Class Test on Lecture Sheet 2

1. 150 individuals attended a marathon held in Sylhet. Of these only y participated in the marathon. If x of the 150 individuals were form Sylhet and z of the individuals participated in the marathon but were not from Sylhet. Which of the following represents the number of individuals who did not participate in the marathon and were not from Sylhet. [BREB (AD) 2019]

A. $150 - x + 2y$ B. $150 - x - y + z$ C. $150 - x + z$ D. $150 - x - z$ E. None of these

Solution: 150 attended, and x are from town Sylhet.

$\Rightarrow 150 - x$ people attended the marathon who are not from town Sylhet;

z participated in the marathon who are not from town Sylhet.

Hence those who did not participate and not from town Sylhet = $150 - x - z$

2. If $\frac{1}{2} + \frac{1}{3} + \frac{1}{5} = \frac{465}{m}$, which of the following must be an integer? [IBA MBA 16-17]

A. $\frac{m}{4}$ B. $\frac{m}{7}$ C. $\frac{m}{9}$ D. $\frac{m}{11}$ E. None of these

সমাধান: Given, $\frac{1}{2} + \frac{1}{3} + \frac{1}{5} = \frac{465}{m}$

$\Rightarrow \frac{15+10+6}{30} = \frac{465}{m}$

$\Rightarrow \frac{31}{30} = \frac{465}{m}$

$\Rightarrow m = \frac{465 \times 30}{31} = 15 \times 30 = 450$

3. The yoga company Yoga for Life offers 45-minute classes at 12 tk. per class. If the number of minutes Randolf spent doing yoga this month was 132 greater than the number of money he paid, how many classes did he attend? [IBA MBA, Dec' 2022]

A. 3 B. 4 C. 5 D. 6 E. 8

সমাধান: Let's start by converting the time spent doing yoga from minutes to classes. Each class is 45 minutes long, so we can divide the total time by 45 to get the number of classes attended.

Let x be the number of classes attended, then the time spent doing yoga in minutes is 45x. The amount paid for these classes is 12x tk.

We are given that the time spent doing yoga is 132 minutes more than the money paid, so we can write an equation:

45x = 12x + 132

Subtracting 12x from both sides, we get:

33x = 132

Dividing both sides by 33, we get: x = 4

Therefore, Rand off attended 4 classes. The answer is (B) 4.

4. A box contains 7 pens and another box contains 8 pencils. If one has total 101 pens and pencils, what is the minimum number of box of pens one has? [IBA MBA, Dec' 2018]

A. 1 B. 2 C. 3 D. 4 E. None of these

সমাধান: এখানে total 101 pens & pencils আছে।

তাহলে, $7x + 8y = 101$

$\Rightarrow y = \frac{101-7x}{8}$

$x = 1$ হলে, $y = \frac{101-7}{8} = \frac{94}{8}$ [পূর্ণসংখ্যা নয়]

$x = 2$ হলে, $y = \frac{101-14}{8} = \frac{87}{8}$ [পূর্ণসংখ্যা নয়]

$x = 3$ হলে, $y = \frac{101-21}{8} = \frac{80}{8} = 10$ [পূর্ণসংখ্যা]

অর্থাৎ, minimum no. of box of pens = 3

5. If $(a+a+a)=(b+b+b+b)$ and $a+b=7$, then what is value of (a^2-b^2)? [IBA BBA 15-16]

A. 0 B. 3 C. 4 D. 7 E. None of these

সমাধান: Given, $a+a+a=b+b+b+b$

$\Rightarrow 3a=4b \ldots\ldots\ldots\ldots\ldots (i)$

Again, $a+b=7$

$\Rightarrow 3a+3b=21$

$\Rightarrow 4b+3b=21$ [From (i)]

$\Rightarrow b=3$

So, $a=7-3=4$

Now, $a^2-b^2=4^2-3^2=16-9=7$

6. $(17)^{3.5}\times(17)^x=17^8$. x = ?

A. 2.29 B. 2.75 C. 4.25 D. 3.5 E. 4.5

সমাধান: Given, $(17)^{3.5}\times(17)^x=17^8$

$\Rightarrow 17^{3.5+x}=17^8$

$\Rightarrow 3.5+x=8$

$\Rightarrow x=4.5$

7. Omar could buy a certain number of notebooks for tk. 300. If each notebook cost is tk. 5 more, he could have bought 10 notebooks less for the same amount. Find the price of each notebook.

A. 15 B. 12 C. 10 D. 20 E. 8

সমাধান: ধরি, প্রতিটা Notebook এর দাম x টাকা।

$\frac{300}{x}-\frac{300}{x+5}=10$

$\Rightarrow \frac{300(x+5-x)}{x(x+5)}=10$

$\Rightarrow \frac{30\times5}{x^2+5x}=1$

$\Rightarrow x^2+5x-150=0$

$\Rightarrow (x+15)(x-10)=0$

$\Rightarrow x=10$

8. Four liters of milk are to be poured into a 2 liter and a 4 liter bottle. If each bottle is to be lied to the same fraction of its capacity, how many liters of milk should be poured into the 4 liters bottle?

A. $\frac{7}{3}$ B. $\frac{2}{3}$ C. $\frac{8}{3}$ D. $\frac{4}{3}$

Solution: ধরি, 4 liters bottle এ x liter milk should be poured.

প্রশ্নমতে, $\frac{x}{4}=\frac{4-x}{2}$ [Total milk = 4 liters]

$\Rightarrow 4(4-x)=2x$

$\Rightarrow 16-4x=2x$

$\Rightarrow 6x=16$

$\Rightarrow x=\frac{16}{6}$

$\therefore x=\frac{8}{3}$

9. If $\frac{a}{b}=\frac{1}{3}, \frac{b}{c}=2, \frac{c}{d}=\frac{1}{2}, \frac{d}{e}=3$ and $\frac{e}{f}=\frac{1}{4}$ then $\frac{abc}{def}$ =? [BEPZA (Asst. Manager) 2021]

A. $\frac{3}{8}$ B. $\frac{27}{8}$ C. $\frac{3}{4}$ D. $\frac{27}{4}$

সমাধান: $\frac{a}{b}=\frac{1}{3}$ ……(i)

$\frac{b}{c}=2$ ……(ii)

$\frac{c}{d}=\frac{1}{2}$ ……(iii)

$\frac{d}{e}=3$ ……(iv)

$\frac{e}{f}=\frac{1}{4}$ ……(v)

$(i)\times(ii)$

$\frac{a}{b}\times\frac{b}{c}=\frac{1}{3}\times 2$

$\Rightarrow\frac{a}{c}=\frac{2}{3}$ ……(vi)

$(ii)\times(iii)$

$\frac{b}{c}\times\frac{c}{d}=2\times\frac{1}{2}$

$\Rightarrow\frac{b}{d}=1$ ……(vii)

$(iii)\times(iv)$

$\frac{c}{d}\times\frac{d}{e}=\frac{1}{2}\times 3$

$\Rightarrow\frac{c}{e}=\frac{3}{2}$ ……$(viii)$

$(iv)\times(v)$

$\frac{d}{e}\times\frac{e}{f}=3\times\frac{1}{4}$

$\Rightarrow\frac{d}{f}=\frac{3}{4}$ ……(ix)

