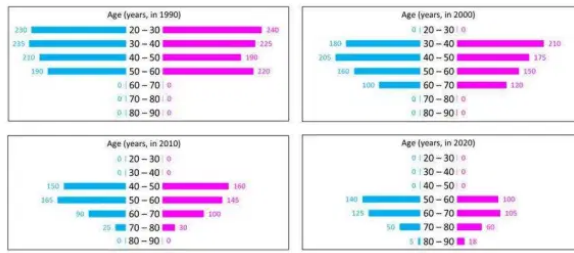


## General Instructions

- (i) This question paper contains 20 questions. All questions are compulsory.
- (ii) It comprises 14 single-correct multiple-choice questions and 6 numerical / type-in-the-answer questions.
- (iii) The questions are grouped under 4 reading comprehension / data sets; read each passage or data set before its questions.
- (iv) Attempt every question; detailed solutions are provided in the companion solutions booklet.
- (v) For numerical questions, report the answer rounded exactly as asked.

1. In the following, a year corresponds to 1st of January of that year. A study to determine the mortality rate for a disease began in 1980. The study chose 1000 males and 1000 females and followed them for forty years or until they died, whichever came first. The 1000 males chosen in 1980 consisted of 250 each of ages 10 to less than 20, 20 to less than 30, 30 to less than 40 and 40 to less than 50. The 1000 females chosen in 1980 also consisted of 250 each of ages 10 to less than 20, 20 to less than 30, 30 to less than 40 and 40 to less than 50. The four figures below depict the age profile of those among the 2000 individuals who were still alive in 1990, 2000, 2010 and 2020. The blue bars in each figure represent the number of males in each age group at that point in time, while the pink bars represent the number of females in each age group at that point in time. The numbers next to the bars give the exact numbers being represented by the bars. For example, we know that 230 males among those tracked and who were alive in 1990 were aged between 20 and 30.



1.1. In 2000, what was the ratio of the number of dead males to dead females among those being tracked?

- (A) 41 : 43
- (B) 71 : 69
- (C) 109 : 107
- (D) 129 : 131

1.2. How many people who were being tracked and who were between 30 and 40 years of age in 1980 survived until 2010?

- (A) 310
- (B) 110
- (C) 190
- (D) 90

1.3. How many individuals who were being tracked and who were less than 30 years of age in 1980 survived until 2020?

- (A) 470
- (B) 240
- (C) 230
- (D) 580

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1.4. How many of the males who were being tracked and who were between 20 and 30 years of age in 1980 died in the period 2000 to 2010?

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1.5. How many of the females who were being tracked and who were between 20 and 30 years of age in 1980 died between the ages of 50 and 60?

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2. Pulak, Qasim, Ritesh and Suresh participated in a tournament comprising of eight rounds. In each round, they formed two pairs, with each of them being in exactly one pair. The only restriction in the pairing was that the pairs would change in successive rounds. For example, if Pulak formed a pair with Qasim in the first round, then he would have to form a pair with Ritesh or Suresh in the second round. He would be free to pair with Qasim again in the third round. In each round, each pair decided whether to play the game in that round or not. If they decided not to play, then no money was exchanged between them. If they decided to play, they had to bet either ₹1 or ₹2 in that round. For example, if they chose to bet ₹2, then the player winning the game got ₹2 from the one losing the game.

At the beginning of the tournament, the players had ₹10 each. The following table shows partial information about the amounts that the players had at the end of each of the eight rounds. It shows every time a player had ₹10 at the end of a round, as well as every time, at the end of a round, a player had either the minimum or the maximum amount that he would have had across the eight rounds. For example, Suresh had ₹10 at the end of Rounds 1, 3 and 8 and not after any of the other rounds. The maximum amount that he had at the end of any round was ₹13 (at the

end of Round 5) and the minimum amount he had at the end of any round was ₹8 (at the end of Round 2). At the end of all other rounds, he must have had either ₹9, ₹11 or ₹12.

It was also known that Pulak and Qasim had the same amount of money with them at the end of Round 4.

