sentence explains the mechanism through which the bacteria are transported, connecting the information about their usual habitat to their airborne journey.

**Sentence 1:** "Once they reach a high altitude, they manage to travel all over the world." This sentence concludes the paragraph by explaining the bacteria's ability to travel globally once they reach a high altitude. The sequence now progresses from introducing the surprising discovery, providing context about the bacteria's usual habitat, explaining the transport mechanism, and concluding with the global travel capability of the bacteria.

90. (2431) **Sentence 2:** "Participation in environmental education programmes can motivate children to act responsibly towards the environment." This sentence provides a general statement about the positive impact of environmental education programs on motivating children to act responsibly.

**Sentence 4:** "Six hundred elementary school children from varied social and linguistic groups participated in an ocean pollution education programme." This sentence introduces the context of the ocean pollution education program and the participation of a diverse group of elementary school children.

**Sentence 3:** "They were motivated to act in ways that would help the environment, like using a reusable water bottle or refusing to use plastic straws." This sentence explains the outcome of the education program, stating that the children were motivated to take environmentally friendly actions.

**Sentence 1:** "This instance highlights how young people from different backgrounds can make important contributions to climate change." This sentence concludes the paragraph by emphasizing the significance of young people, from diverse backgrounds, contributing to addressing climate change

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