$(vi)\times(vii)\times(viii)\times(ix)$

$\frac{a}{c}\times\frac{b}{d}\times\frac{c}{e}\times\frac{d}{f}=\frac{2}{3}\times 1\times\frac{3}{2}\times\frac{3}{4}$

$\Rightarrow\frac{ab}{ef}=\frac{3}{4}$ ……(x)

$(x)\times(iii)$

$\frac{ab}{ef}\times\frac{c}{d}=\frac{3}{4}\times\frac{1}{2}$

$\Rightarrow\frac{abc}{efd}=\frac{3}{8}$

10. If $3x-5y=5$ and $\frac{x}{x+y}=\frac{5}{7}$ then what is the value of $x-y$ is:

A. -3 B. 3 C. 6 D. 9

Solution: Here, $3x-5y=5$ ……(i)

and $\frac{x}{x+y}=\frac{5}{7}$

$\Rightarrow 7x=5x+5y$

$\Rightarrow 2x-5y=0$ ……(ii)

$(i)-(ii)$

$3x-5y=5$

$2x-5y=0$

$(-)\ \ (+)\ \ (-)$

$x=5$

From (ii)

$2x-5y=0$

$\Rightarrow 5y=2x$

$\Rightarrow 5y=2\times 5$

$\therefore y=2$

So, the value of $x-y=5-2=3$

Practice Math

1. What is the range of the dataset of numbers comprised entirely of $\{1, 6, x, 17, 20, y\}$ if all terms in the dataset are positive integers and $xy = 18$? [IBA MBA Dec 2020]

   A. 16 B. 17 C. 18 D. 19 E. Cannot be determined

   সমাধান: $xy = 18$

   $18 = 1 \times 18$

   $= 2 \times 9$

   $= 3 \times 6$

   x, y এর মান যাই হোক না কেন Dataset এর Highest আর Lowest number সর্বক্ষেত্রেই same থাকে। যা হচ্ছে 20 ও 1।

   $\therefore$ Range = Highest − Lowest = $20 - 1 = 19$

2. If $\frac{x}{y} > 0$, which of the following must be true? [Bakhrabad Gas Distribution (Asst. Manager) 2017]

   A. $xy > 0$ B. $(x - y) > 0$ C. $(x + y) > 0$ D. None of these

   সমাধান: যেহেতু $\frac{x}{y} > 0$, সেক্ষেত্রে x ও y উভয়ই ধনাত্মক অথবা উভয়েই ঋণাত্মক হবে।

   অপশনগুলোর মাঝে কেবল অপশন (A) এর ক্ষেত্রেই সর্বদা আমরা ধনাত্মক মান পাবো। অর্থাৎ, $xy > 0$।

3. If $xy < 0$, which of the following must be true?

   i. $x + y = 0$ ii. $2y - 2x < 0$ iii. $x^2 + y^2 > 0$

   A. i only B. ii only C. iii only D. both ii and iii E. both i & iii

   Solution: $xy < 0$। x ও y এর যেকোন একটি negative.

   i. $x + y > 0$ কিনা সেটা বলা যাবে না। কারণ x ও y এর মান জানা নেই।

   ii. $2y - 2x < 0$

   $\Rightarrow y - x < 0$; x ও y এর মান জানা নেই।

   iii. $x^2 + y^2 > 0$; দু'টি বর্গের যোগফল সবসময় $(+)$ হবে।

4. If average of a, b, c, d is 5 and $a < b < c < d$, what is the greatest possible value of d if all of them are positive integer [IBA MBA Dec 2019]

   A. 15 B. 16 C. 14 D. 17 E. None of these

   সমাধান: (C) $\frac{a+b+c+d}{4} = 5 \quad \Rightarrow a + b + c + d = 20$

   d কে integer বা maximize করতে চাইলে a, b, c কে minimize করতে হবে।

   a, b, c-এর ন্যূনতম possible মানগুলো $= 1, 2, 3$

   $a + b + c = 6 \therefore d = 20 - 6 = 14$

5. If $-2 < a < 11$ and $3 < b < 12$, then which of the following is NOT true? [UCBL (PO) 2017]

   A. $1 < a + b < 23$ B. $-14 < a - b < 8$ C. $-7 < b - a < 14$ D. $1 < b + a < 23$

   সমাধান: দেওয়া আছে, $-2 < a < 11$ এবং $3 < b < 12$

   এক্ষেত্রে option গুলো check করে দেখা যায় যে, option C এর ক্ষেত্রে প্রদত্ত ব্যবধির $(-7 < b - a < 14)$ -7 এর মান কখনই আসা সম্ভব নয়।

   যেমন: option A এর ক্ষেত্রে, $3 + (-2) = 1, 12 + 11 = 23$

   option B এর ক্ষেত্রে, $-2 - 12 = -14, 11 - 3 = 8$

   option C এর ক্ষেত্রে, $12 - (-2) = 14, 3 - 11 = -8$

   option D এর ক্ষেত্রে, $3 + (-2) = 1, 12 + 11 = 23$

6. If $5 > x > 2$ and $10 > y > 7$, then which of the following expression must be positive?

[Bakhrabad Gas Distribution Co. Ltd. (Asst. Manager) 2017]

A. $x^2y - xy^2$ B. $xy^2 - x^2y$ C. $4xy - x^2y$ D. $4xy - xy^2$

সমাধান: দেওয়া আছে, $5 > x > 2$ এবং $10 > y > 7$

$\Rightarrow 2 < x < 5$ এবং $7 < y < 10$

Option A: $x^2y - xy^2 = xy(x - y)$

Option B: $xy^2 - x^2y = xy(y - x)$

Option C: $4xy - x^2y = xy(4 - x)$

Option D: $4xy - xy^2 = xy(4 - y)$

এখানে, পূর্ণসংখ্যা বিবেচনায় x এর সম্ভাব্য মান: 3, 4 এবং y এর সম্ভাব্য মান: 8, 9।

যেহেতু, $y > x$ আবার, $y > 4$

সেহেতু $(y - x)$ যুক্ত রাশি সর্বদাই ধনাত্মক হবে।

$\therefore xy(y - x)$ always positive/ MUST be positive

7. If $0 \leq x \leq 4$ and $y < 6$, which of the following cannot be the value of xy?

[Bakhrabad Gas Distribution Co. Ltd. Asst. Manager (General) 2017]

A. -2 B. 0 C. 6 D. None of these

সমাধান: এখানে, $0 \leq x \leq 4$ এবং $y < 6$

অর্থাৎ, x এর গ্রহণযোগ্য মানসমূহ: 0, 1, 2, 3, 4

এবং y এর গ্রহণযোগ্য মানসমূহ: ... ... $-3, -2, -1, 0, 1, 2, 3, 4, 5$ ইত্যাদি

এখন, x এবং y এর গুণফল অর্থাৎ, xy এর মান প্রদত্ত

option গুলোর $(A - C)$ যেকোনটির সমান হতে পারে।

8. What is the solution of $\frac{1}{3x-5} < \frac{1}{3}$ in real number? [43rd BCS]

A. $-\infty < x < \frac{5}{3}$ B. $\frac{8}{3} < x < \infty$ C. $-\infty < x < \frac{5}{2}$ অথবা $\frac{8}{3} < x < \infty$ D. $-\infty < x < \frac{5}{2}$ এবং $\frac{8}{3} < x < \infty$

সমাধান: $\frac{1}{3x-5} < \frac{1}{3}$

$\Rightarrow 3x - 5 > 3$ [$\frac{1}{x} > \frac{1}{y}$ হলে $x < y$]

