# 8 Quantitative Reasoning

## Introduction

Quantitative-reasoning-based questions require you to use concepts such as number theory, time work, time speed distance, and permutations-combinations, to name a few. Besides these, you are expected to use analytical and reasoning skills. These questions can be tackled easily if you are well versed in these concepts. The respite is that you will not require any complicated formula or property to answer these questions. Practising different varieties of sets is the key to success!

So, start with a few solved examples to understand this variety of DILR sets, and then practise more questions from the exercise section.

**Example 1:**

There are 80 identical snooker balls of red colour. All the balls are of 100 gm, except 1 ball, which is slightly heavier. You have just one weighing balance. What is the minimum number of times you need to use the balance to identify the odd ball?

**Solution: 4**

The optimum way to identify the odd ball is to divide the balls into 3 groups (with the number of balls as close to each other as possible to each other).

So, we will first divide the balls into 3 groups: 27, 27, and 26

Now, we will weigh the equal groups. If the heavier ball is in any one of them, then that pan will go down, and we will further divide it into 3 groups, and continue the process.

In case, if the two pans are equal, we can conclude that the heavier ball must be in the 3rd group, and we can divide those 26 balls further as – 9, 9, 8 and continue the process.

In either of the cases, the total number of times you will require to use the pan balance will be 4.

Hence, the answer is 4.

**Keynote**

If the number of times you require to use pan balance is n, then $3^n \geq$ number of balls

**Example 2:**

In a game of picking marbles, Arun picked one marble more than Barun. Karun picked one marble more than Tarun. Arun and Barun picked 10 more marbles than Karun and Tarun. Arun, Barun, Karun, and Tarun picked 60 marbles. How many marbles did Arun pick?

(A) 12
(B) 18
(C) 13
(D) 17

**Solution: (B)**

This is a very simple question. However, if you start making equations, you may get lost in between. So, in such questions, we can use the *balancing method*.

Arun and Barun picked 10 marbles more than Karun and Tarun, and together they picked 60 marbles. So, we can easily figure out that Arun and Barun must have picked 35 marbles (5 more than the half), and Karun and

Tarun must have picked 25 marbles (5 less than the half).

Similarly, Arun picked one marble more than Barun, and together they picked 35 marbles (as mentioned above). So, Arun must have picked 18 marbles and Barun must have picked 17 marbles.

Hence, option (B).

**Example 3:**
Two containers are being used to carry six pumpkins. Each container can carry a maximum of 50 kg. The weights of the pumpkins are:

30 kg, 26 kg, 20 kg, 16 kg, 4 kg, 4 kg,

In how many different ways can these pumpkins be packed into the containers?

(A) 2
(B) 1
(C) 3
(D) None of these

**Solution: (A)**

This is a typical question based on quantitative reasoning. A good hand on numbers will help you work around this quickly.

As the total weight of all the pumpkins is 100 kg, and each box can carry a maximum of 50 kg only, we just need to split the pumpkins into two groups with each group having a 50 kg weight. Following are the possibilities:

| Group 1 | Group 2 |
|---|---|
| 30, 20 | 26, 16, 4, 4 |
| 30, 16, 4 | 20, 26, 4 |

So, there are only 2 ways to do it.

Hence, option (A) is correct.

**Rack Your Brain**

**1.** A rectangular field of 40 metres × 28 metres is to be divided into square plots. What will be the minimum number of square plots so formed?

**Rack Your Brain**

**2.** In the following addition, each letter represents a distinct digit. Find the value of A.

```
  EGG
+ EGG
-------
 PAGE
```

## Practice Exercise

### Level of Difficulty – 1

### Set 1

**Directions for Questions 1 to 5: Refer to the data below and answer the questions that follow.**

An academy organises a sports competition in a city. The sports competition involves four different games—badminton, cricket, football, and hockey. The winner of a particular game gets a maximum of 10 points, the one who comes second gets 9 points, and so on. There were 8 players (A – H) who participated in each of the 4 games. No two players got the same points in any game. The minimum number of points that any player can get in any game is 3.