	Pulak	Qasim	Ritesh	Suresh
Round 1		₹8	₹10	₹10
Round 2	₹13	₹10		₹8
Round 3				₹10
Round 4				
Round 5	₹10	₹10		₹13
Round 6				
Round 7		₹12	₹4	
Round 8	₹13			₹10

**2.1.** What BEST can be said about the amount of money that Ritesh had with him at the end of Round 8?

- (A) ₹4 or ₹5
- (B) Exactly ₹5
- (C) Exactly ₹6
- (D) ₹5 or ₹6

**2.2.** What BEST can be said about the amount of money that Pulak had with him at the end of Round 6?

- (A) Exactly ₹12
- (B) ₹11 or ₹12
- (C) ₹12 or ₹13
- (D) Exactly ₹11

**2.3.** How much money (in ₹) did Ritesh have at the end of Round 4?

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2.4. How many games were played with a bet of ₹2?

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2.5. Which of the following pairings was made in Round 5?

- (A) Pulak and Ritesh
  - (B) Pulak and Qasim
  - (C) Pulak and Suresh
  - (D) Qasim and Suresh
- 

3. All the first-year students in the computer science (CS) department in a university take both the courses (i) AI and (ii) ML. Students from other departments (non-CS students) can also take one of these two courses, but not both. Students who fail in a course get an F grade; others pass and are awarded A or B or C grades depending on their performance. The following are some additional facts about the number of students who took these two courses this year and the grades they obtained.

1. The numbers of non-CS students who took AI and ML were in the ratio 2 : 5.
2. The number of non-CS students who took either AI or ML was equal to the number of CS students.
3. The numbers of non-CS students who failed in the two courses were the same and their total is equal to the number of CS students who got a C grade in ML.
4. In both the courses, 50% of the students who passed got a B grade. But, while the numbers of students who got A and C grades were the same for AI, they were in the ratio 3 : 2 for ML.
5. No CS student failed in AI, while no non-CS student got an A grade in AI.

6. The numbers of CS students who got A, B and C grades respectively in AI were in the ratio 3 : 5 : 2, while in ML the ratio was 4 : 5 : 2.
7. The ratio of the total number of non-CS students failing in one of the two courses to the number of CS students failing in one of the two courses was 3 : 1.
8. 30 students failed in ML.

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**3.1.** How many students took AI?

- (A) 90
- (B) 60
- (C) 270
- (D) 210

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**3.2.** How many CS students failed in ML?

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**3.3.** How many non-CS students got A grade in ML?

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**3.4.** How many students got A grade in AI?

- (A) 63
- (B) 99
- (C) 84
- (D) 42

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**3.5.** How many non-CS students got B grade in ML?

- (A) 165
- (B) 75
- (C) 25
- (D) 90



4. There are only four neighbourhoods in a city-Levmisto, Tyhrmisto, Pesmisto and Kitmisto. During the onset of a pandemic, the number of new cases of a disease in each of these neighbourhoods was recorded over a period of five days. On each day, the number of new cases recorded in any of the neighbourhoods was either 0, 1, 2 or 3.

The following facts are also known:

1. There was at least one new case in every neighbourhood on Day 1.
2. On each of the five days, there were more new cases in Kitmisto than in Pesmisto.
3. The number of new cases in the city in a day kept increasing during the five-day period. The number of new cases on Day 3 was exactly one more than that on Day 2.
4. The maximum number of new cases in a day in Pesmisto was 2 and this happened only once during the five-day period.
5. Kitmisto is the only place to have 3 new cases on Day 2.
6. The total numbers of new cases in Levmisto, Tyhrmisto, Pesmisto and Kitmisto over the five-day period were 12, 12, 5 and 14 respectively.



4.1. What BEST can be concluded about the number of new cases in Levmisto on Day 3?

- (A) Exactly 2
  - (B) Either 2 or 3
  - (C) Either 0 or 1
  - (D) Exactly 3
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**4.2.** On which day(s) did Pesmisto not have any new case?

- (A) Both Day 2 and Day 3
  - (B) Only Day 3
  - (C) Both Day 2 and Day 4
  - (D) Only Day 2
- 

**4.3.** Which of the two statements below is/are necessarily false?

Statement A: There were 2 new cases in Tyhrmisto on Day 3.

Statement B: There were no new cases in Pesmisto on Day 2.

- (A) Neither Statement A nor Statement B
  - (B) Statement B only
  - (C) Both Statement A and Statement B
  - (D) Statement A only
- 

**4.4.** On how many days did Levpisto and Tyhrmisto have the same number of new cases?

- (A) 4
- (B) 5
- (C) 2
- (D) 3



4.5. What BEST can be concluded about the total number of new cases in the city on Day 2?

- (A) Either 7 or 8
- (B) Either 6 or 7
- (C) Exactly 7
- (D) Exactly 8