$\Rightarrow 3x > 8$

$\Rightarrow x > \frac{8}{3}$

সংখ্যারেখা:

$\therefore \frac{8}{3} < x < \infty$

9. A student obtained 60, 75 and 85 marks respectively in 3 monthly examination in physics and 95 marks in the final examination. The 3 monthly examinations are of equal weight whereas the final examination is weighted twice as much as monthly examination. What is the average mark in physics? [BB AD 2022]

A. 82 B. 85 C. 79 D. 78.75

Solution: প্রশ্নে বলা হচ্ছে, একজন শিক্ষার্থী পদার্থ বিজ্ঞানের 3টি মাসিক পরীক্ষায় যথাক্রমে 60, 75 এবং 85 নম্বর পেয়েছে ও ফাইনাল পেয়েছে 95 নম্বর। তিনটি মাসিক পরীক্ষার মান ছিল সমান এবং ফাইনাল পরীক্ষার মান মাসিক পরীক্ষার মানের দ্বিগুণ ছিল। পদার্থবিজ্ঞানে তার গড় নম্বর কত ছিল?

এখানে ফাইনাল পরীক্ষার মান দ্বিগুণ হওয়াতে 95 নম্বরকে 2 দিয়ে গুণ করতে হবে এবং নিচেও 1 এর পরিবর্তে 2 যোগ করতে হবে।

$\therefore$ নির্ণেয় গড় $= \frac{(60\times1)+(75\times1)+(85\times1)+(95\times2)}{1+1+1+2} = \frac{60+75+85+190}{5} = \frac{410}{5} = 82$

10. The average of several exam scores is 80. One make up exam was given. Included with the other scores, the new average was 84. Of the score on the make-up exam was 92, how many total exams were given after make up ? [বাংলাদেশ পেট্রোলিয়াম ইনস্টিটিউট-এর সহকারী পরিচালক-২০২০]

A. 3 B. 2 C. 4 D. 5

সমাধান: Say total test = x

Avg. of x test scores = 80

So, sum of x test scores = 80x

I markup test is given and average becomes 84.

new sum of test scores = 84(x + 1)

Mark up test score = 92.

So, 80x + 92 = 84(x + 1)

⇒ 80x + 92 = 84x + 84 ⇒ 4x = 8 ∴ x = 2

∴ total exam = x + 1 = 2 + 1 = 3

11. If $3x + 5y = 14$ and $x - y = 6$ then, what is the average of x and y?

[দি সিকিউরিটি প্রিন্টিং লি: (সহকারী ম্যানেজার) ২০২১]

A. 0 B. 2 C. 2.5 D. 3

সমাধান: $3x + 5y = 14 \ldots\ldots\ldots\ldots\ldots (i)$

$x - y = 6 \ldots\ldots\ldots\ldots\ldots (ii)$

$(i) + (ii)$

$4x + 4y = 20$

$\Rightarrow 4(x + y) = 20$

$\Rightarrow x + y = 5$

$\Rightarrow \frac{x+y}{2} = \frac{5}{2} = 2.5$

∴ নির্ণয় গড় 2.5

বিকল্প সমাধান:

$(i) - (ii) \times 3$

$3x + 5y = 14$

$3x - 3y = 18$

$(-) \quad (+) \quad (-)$

$8y = -4$

$\Rightarrow y = -\frac{1}{2}$

$\therefore (ii)$ হতে $x + \frac{1}{2} + 6$

$\Rightarrow x = 6 - \frac{1}{2}$

$\Rightarrow x = \frac{11}{2}$

$\therefore \frac{x+y}{2} = \frac{\frac{11}{2}-\frac{1}{2}}{2} = \frac{\frac{11-1}{2}}{2} = \frac{\frac{10}{2}}{2} = \frac{5}{2} = 2.5$

12. A student's marks are wrongly entered as 83 instead of 63. Due to the error the average marks for the class got increased by 0.5. Find the number of student in the class. [তিতাস গ্যাস (সহকারী ব্যবস্থাপক) 2021]

A. 10 B. 20 C. 40 D. 73

সমাধান: ধরি, মোট শিক্ষার্থী সংখ্যা x, গড় নম্বর y।

∴ মোট নম্বর xy

ভুলের জন্য মোট নম্বর বৃদ্ধি পায় $(83 - 63) = 20$

প্রশ্নমতে, $xy + 20 = x(y + 0.5)$

$\Rightarrow xy + 20 = xy + 0.5x$

$\Rightarrow x = \frac{20}{0.5} = 40$ জন

[Shorcut: $\frac{83-63}{0.5} = \frac{20}{0.5} = 40$]

13. If the average of the four numbers M, $2M + 3$, $3M - 5$ and $5M + 1$ is 63, what is the value of M?

[কর্ণফুলী গ্যাস ডিস্ট্রিবিউশন কোম্পানী লি. (সহকারী ব্যবস্থাপক) ২০২১]

A. 23 B. 22 C. 11 D. 32

সমাধান: প্রশ্নমতে, $\frac{M+2M+3+3M-5+5M+1}{4} = 63$

$\Rightarrow 11M - 1 = 252$

$\Rightarrow 11M = 253$

$\Rightarrow M = \frac{253}{11}$

$\Rightarrow M = 23$

14. The average of a set of 12 numbers, which includes 34, is A. If 34 is removed from the set and 38 is included to the set, what is the average of the new set of numbers in terms of A?

[বাংলাদেশ গ্যাস ফিল্ডস কোম্পানি লি. (সহকারী ব্যবস্থাপক) ২০২১]

A. A + 4 B. $\frac{A+38}{12}$ C. $A + \frac{1}{3}$ D. None of these

সমাধান: সবগুলো সংখ্যার যোগফল = $12 \times A = 12A$

প্রশ্নমতে, নতুন মোট যোগফল = $12A - 34 + 38 = 12A + 4$

$\therefore$ গড় = $\frac{12A+4}{12} = \frac{12A}{12} + \frac{4}{12} = A + \frac{1}{3}$

15. There are 3 groups of students, each containing 25, 50 and 25 students respectively. The mean marks obtained by the first two groups are 60 and 55. The combined mean of all three groups is 58. What is the mean of the marks scored by the third group?

A. 52 B. 57 C. 58 D. 62

সমাধান: ধরি, mean marks obtained/ scared by the third group = P

প্রশ্নমতে, $\frac{60\times1+55\times2+P\times1}{1+2+1} = 58$ [Studies ratio from 3 groups = 25: 50: 25 = 1: 2: 1]

$\Rightarrow 60 + 110 + P = 232$

$\Rightarrow P = 232 - 170 = 62$

বিকল্প সমাধান: ধরি, $n_1 = 25, n_2 = 50, n_3 = 25$

$\overline{X_1} = 60, \overline{X_2} = 55, \overline{X_3} = ?$

& $\bar{X} = 58$

তাহলে, $\bar{X} = \frac{n_1\overline{X_1}+n_2\overline{X_2}+n_3\overline{X_3}}{n_1+n_2+n_3}$

$\Rightarrow 58 = \frac{25\times60+50\times55+25\times\overline{X_3}}{25+50+25}$

$\Rightarrow 1500 + 2750 + 25 \times \overline{X_3} = 100 \times 58 = 5800$

$\Rightarrow 25 \times \overline{X_3} = 5800 - 4250 = 1550$

$\Rightarrow \overline{X_3} = \frac{1550}{25} = 62$

16. The average age of 80 boys in a class is 15. The average age of a group of 15 boys in the class is 16 and the average age of another 25 boys in the class is 14. What is the average age of the remaining boys in the class?