The table below shows the partial scorecard of the players. G is the winner of one game. H's highest score is 6.

| Players | Badminton | Cricket | Football | Hockey | Total |
|---|---|---|---|---|---|
| A | | 10 | | 9 | 37 |
| B | 10 | | 8 | | 34 |
| C | | 5 | | 6 | 24 |
| D | 6 | | | 8 | 28 |
| E | | 3 | | 3 | 15 |
| F | 3 | 4 | | | 16 |
| G | 9 | | 9 | | 36 |
| H | | | 3 | 4 | 18 |

**1.** Who stood 4th in cricket?
(A) B
(B) D
(C) G
(D) None of them

**2.** Who stood 5th in football?
(A) C
(B) E
(C) D
(D) None of them

**3.** What was E's ranking in badminton?
(A) 6th
(B) 7th
(C) 8th
(D) Data insufficient

**4.** Who stood 8th, 7th, 6th, and 5th in football (in that order)?
(A) H, C, E, F
(B) H, E, F, C
(C) H, F, E, C
(D) H, C, F, E

**5.** Who stood 3rd in badminton?
(A) A
(B) E
(C) C
(D) H

## Set 2

**Directions for Questions 6 to 11: Refer to the data below and answer the questions that follow.**

A goldsmith has only three different types of weights—10 gm, 2 gm, and 1 gm—and a total of 180 weights. With these, he can weigh a bangle, a ring, and a pendant whose total weight is 1,019 gm simultaneously and with no weight being left. It is known that the bangle is the lightest in weight, whereas the pendant is the heaviest in weight. It is also known that:

**i)** In weighing each item, he used at least two and at most 35 weights of each type.

**ii)** The total number of 2 gm weights used in weighing the ring is 35.

**iii)** The weight of the ring and the bangle put together is 635 gm.

**iv)** The number of 10 gm weights used in weighing the pendant is 35 and that of 1 gm weights used in weighing the ring is 15.

**v)** The number of 10 gm weights used in weighing the bangle is a prime number, but the number of 10 gm weights used in weighing the ring is not a prime number.

**vi)** The number of 2 gm weights used in weighing the bangle is 19.

**6.** What is the total number of 2 gm weights that the goldsmith had?
(A) 73
(B) 65
(C) 57
(D) Cannot be determined

**7.** How many 10 gm weights did the goldsmith use to weigh the ring?
(A) 35
(B) 28
(C) 20
(D) Cannot be determined

**8.** What is the difference between the weight of the ring and the weight of the bangle?
(A) 83 gm
(B) 74 gm
(C) 70 gm
(D) 95 gm

**9.** What is the total number of weights that the goldsmith used to weigh the ring?

**10.** What is the weight of the bangle (in gm)?

**11.** How many 1 gm weights did the goldsmith use to weigh the bangle?

## Set 3

**Directions for Questions 12 to 15: Refer to the data below and answer the questions that follow.**

Five managers (A – E) were deployed on project X. The following table gives information about the % of work done by each of them and the days taken to complete that part of the work.

| Person | Number of days they worked | Percentage of work done to complete the project |
|---|---|---|
| **A** | 8 | 20% |
| **B** | 3 | 10% |
| **C** | 6 | 25% |
| **D** | 15 | 30% |
| **E** | 6 | 15% |

Now, the same set of managers is being deployed on another project (Y) which has an equal amount of work to be completed as in project X. Also, assume that each manager will be working at the same efficiency as they worked on project X unless mentioned otherwise.

**12.** How many days will D take to complete double the work as project X if he works alone?

(A) 50 days
(B) 90 days
(C) 100 days
(D) Cannot be determined

**13.** A and B start the work on project Y. After 10 days, they both leave. Now the remaining work is completed by another manager (Ms. F) in 5 days. In how many days, can Ms. F complete the whole project if she works alone?

(A) 12 days
(B) 15 days
(C) 18 days
(D) 9 days

**14.** C and D start working together on project Y. However, C takes leave every 3rd day. On which day the project will be completed if no one else worked on the project?

(A) 19th day
(B) 20th day
(C) 21st day
(D) 22nd day

**15.** If only B, C, and D are to complete project Y in 15 days, how many days, at the most, can B remain absent during this period? (Consider only full-day leaves)

(A) 10 days
(B) 12 days
(C) 13 days
(D) 14 days

## Level of Difficulty – 2

### Set 1

**Directions for Questions 1 to 4: Refer to the data below and answer the questions that follow.**

In a marketing campaign, a T-shirt is gifted to each of the six people: P, Q, R, S, T, and U by a T-shirt manufacturing company. The T-shirt sizes of these six people are 6, 7, 8, 9, 10, and 11, respectively. A person can be gifted a T-shirt whose size is in the range of +1 to -1 of his T-shirt size. It was found that three people got T-shirts of one size, two other people got T-shirts of different sizes, and the remaining person got T-shirts of a third size. The average T-shirt size of the six people is 0.33 inch more than the average size of the six T-shirts gifted to them.