A. 14 B. 14.75 C. 15.25 D. None

সমাধান: 80 জন বালকের মোট বয়স = $80 \times 15 = 1200$

আবার, 15 জন বালকের মোট বয়স = $16 \times 15 = 240$

এবং 25 জন বালকের মোট বয়স = $25 \times 14 = 350$

∴ 40 জন বালকের মোট বয়স = $240 + 350 = 590$

∴ Remaining 40 জন বালকের বয়সের গড় = $\frac{1200-590}{40} = 15.25$

17. 3 years ago, the average age of a family of 5 members was 17 years. A baby having been born, the average age of the family is the same today. The present age of the baby is: [Janata Bank (EO) 2017]

A. 1 year B. 1 year 6 months C. 2 years D. 3 years

সমাধান: 3 years ago, total age of a family of 5 members = $5 \times 17 = 85$

∴ At present, total age of 5 members = $85 + 5 \times 3 = 100$

Let, present age of the baby = B

ATQ, $\frac{100+B}{6} = 17 \Rightarrow B = 102 - 100 = 2$

18. The average age of a committee of eight members is 40 years. A member aged 55 years retired and his place was taken by another member aged 39 years. The average age of the present committee is:

A. 30 B. 32 C. 34 D. 38

সমাধান: Total age of eight members = $40 \times 8 = 320$

Under the given condition, we can write, average age of the present committee = $\frac{320-55+39}{8} = \frac{304}{8} = 38$

19. If x and y are both positive integers and $10 < x < 20$ and $7y - 2x = 0$, what is the value of $x - y$? [IBA MBA 16-17]

A. 7 B. 8 C. 9 D. 10 E. None of these

সমাধান: এখানে, $10 < x < 20$ এবং $7y - 2x = 0 \Rightarrow 7y = 2x$

x এর সম্ভাব্য মান: 11, 12, 13, 14, 15, 16, 17, 18, 19

সম্ভাব্য x এর মানগুলোর মাঝে কেবলমাত্র 14 এর সাথে 2 multiply করলে আমরা এমন সংখ্যা পাই যার গুণনীয়ক 7. অর্থাৎ $2 \times 14 = 28$

যেহেতু, $7y = 2x = 28$

$\Rightarrow y = \frac{28}{7} = 4$

$\therefore x - y = 14 - 4 = 10$

20. If $-8 \leq x \leq 2$ and $-4 \leq y \leq 10$ which of the following represents the range of all possible values of xy? [IBA MBA 17]

A. $-8 \leq xy < 20$ B. $-80 \leq xy \leq 32$ C. $-32 \leq xy \leq 20$

D. $-8 \leq xy \leq 32$ E. $-80 \leq xy \leq 80$

সমাধান: এখানে, $-8 \leq x \leq 2$ এবং $-4 \leq y \leq 10$

Minimum value of $x \times y$ is = $-8 \times 10 = -80$

Again, maximum value of $x \times y$ is = $(-8)(-4) = 32$

So, range of all possible values of xyz: $-80 \leq xy \leq 32$

21. The average of the two-digit numbers, which remain the same when the digits interchange their positions, is:

A. 33 B. 44 C. 55 D. 66 E. 77

সমাধানঃ Two digit numbers which remain the same when the digits interchange their positions are 11, 22, 33, ... etc.

So, the series is $11 + 22 + 33 + \ldots\ldots\ldots + 99$

So, প্রথম পদ, a = 11, d = $22 - 11 = 33 - 22 = 11$

nতম পদ = 99

$\therefore 11 + (n-1)(11) = 99$

$\Rightarrow 12 + 11n - 11 = 99$

$\Rightarrow n = 99$

$\therefore$ সমষ্টি = $\frac{n}{2}\{2a + (n-1)d\} = \frac{9}{2}\{22 + 88\} = \frac{9}{2} \times 110 = 495$

$\therefore$ গড় = $\frac{495}{9} = 55$

22. The average age of 8 students is 20. The average age of first two students is 19 and that of the next three students is 21. If the age of the sixth student is less than that of the seventh and eighth student by 2 and 3 respectively, then find the age of the eight student. [IBA MBA 17-18]

A. 18 B. 21 C. 24 D. 27 E. None of these

সমাধানঃ Total age of 8 students = 160

Again, Average age of first two students = 19

So, total age = 38

Again, total age of next 3 students = $21 \times 3 = 63$

So, total age of remaining 3 students = $160 - (38 + 63) = 59$

Let, sixth student's age = P

$\therefore$ seventh student's age = P + 2

& eights student's age = P + 3

ATQ, $P + P + 2 + P + 3 = 59$

$\Rightarrow 3P = 54$

$\Rightarrow P = 18$

$\therefore$ Age of the eight student = $18 + 3 = 21$

23. In a particular course Arif appeared in 10 quizzes. The average of his best 9 quizzes is 10% more than the average of all the quizzes he attended. The total marks obtained in best 9 quizzes is what percent of the total marks obtained in 10 quizzes? [IBA BBA 14-15]

A. 80% B. 88% C. 90% D. 99% E. None of these

সমাধানঃ ধরি, total marks in the best 9 quizzes = x

So, average = $\frac{x}{9}$

আবার, ধরি, 10^{th} quiz এ প্রাপ্ত নম্বর = y

$\therefore$ Average = $\frac{x+y}{10}$

প্রশ্নমতে, $\frac{x}{9} = \frac{x+y}{10} \times \frac{110}{100}$

$\Rightarrow \frac{x}{9} = \frac{11(x+y)}{100}$

$\Rightarrow 100x = 99x + 99y$

$\Rightarrow x = 99y$

অর্থাৎ, $\frac{x}{x+y} \times 100\% = \frac{99y}{100y} \times 100\% = 99\%$

24. Six number are arranged in decreasing order. The average of the first five numbers is 30 and the average of the last five numbers is 25. The difference the first and the last numbers is-

A. 20 B. 25 C. 5 D. 30

Solution: ধরি, Member গুলো a, b, c, d, e, f

$\frac{a+b+c+d+e}{5} = 30$

$\Rightarrow a+b+c+d+e = 150 \dots\dots\dots (i)$

$\frac{b+c+d+e+f}{5} = 25$

$\Rightarrow b+c+d+e+f = 125 \dots\dots\dots (ii)$

$(i) - (ii)$

$a - f = 25$

25. Nine persons went to a hotel for taking their meals. 8 of them spent tk. 12 each on their meals, and the ninth spent tk. 8 more than the average expenditure of all the nine. What was the total money spent by them?