**1.** Which of the following persons was definitely not gifted the T-shirt whose size was different from the rest of the T-shirts that were gifted?
(A) P
(B) Q
(C) R
(D) S

**2.** For which of the following persons can the size of the T-shirt gifted to him be determined?
(A) P
(B) Q
(C) T
(D) U

**3.** If P got the T-shirt of size 6, what would be the size of T-shirt gifted to R?
(A) 7
(B) 8
(C) 9
(D) 7 or 9

**4.** If Q got the T-shirt of size 7, then for how many of the remaining 5 people, the size of the T-shirts gifted to them can be determined uniquely?

### Set 2

**Directions for Questions 5 to 8: Refer to the data below and answer the questions that follow.**

Six families—ABC, DEF, GHI, JKL, MNO, and PQR reside in a particular society. The monthly incomes of these six families are 25, 30, 40, 45, 60, and 80 (in no particular order). The monthly expenditures of these families are 15, 25, 30, 30, 40, and 50 (in no particular order). Each of these families saves some money at the end of a particular month. Further, it is known:

**i)** Incomes of DEF, GHI, and JKL are in arithmetic progression (in no particular order).

**ii)** Incomes of ABC, DEF, and MNO are in arithmetic progression (in no particular order).

**iii)** Expenditures of DEF, GHI, and ABC are also in arithmetic progression (in no particular order).

**iv)** Income of ABC is more than twice the income of JKL.

**Note:** All values given in this question are in ('000) rupees.

Income – Expenditure = Savings

**5.** What is the income of MNO (In '000 rupees)?
(A) 30
(B) 80
(C) 60
(D) 40

6. What is the saving of ABC (In '000 rupees)?
   (A) 30
   (B) 40
   (C) 50
   (D) Cannot be determined

7. What is the saving of PQR (In '000 rupees)?
   (A) 20
   (B) 10
   (C) 30
   (D) None of these

8. Which of the following amounts can be the saving of GHI (In '000 rupees)?
   (A) 10
   (B) 30
   (C) 15
   (D) 20

## Set 3

**Directions for Questions 9 to 13: Read the following information and answer the questions that follow.**

Royal Flora House wants to export five types of flowers: tuberose, tulips, freesia, orchids, and hydrangeas to India for a wedding. Before exporting, the florist decided to check the weights of all five types of flowers, as the transporter would charge him based on the weight of the flowers. But in the weighing machine available with the florist, the calibration of the weights from 0 to 100 kg were not properly visible. Since it was necessary to know the weights before handing them to the transporter, the florist decided to weigh the flowers in groups of three making sure that no group of three flowers was repeated. The weights obtained while weighing them were as follows: 106 kg, 116 kg, 122 kg, 126 kg, 132 kg, 146 kg, 120 kg, 126 kg, 136 kg, and 142 kg. It is also known that the weight of tuberose is the average of tulips and hydrangeas. Further, hydrangeas are heavier than freesia but lighter than orchids.

9. Which type of flower is the heaviest?
   (A) Tulip
   (B) Orchids
   (C) Tuberose
   (D) Hydrangeas

10. What is the weight (in kg) of tulips?
   (A) 30
   (B) 35
   (C) 40
   (D) 56

11. What is the average weight (in kg) of all the five types of flowers?
   (A) 50
   (B) 48
   (C) 42.4
   (D) 45

12. What is the weight (in kg) of freesia?
   (A) 50
   (B) 36
   (C) 40
   (D) 30

13. How many types of flowers weigh more than 40 kg?
   (A) One
   (B) Two
   (C) Three
   (D) Four

## Set 4

**Directions for Questions 14 to 17: Read the passage given below and solve the questions based on it.**

A renowned B-school offers 6 electives as part of its management programme. The electives are—Analytics (A), Business Communications (B), Construction Management (C), Derivatives (D), Entrepreneurship (E), and Financial Modelling (F).

Ten students have the option to choose various electives from those mentioned above. As part of their evaluation process, the students are given points on a scale of 1 to 5. None of the assessors awarded fractional points to any of the students.

It is also known that not all the electives are taken by all the students and not all the students are taking at least an elective.

The following table provides information about the number of elective takers and the range of scores (i.e., the maximum and the minimum scores) obtained by the students in that elective. For example, if the range of the scores for a particular elective is 1-4, then at least one of the students must have got 1 point and at least one must have got 4 points.

| Elective | Range of scores of all the elective takers (minimum and maximum score) | Average score of the elective takers | Number of elective takers |
|---|---|---|---|
| A | 1 – 4 | 3.5 | 6 |
| B | 2 – 4 | 3 | 3 |
| C | 1 – 5 | 4 | 7 |
| D | 1 – 2 | 4/3 | 3 |
| E | 2 – 5 | 4 | 4 |
| F | 3 – 5 | 11/3 | 6 |

**14.** How many students have scored more than 4 points in at least two electives?
(A) 4
(B) 7
(C) 2
(D) Cannot be determined

**15.** What is the minimum number of students who must have scored less than 2 points in at least one elective?
(A) 3
(B) 4
(C) 2
(D) None of these

**16.** Electives C and E are merged to form a new elective N. This new elective N will have all those students who have opted for electives C and E and the scores of each of these electives have been taken into consideration while finding the average of elective N. What is the average score of elective N?
(A) 4
(B) 3
(C) 3.5
(D) Cannot be determined

**17.** Electives A and B are merged to form a new elective H. This new elective H will be having all those students who have opted for elective A and elective B and the scores of each of these electives have been taken into consideration while finding the average of elective H. If none of the students of elective A and elective B are common, then what will be the average score of elective H?
(A) 10/3
(B) 3
(C) 3.5
(D) None of these

## Level of Difficulty – 3

### Set 1

**Directions for Questions 1 to 3: Answer the following questions based on the information given.**

Ten people in a class are assigned a distinct multiple of 7 less than 100.

**i)** A and C got numbers with the same tens digit such that A is greater than C.

**ii)** The number assigned to F had one digit as the square of the other.

**iii)** The difference between the numbers assigned to H and B is equal to the number assigned to D.

**iv)** G got a number greater than I but less than B.

**v)** The sum of numbers assigned to D and B is equal to the number assigned to E.

**vi)** The smallest value assigned was to I while the largest value assigned was to J; such that J/I = H – 1.

**vii)** The number assigned to B is less than the number assigned to F.

**1.** Who was assigned the number 84?
(A) E
(2) D
(C) B
(4) None of these

**2.** What number is assigned to E?
(A) 91
(B) 84
(C) 56
(4) None of these

**3.** What is the absolute difference between the numbers assigned to B and C?
(A) 35
(B) 42
(C) 49
(D) None of these

### Set 2

**Directions for Questions 4 to 7: Answer the following questions based on the information given below.**

Mr. Hiralal and Mr. Chandilal are two share market short-term equity traders, who trade at the BSE from Monday to Friday, only in Adani Infrastructure shares.

They have their own fixed and distinct strategies for trading.

Mr. Hiralal purchases 1 unit of equity when the price goes down and sells 1 unit of equity when it goes up. Mr. Chandilal, on the contrary, purchases 1 unit of equity when the price goes below ₹1,640, and sells off 1 unit when it goes above ₹1,680. All the transactions are done at the end of the day (i.e., at the closing market price). Also, a day's closing price is the opening price for the next day.

On Monday of a particular week, it was found that Mr. Hiralal and Mr. Chandilal had 10 and 5 units of Adani Infrastructure equities and funds of ₹6,000 and ₹10,000, respectively, with them. In that week, it was also found that the opening price per unit of Adani Infrastructure equity on Monday was ₹1,660, while the closing price on Friday was ₹1,640. Also, the fluctuation, which happened daily either way, was of the value of ₹20 per equity only for that week.

**4.** If both Mr. Hiralal and Mr. Chandilal sold equity on a particular day in the week, then what was the opening price of a unit of Adani Infrastructure on Thursday?
(A) ₹1,680
(B) ₹1,700
(C) ₹1,720
(D) ₹1,740

5. If both Mr. Hiralal and Mr. Chandilal bought equity on a particular day, while the next day Mr. Hiralal sold and Mr. Chandilal did not buy equity, what was the closing price of a unit of Adani Infrastructure on Wednesday?
(A) ₹1,620
(B) ₹1,640
(C) ₹1,660
(D) ₹1,680

6. What can be the minimum possible value of the funds available with Mr. Hiralal and Mr. Chandilal together, at the end of Friday?
(A) ₹7,650
(B) ₹8,470
(C) ₹9,560
(D) ₹10,840

7. Mr. Hiralal had 4 units of equity more than Mr. Chandilal at the end of Friday. Then what was the opening price of a unit of Adani Infrastructure on Thursday?
(A) ₹1,620
(B) ₹1,680
(C) ₹1,680
(D) ₹1,640

## Set 3

**Directions for Questions 8 to 11: Answer the following questions based on the information given.**

Each person among a group of three friends: Shreya, Aayush, and Muskan, had some burgers and some drinks. Shreya had at least one burger and twice as many drinks as burgers. Aayush had at least one burger and thrice as many drinks as burgers. Muskan had at least one burger and the number of drinks consumed by her exceeded the number of burgers by three. The total number of items they consumed was less than twenty. No person consumed more than 3 burgers.