A. 114 B. 125 C. 119 D. 117 E. 205

সমাধান: 8 জনের total expenditure = $8 \times 12 = 96$

ধরি, total expenditure of all the nine = x

∴ Ninth spent = $x - 96$

প্রশ্নমতে, $\frac{x}{9} + 8 = x - 96$

$\Rightarrow x + 72 = 9(x - 96)$

$\Rightarrow x + 72 = 9x - 9 \times 96$

$\Rightarrow 8x = 72 + 9 \times 96$

$\Rightarrow x = \frac{72}{8} + \frac{9 \times 96}{8}$

$\Rightarrow x = 9 + 108$

$\Rightarrow x = 117$

Home Task Math

26. If $2x < y < 0$, which following must be greatest? [Islami Bank Bangladesh (PO) 2017]

A. $2y + 2x$ B. $3x - 2y$ C. $-(3x - 2y)$ D. $-(3x + 2y)$

সমাধান: $2x < y < 0$

ধরি, $x = -2, 2x = -4, y = -2$ $[-4 < -2 < 0]$

A. $2y + 2x = 2(-2) + 2(-2) = -8$

B. $3x - 2y = 3(-2) - 2(-2) = -2$

C. $-(3x - 2y) = -\{3(-2) - 2(-2)\} = 2$

D. $-(3x + 2y) = -\{3(-2) + 2(-2)\} = 10$

27. If $|x - 2| < 3$ then for which values of m and n is $m < 3x + 5 < n$? [৪১তম বিসিএস]

A. m = 1, n = 10 B. m = 2, n = 20 C. m = 3, n = 30 D. m = 4, n = 40

সমাধান: $|x - 2| < 3$

$\Rightarrow -3 < x - 2 < 3$ [If $|r| < m$ then it can be written as $-m < r < m$ or $(r < m$ and $-r < m)$]

$\Rightarrow -3 + 2 < x < 3 + 2$

$\Rightarrow -1 < x < 5$

$\Rightarrow -1 \times 3 < 3x < 5 \times 3$

$\Rightarrow -3 < 3x < 15$

$\Rightarrow -3 + 5 < 3x + 5 < 15 + 5$

$\Rightarrow 2 < 3x + 5 < 20$

∴ $m = 2$ ও n = 20

28. If $|x-1| = 2x$, what is the value of x? [বাংলাদেশ সেতু কর্তৃপক্ষের সহকারী পরিচালক-২০২০]

A. -1 B. $\frac{1}{3}$ C. 2 D. $\frac{4}{3}$

সমাধান: $|x-1| = 2x$

(+) ধনাত্মক মান নিয়ে, $x-1 = 2x$

(-) ঋণাত্মক মান নিয়ে পাই, $-(x-1) = 2x \Rightarrow x-1 = -2x \Rightarrow 3x = 1$

$\Rightarrow x = \frac{1}{3}$ যেহেতু $x = -1$ বসালে সমীকরণ সিদ্ধ করে না তাই, $x \neq -1 \therefore x = \frac{1}{3}$

29. If $\frac{a}{b}$ greater than $\frac{c}{d}$. and none of a, b, c and d is not equal to 0, which of the following must be true?

A. $\frac{-a}{b} < \frac{c}{d}$ B. $\left|\frac{a}{b}\right| > \left|\frac{c}{d}\right|$ C. $\frac{a}{b} = 3$ D. $\frac{-a}{b} < \frac{-c}{d}$ [UCBL (PO) 2021]

সমাধান: অপশন টেস্টের মাধ্যমে,

অপশন (a): $\frac{-a}{b} < \frac{c}{d}$ এক্ষেত্রে

$\frac{a}{b}$ এর মান -1 $\frac{c}{d}$ এর মান -2 হলে শর্ত সব সময় সঠিক হয় না।

অপশন (b): $\left|\frac{a}{b}\right| > \left|\frac{c}{d}\right|$ এক্ষেত্রে

$\frac{a}{b} = -2$ ও $\frac{c}{d} = -3$ হলে শর্ত গ্রহণযোগ্য হয় না।

অপশন (c): $\frac{a}{b} = 3$ এবং $\frac{c}{d} = -1$ হলে

$\frac{b}{a} = \frac{1}{3}$ এবং $\frac{d}{c} = -1$ হয় তাই গ্রহণযোগ্য নয়।

অপশন (d): $\frac{-a}{b} < \frac{-c}{d}$ এটি a, b, c, d এর যেকোন মানের জন্য গ্রহণযোগ্য।

30. For which value of x, the value of $(x^2 - 6x + 8)$ is negative? [তিতাস গ্যাস (সহকারী ব্যবস্থাপক) 2021]

A. $2 < x < 4$ B. $x < 4$ C. $8 > x > 6$ D. $x > 8$

সমাধান: $x^2 - 6x + 8$ ঋণাত্মক হলে,

$x^2 - 6x + 8 < 0$

$\Rightarrow x^2 - 4x - 2x + 8 < 0$

$\Rightarrow x(x-4) - 2(x-4) < 0$

$\Rightarrow (x-4)(x-2) < 0$

এখন $(x-4)(x-2) < 0$ হবে যদি $x-4 > 0$ এবং $x-2 < 0$ হয়

অথবা, $x-4 < 0$ এবং $x-2 > 0$

১ম ক্ষেত্রে,

$x-4 > 0$ এবং $x-2 < 0$

$\Rightarrow x > 4$ এবং $x < 2$

২য় ক্ষেত্রে,

$x-4 < 0$ এবং $x-2 > 0$

$\Rightarrow x < 4$ এবং $x > 2$

$\therefore 2 < x < 4$

31. What is the solution of $x^2 - 3x - 10 > 0$? [৪২তম বিসিএস]

A. $(-\infty, -1) \cup (4, +\infty)$ B. $(-\infty, -2) \cup (5, +\infty)$

C. $(\infty, 2) \cup (5, +\infty)$ D. $(-5, -\infty) \cup (\infty, 2)$

সমাধান: $x^2 - 3x - 10 > 0$

$\Rightarrow x^2 - 5x + 2x - 10 > 0$

$\Rightarrow x(x-5) + 2(x-5) > 0$

$\Rightarrow (x-5)(x+2) > 0$

এখন হয় $x-5>0$ এবং $x+2>0$ অথবা

$x-5<0$ এবং $x+2<0$ কেননা দুটি সংখ্যার গুণফল ধনাত্মক হলে উভয়ই ধনাত্মক হবে।

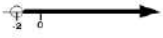
∴ ১ম ক্ষেত্রে,

$x-5>0$

$\Rightarrow x>5$

সংখ্যারেখা,  ; $(5,\infty)$

$x+2>0 \Rightarrow x>-2$

সংখ্যারেখা  ; $(-2,\infty)$

∴ সমাধান $=(5,\infty)\cap(-2,\infty)=(5,\infty)$

সংখ্যারেখা: 

আবার দ্বিতীয় ক্ষেত্রে,

$x-5<0$ এবং $x+2<0$

$\Rightarrow x<5$ এবং $x<-2$

সংখ্যারেখা 

∴ $(-\infty,5)$ $(-\infty,-2)$

∴ সমাধান $=(-\infty,5)\cap(-\infty,-2)$

$=(-\infty,-2)$

∴ সংখ্যারেখা 

∴ নির্ণেয় সমাধান $=(5,\infty)\cup(-\infty,-2)$

32. If $x^2-5x+6<0$, then- [৩৭তম বিসিএস]

A. $2<x<3$ B. $-3<x<-2$ C. $x<2$ D. $x<3$

সমাধান: $x^2-5x+6<0$

$\Rightarrow (x-2)(x-3)<0$

$x-2<0$ হলে, $x<2$ এবং

$x-3>0$ হলে, $x>3$

আবার, $x-3<0$ হলে, $x-2>0$

$\Rightarrow x<3$ $\Rightarrow x>2$

$\therefore 2<x<3$

33. If the average of x and y is 9 and z = 12, what is the average of x, y and z? [CGA Auditor 2021]

A. 6 B. 9 C. 10 D. 12 E. 14

সমাধান: $\frac{x+y}{2}=9 \Rightarrow x+y=18$

$\Rightarrow x+y+z=18+12=30$

$\Rightarrow \frac{x+y+z}{3}=10$

34. The average mark obtained by 15 students was 10 and the average mark obtained by 10 students was 15. What was the average mark obtained by all students? [BCIC বাণিজ্যিক কর্মকর্তা ২০২১]

A. 10 B. 12.5 C. 12 D. 15 E. 20

Solution: Average of 15 students is 10

Total mark of 15 student $=10\times15=150$

Average of 10 students is 15

Total mark of 10 students $=15\times10=150$

Total mark of $(10+15)=25$ students $=150+150=300$

Average of 25 students $=\frac{300}{25}=12$

35. The captain of a cricket team of 11 members is 26 years old and the wicketkeeper was 3 years older than him. If the ages of these two are excluded, the average age of the remaining players is one year less than the average age of the whole team. What is the average age of the team? [তিতাস গ্যাস (সহঃ ব্যবস্থাপক) 2021]

A. 23 B. 24 C. 25 D. কোনটিই নয়

সমাধান: মনে করি, পুরো দলের গড় বয়স = x

∴ পুরো দলের মোট বয়স = $11x$

উইকেট কিপারের বয়স = $26 + 3 = 29$

আবার 9 জনের মোট বয়স = $9(x - 1)$ [যেহেতু গড় বয়স 1 কমে]

প্রশ্নমতে,

$9(x - 1) + 26 + 29 = 11x$

$\Rightarrow 9x - 9 + 26 + 29 = 11x$

$\therefore x = 23$

36. Sum of P and Q is 72 and the value of R is 42. What is the average of P, Q and R?

[Standard Bank Ltd (Trainee Asst. Off. Cash) 2016, BB (AD) 2008]

A. 32 B. 34 C. 36 D. 38

Solution: $P + Q = 72$

$\Rightarrow P + Q + R = 72 + 42 = 96$

Average = $\frac{114}{3} = 38$

37. In a set of three numbers, the average of first two numbers is 2. The average of the last two numbers is 3 and the average of the first and the last numbers is 4. What is the average of three numbers? [BB AD '12]

A. 6 B. 3 C. 9 D. 24

Solution: ধরি, তিনটি সংখ্যা x, y, z

x ও y এর average = 2

$\Rightarrow \frac{x+y}{2} = 2$

$\Rightarrow x + y = 4 \dots\dots\dots (i)$

y ও z এর average = 3

$\Rightarrow \frac{y+z}{2} = 3$

$\Rightarrow y + z = 6 \dots\dots\dots (ii)$

x ও z এর average 4

$\Rightarrow \frac{x+z}{2} = 4$

$\Rightarrow x + z = 8 \dots\dots\dots (iii)$

$(i) + (ii) + (iii)$ করে পাই

$2(x + y + z) = 18$

$\Rightarrow x + y + z = 9$

∴ average = 3

38. A batsman makes a score of 87 runs in the 17^{th} innings and thus increases his average by 3. What is his average after 17^{th} innings? [Mercantile Bank Ltd (MTO) 2015]

A. 38 B. 93 C. 39 D. 40

সমাধান: ধরি, 17^{th} innings এর পর average x

17^{th} innings এর পর মোট sum 17x

16^{th} innings এর পর মোট রান = $17x - 87$

এখন, নতুন গড় − পুরাতন গড় = 3

$x - \frac{17x-87}{16} = 3$

$\Rightarrow 16x - 17x + 87 = 48$

$\Rightarrow -x = -39$

$\therefore x = 39$

39. The average age of 8 men is increased by 2 years when one of them whose age is 24 years is replaced by a woman. What is the age of the woman? [Janata Bank Ltd (Executive Officer) 2017]

A. 35 B. 28 C. 32 D. 40

সমাধান: ধরি, শুরুতে average ছিলো x

মোট বয়স 8x

New woman এর বয়স y বছর

$\frac{8x+y-24}{8} = x + 2$

$\Rightarrow 8x + y - 24 = 8x + 16$

$\Rightarrow y = 40$

40. A debate team of three members has a average age of 24 years. If no member has a age not less then 21, then what is the highest possible age of one member? [NSI (Field Officer) 2021]

A. 28 years B. 30 years C. 26 years D. 32 years

সমাধান: একজনের বয়স সর্বোচ্চ হতে হলে অপর দুইজনের বয়স সর্বনিম্ন অর্থাৎ 21 বছর করে হতে হবে। ধরি সর্বোচ্চ বয়স x বছর।

$\therefore$ প্রশ্নমতে, $\frac{21+21+x}{3} = 24$

$\Rightarrow 42 + x = 72$

$\Rightarrow x = 72 - 42 = 30$ বছর

41. In the first 10 over's of a cricket game, the run rate was only 3.2. What should be the run rate in the remaining 40 over's to reach the target of 282 runs?

[Trust Bank (MTO)-2016, Janata Bank Executive Off. 2012]

A. 6.25 B. 6.5 C. 6.75 D. 7

সমাধান: প্রথম 10 over এ run rate 3.2

প্রথম 10 over এ মোট run $3.2 \times 10 = 32$

বাকি 40 over এ run নিতে হবে $(282 - 32) = 250$

$\therefore$ run rate হবে $\frac{250}{40} = 6.25$

42. While travelling on a train Mr. Saif noticed three different numbers were written on the roof of the train. He calculated that the average of the three numbers was V. If one numbers was Z and another was Y what was the remaining number? [IBA BBA 09-10]

A. $ZY - V$ B. $\frac{Z}{V} - 3 - Y$ C. $\frac{Z}{3} - V - Y$ D. $3V - Z - Y$ E. $V - Z - Y$

Solution: ধরি, তৃতীয় number-টি X

$\therefore \frac{X+Y+Z}{3} = V$

$\Rightarrow X + Y + Z = 3V$

$\Rightarrow X = 3V - Y - Z$

43. The smallest of three consecutive even integer is 40 less than three times the largest. What is the largest of these integers?

A. 17 B. 10 C. 15 D. 14 E. None of these

Solution: ধরি, তিনটি consecutive even integer $x-2, x, x+2$

$3(x+2)-40=x-2$

$\Rightarrow 3x+6-40=x-2$

$\Rightarrow 2x=32$

$\Rightarrow x=16$

$\therefore x+2=18$

44. 3 people are splitting a tk. 150 bill. If A pays tk. 5 less than B, which c pays more than tk. 60, what is the most A can pay, given all of them pay integer amounts? [IBA MBA 2018]

A. 29 B. 42 C. 47 D. 61 E. None of these

Solution: A কে যদি maximum pay করতে হয়। C এর pay minimum করতে হবে। অর্থাৎ C 61 টাকা দিবে।

ধরি, A x টাকা দিবে।

এখন, $x+x+5+61=150$

$\Rightarrow 2x=84$

$\Rightarrow x=42$

45. $|3x-15|=18$. What is the product of all possible values of x?

A. -11 B. -10 C. -9 D. -8

সমাধান: দেওয়া আছে, $|3x-15|=18$

$(+)$ ধনাত্মক মান নিয়ে,

$(3x-15)=18 \Rightarrow 3x=18+15 \Rightarrow 3x=33 \Rightarrow x=11$

$(-)$ ঋণাত্মক মান নিয়ে,

$-(3x-15)=18 \Rightarrow 3x-15=-18 \Rightarrow 3x=-3 \Rightarrow x=-1$

x-এর মানদ্বয়ের গুণফল$=11\times(-1)=-11$

46. Amin has 12 pieces of tk. 10 and tk. 5 notes in his wallet. If the total value of all the notes is less than tk. 95, what is the maximum number of tk. 10 notes that he has?

A. 7 B. 6 C. 5 D. 8

সমাধান: Given that, Total notes $=12$

Let, the number of tk. 10 notes $=x$

$\therefore$ The numbers of tk. 5 notes $=12-x$

According to the equation,

$(10\times x)+5\times(12-x)<95 \Rightarrow 10x+60-5x<95 \Rightarrow 5x<95-60$

$\Rightarrow x<\frac{35}{5}=7$

So, the number of tk. 10 notes will be less than 7 i.e 6

47. Find the range of value of x for which $(2x+3)(x-1)<0$. [IBA MBA 18]

A. $x<-\frac{3}{2}$ B. $-\frac{3}{2}<x<1$ C. $x>1$ D. $x>-\frac{3}{2}$ E. None of these

Solution: $2x+3>0$

$\Rightarrow 2x>-3$

$\Rightarrow x>-\frac{3}{2}$

Or, $x-1<0$

$\Rightarrow x<1$

$\therefore -\frac{3}{2}<x<1$

48. If $x < 10$, then it must be true that [IBA MBA 15]

A. $-x < -10$ B. $-x - 2 < 12$ C. $-x + 2 < -8$ D. $x - 2 < 9$ E. None of these

Solution: $x < 10$

$\Rightarrow x - 2 < 10 - 2$

$\Rightarrow x - 2 < 8$

এক্ষেত্রে, $x - 2$, 9 এর ছোট হবে।

$\therefore x - 2 < 9$

49. If $2 < x < 3$ and $7 < y < 8$, which of the following expressions will give the largest value?

A. x^2y B. xy^2 C. 5xy D. $\frac{4x^2y}{3}$ E. $\frac{3x^2y}{4}$

Solution: ধরি, $x = 2$, $y = 7$

$x^2y = 2^2 \times 7 = 28$

$xy^2 = 2 \times 7^2 = 98$

$5xy = 5 \times 2 \times 7 = 70$

$\frac{4x^2y}{3} = \frac{4}{3} \times 28 < 98$

$\frac{3}{4}x^2y = \frac{3}{4} \times 28 < 98$

50. If the average of seven consecutive integers is k + 2, then the product of the greatest and least integers is:

A. $k^2 + 4k - 5$ B. $k^2 - 9$ C. $k^2 + 6k - 9$ D. $k^2 - 2k + 1$ E. $k^2 - 4k + 5$

সমাধান: বিজোড় সংখ্যক consecutive number এর ক্ষেত্রে মাঝখানের সংখ্যাটি average হয় না।

তাহলে, $k + 2$ চতুর্থ সংখ্যা।

Greatest number = $k + 2 + 3 = k + 5$

Least number = $k + 2 - 3 = k - 1$

Product = $(k + 5)(k - 1) = k^2 + 4k - 5$

51. The average age of 8 people increase by 2 years when two women are included in place of two men aged 20 and 24. Find the average age of the two women. [IBA MBA 15]

A. 30 B. 32 C. 35 D. 40 E. None of these

সমাধান: ধরি, Initial average = x

8 জন এর মোট বয়স 8x

এখন, $\frac{8x - 44 + y}{8} = x + 2$

$\Rightarrow 8x - 44 + y = 8x + 16$

$\Rightarrow y = 60$

$\therefore$ Average = $\frac{60}{2} = 30$

52. The average of 10 numbers is x and the average of five numbers is y. If the average of remaining five is z, then- [IBA MBA 17-18]

A. $x = y + z$ B. $z = x + 2y$ C. $x = 2y + 2z$ D. $2x = y + z$ E. None of these

সমাধান: প্রথম 10টি সংখ্যার গড় = x, এর মধ্যে 5টি সংখ্যার গড় y এবং অপর 5টি সংখ্যার গড় = z।

প্রথম 10টি সংখ্যার সমষ্টি = 10x

[$\because$10টি সংখ্যার গড়, x = $\frac{\text{সংখ্যাগুলোর সমষ্টি}}{10}$, $\therefore$ সংখ্যাগুলোর সমষ্টি = 10x]

অনুরূপভাবে, 5টি সংখ্যার সমষ্টি = 5y

অপর 5টি সংখ্যার সমষ্টি = 5z

শর্তমতে, $5y + 5z = 10x$ $\therefore y + z = 2x$

53. The average of the five numbers is 7. If one of the numbers is multiplied by 3, the average of the numbers increases to 9.4. Which of the five numbers is multiplied by 3? [IBA MBA '15]

A. 3 B. 4 C. 5 D. 6 E. None of these

Solution: 5টি number এর average 7

5টি number এর সমষ্টি = $7 \times 5 = 35$

ধরি, যে সংখ্যাটি 3 দিয়ে গুণ করা হয়েছে সেটি x।

3 দিয়ে গুণ করার পর সমষ্টি = $35 + 2x$

এখন, $\frac{35+2x}{5} = 9.4$

$\Rightarrow 35 + 2x = 47$

$\Rightarrow 2x = 12$

$\therefore x = 6$

54. The average of 20 numbers is zero. Of them, at the most how many may be greater than zero?

A. 0 B. 1 C. 10 D. 19 E. 20

Solution: 20টি number এর average 0 হলে এদের সমষ্টিও 0 হবে।

যদি 19টি number positive হয়, এবং এদের sum x হয়, তাহলে 20^{th} number $(-x)$ হলে sum 0 হবে।

$\therefore$ সর্বোচ্চ 19টি number positive হতে পারবে।

55. If the average of m numbers is n^2 and that of n numbers is m^2, then the average of $(m + n)$ numbers-

A. $m - n$ B. mn C. $m + n$ D. $\frac{m}{n}$ E. None of these

Solution: Average is the sum of the data values divided by the total number of data values.

Given that average of m numbers is n^2

$n^2 = \frac{sum\ of\ mnumbers}{m}$

Therefore, sum of m numbers = mn^2

Given that average of n numbers is m^2

$m^2 = \frac{sum\ of\ n\ numbers}{n}$

Therefore, sum of n numbers = nm^2

Therefore, average of $(m + n)$ numbers is $\frac{mn^2+nm^2}{m+n} = \frac{mn(m+n)}{m+n} = mn$

Written Math

1. The average age of seven boys sitting in a row facing North is 26 years. If the average age of the first three boys is 19 years and the average age of the last three boys is 32 years, what is the age of the boy who is sitting in the middle of the row?

Solution: Average age of 7 boys = 26

Sum age of 7 boys = $26 \times 7 = 182$

Average age of first three boys = 19

Sum age of first three boys = $19 \times 3 = 57$

Average age of last three boys = 32

Sum age of last three boys = $32 \times 3 = 96$

Age of 7^{th} boy = $182 - (96 + 57) = 29$ (Answer)

2. The average monthly income of P and Q is tk. 5050. The average monthly income of Q and R is tk. 6250 and the average monthly income of P and R is tk. 5200. The monthly income of P is:

Solution: P ও Q এর average, $\frac{P+Q}{2} = 5050$

$\Rightarrow P + Q = 10100 \dots\dots\dots (i)$

Q ও R এর average $\frac{Q+R}{2} = 6250$

$\Rightarrow Q + R = 12500 \dots\dots\dots (ii)$

P ও R এর average $\frac{P+R}{2} = 5200$

$\Rightarrow P + R = 10400 \dots\dots\dots (iii)$

$(i) + (ii) + (iii)$

$2(P + Q + R) = 33000$

$\Rightarrow P + Q + R = 16500 \dots\dots\dots (iv)$

$(iv) - (ii)$

$P = 4000$ (Answer)

3. The average temperature of the town in the first four days of a month was 58 degrees. The average for the second, third, fourth and fifth days was 60 degrees. If the temperature of the first and fifth day were in the ratio 7:8. Then what is the temperature on the fifth day?

Solution: প্রথম 8 দিনের average temperature = 58

$\Rightarrow$ প্রথম 8 দিনের মোট temperature = $4 \times 58 = 232$

2^{nd}, 3^{rd}, 4^{th}, 5^{th} দিনের average temperature = 60

2^{nd}, 3^{rd}, 4^{th}, 5^{th} দিনের total temperature = $60 \times 4 = 240$

5^{th} day $- 1^{st}$ day এর temperature = $240 - 232 = 8$

ধরি, 1^{st} ও 5^{th} day এর temperature 7x ও 8x

$8x - 7x = 8$

$\Rightarrow x = 8$

$\therefore 5^{th}$ day এর temperature = $8 \times 8 = 64$ degrees (Answer)

4. The weight of a box is estimated by three persons. According to A, the weight lies between 50 and 60 kg. According to B, the weight is more than 45 kg but less than 58 kg. C estimate that the weight cannot be greater than 56 kg. If all of them are correct in their estimation, what is the average of different probable weight of the box? [IBA MBA 17-18]

Solution: A $\rightarrow$ $50 \leq$ weight ≤ 60

B $\rightarrow$ 45 < weight < 58

A ও B অনুসারে, $50 \leq$ weight < 58

C $\rightarrow$ weight ≤ 56

$\therefore$ Finally, $50 \leq$ weight ≤ 56

সম্ভাব্য weight 50, 51, 52, 53, 54, 55, 56

$\therefore$ average = $\frac{50+51+52+53+54+55+56}{7} = 53$ (Answer)

5. The average of the annual income of Jamil and Kalam, Kalam and Azad, Azad and Jamil is tk. 38000, tk. 48000 and tk. 58000 respectively. What is the average income of Jamil, Kamal and Azad.

Solution: Given that, [Dhaka Bank (TCO) 2016]

$\frac{Jamil+Kalam}{2}$ = tk. 38000 $\therefore$ Jamil + Kalam = tk. 76000

$\frac{Kalam+Azad}{2}$ = tk. 48000 $\therefore$ Kalam + Azad = tk. 96000

$\frac{Azad+Jamil}{2}$ = tk. 58000 $\therefore$ Azad + Jamil = tk. 116000

Now,

Jamil + Kalam + Kalam + Azad + Azad + Jamil = 76000 + 96000 + 116000

$\Rightarrow$ 2(Jamil+Kalam+Azad) = 288000

$\Rightarrow$ Jamil + Kalam + Azad = 144000

$\Rightarrow \frac{Jamil+Kalam+Azad}{3} = \frac{144000}{3}$

$\therefore \frac{Jamil+Kalam+Azad}{3}$ = 48000 (Answer)

6. If each of 4 subsidiaries of corporation R has been granted a line of credit of tk. 700000 and each of the other 3 subsidiaries of corporation R has been granted a line of credit of tk. 112,000, what is the average (arithmetic mean) line of credit granted to a subsidiary of corporation R? [Dhaka Bank (TO) 2018]

Solution: Total granted credit = $(4 \times 700000 + 3 \times 112000) = 3136000$

$\therefore$ The average line of credit granted = $\frac{3136000}{7} = 448000$ (Answer)

7. A worker is paid tk. x per hour for the first 5 hours he works each day. He is paid tk. y per hour for each hour he works in excess of 5 hours. During one week, he works 8 hours on Saturday, 11 hours on Sunday, 12 hours on Monday, 10 hours on Tuesday and 9 hours on Wednesday. What is his average daily wage in tk. for five days of week? [PKSF AM 2009]

Solution: Day wise earning of the worker: Saturday = 5x + 3y

Sunday = 5x + 6y

Monday = 5x + 7y

Tuesday = 5x + 5y

Wednesday = 5x + 4y

Sum of five days = 25x + 25y

$\therefore$ Average earning = $\frac{25(x+y)}{5} = 5(x+y)$ (Answer)

8. The average income of A for 15 days is tk. 70. The average for first five days is tk. 60 and that for the last nine days is tk. 80. What is the income for the sixth day? [Shahjalal Bank (TO) 2011]

Solution: Total income of 15 days = tk. (70×15) = tk. 1050

Income of 1st 5 days = tk. (60×5) = tk. 300

Income of lat 9 days = tk. (80×9) = tk. 720

$\therefore$ Income of sixth day = tk. $(1050 - 300 - 720)$ = tk. 30 (Answer)

9. The average weight of three men A, B, and C is 84 kg. Another man D joins the group and the average now becomes 80 kg. If a fifth man E, whose weight is 3 kg more than that of D, replace A, then the average weight of B, C, D, and E becomes 79 kg. What is the weight of A?

[AB Bank (PO)-02, One Bank (PO)-08, RAKUB (SO)-14, Al-Arafah Bank (MTO)-16, Janata Bank (EO)-17]

সমাধান: Total weight of A, B, and C = $84 \times 3 = 252$ kg

Total weight of A, B, C, and D = $80 \times 4 = 320$ kg

$\therefore$ Weight of D = $320 - 252 = 68$ kg

$\therefore$ Weight of E = $68 + 3 = 71$ kg

$\therefore$ Total weight of B, C, D and E = $79 \times 4 = 316$ kg

$\therefore$ Weight of B and C = $316 - 68 - 71 = 177$ kg

$\therefore$ Weight of A = $252 - 177 = 75$ kg (Answer)

10. Average age of 32 persons increases 2 years when 2 persons leave the group. If the average of those 2 persons is $\frac{1}{3}^{rd}$ of the average age of 32 person then what is the average age of the remaining 30 persons?

[Islami Bank (PO) 2024]

Solution: Let, the average of 32 persons = $x - 2$

$\therefore$ Average age of 30 persons = x

The average age of 2 persons = $\frac{x-2}{3}$

$\therefore$ Total age of 2 person = $2 \times \left(\frac{x-2}{3}\right)$

$\therefore$ Total age of 32 person = $32(x-2)$

$\therefore$ Total age of 30 person = $30x$

ATQ, $32(x-2) = 30x + 2\left(\frac{x-2}{3}\right)$

$\Rightarrow 32x - 64 = 30x + \frac{2x-4}{3}$

$\Rightarrow 2x = \frac{2x-4+192}{3}$

$\Rightarrow 6x = 2x + 188$

$\Rightarrow 4x = 188$

$\Rightarrow x = \frac{188}{4}$

$\therefore x = 47$ (Answer)