8. If Shreya has at least 6 items in total and the total number of items consumed is not equal to 17, how many items did Muskan have?
(A) 7
(B) 5
(C) 9
(D) Cannot be determined

9. Refer to the data in the previous question, how many drinks did Aayush have?
(A) 3
(B) 6
(C) 9
(D) Cannot be determined

10. If Aayush had 6 drinks and the total number of items consumed by all three friends is greater than 16, what is the sum of the number of burgers consumed by Shreya and the number of drinks consumed by Muskan?
(A) 6
(B) 5
(C) 7
(D) Cannot be determined

11. Refer to the data in the previous question, what is the number of burgers consumed by Muskan?
(A) 1
(B) 2
(C) 3
(D) Cannot be determined

## Set 4

**Directions for Questions 12 to 14: Answer the following questions based on the information given.**

In super honda automobile company, a bell strikes at the end of every minute starting at 1:00 p.m. The last bell strikes at 4:00 p.m. Also, a motorcycle comes out of the production department only between any two successive strikes of the bell. The minimum possible number of motorcycles is produced on a particular day ensuring that at least two motorcycles are produced during the strike of any 30 consecutive bells.

**12.** How many motorcycles are produced?

(A) 6
(B) 10
(C) 12
(D) 13

**13.** What is the maximum number of motorcycles that can be produced between 1:20 p.m. and 1:50 p.m.?

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

**14.** What is the maximum number of motorcycles that can be produced between 3 pm and 4 pm?

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

**Direction for Question 15: Answer the following question based on the information given.**

In the addition problem shown below, distinct letters of the alphabet are used to represent the digits from 0 to 9.

T and W are less than 5 with T > W.

The sum of T and W is the average of P and U.

$$\begin{array}{r} P\ Q\ R\ S\ T \\ +\ U\ R\ V\ T\ W \\ \hline Y\ W\ X\ U\ W\ R \end{array}$$

**15.** What is the value of S?

(A) 4
(B) 6
(C) 8
(D) 9

## Solutions

### Level of Difficulty - 1

**1. (B)**

Let's analyse the data given in the table.

**a)** Looking at the hockey column, G has won one game so G got 10 points in hockey, and 8 points in cricket. (As the total points of G is 36).

**b)** Now, B's total is 34 and he has scored 10 and 8 in badminton and football, respectively. So, 34 – 18 = 16. Possibility for 16 points for the remaining two games (i.e., cricket and hockey) are: (8, 8), (9, 7), (10, 6).

# (8, 8) - not possible as D already scored 8 in hockey.

# (10, 6) – Not possible as B has already scored 10 points in badminton.

# (9, 7) - Possible. But scoring 9 in hockey is not possible as A has already scored 9 in that game. So, B scored 7 in hockey and 9 in cricket.

**c)** Now, F must have scored 5 in hockey as all other values are assigned to other players in that column.

**d)** As H's highest score is 6, he can't score 6 in badminton as D already scored 6. So, H scored 6 in cricket, and D got 7 in cricket.

**e)** H's score in badminton will be 18 – (6 + 3 + 4) = 5.

**f)** A scored 37 in all four games. So, 37 – 19 = 18 points in the remaining two games (i.e., badminton and hockey). The only possibility is (8, 10). So, A scored 8 in badminton (as B has already scored 10 in badminton), and 10 in football.

**g)** C scored a total of 24 in all games. So, 24 – (5 + 6) = 13 points were scored in the remaining two games. The only possibility is (7, 6). As D has already scored 6 in badminton, C should have scored 7 in badminton and 6 in football.

**h)** Similarly, we can find out all the remaining missing values and complete the table as shown below.

| Players | Badminton | Cricket | Football | Hockey | Total |
|---|---|---|---|---|---|
| **A** | 8 | 10 | 10 | 9 | 37 |
| **B** | 10 | 9 | 8 | 7 | 34 |
| **C** | 7 | 5 | 6 | 6 | 24 |
| **D** | 6 | 7 | 7 | 8 | 28 |
| **E** | 4 | 3 | 5 | 3 | 15 |
| **F** | 3 | 4 | 4 | 5 | 16 |
| **G** | 9 | 8 | 9 | 10 | 36 |
| **H** | 5 | 6 | 3 | 4 | 18 |

From the table, we can say that D stood 4th in the game of cricket.

Hence, option (B) is correct.

**2. (A)**

Based on the values obtained in the table, C stood 5th in football.
Hence, option (A) is correct.

**3. (B)**

Based on the values obtained in the table, E's rank in badminton was 7th.
Hence, option (B) is correct.

**4. (C)**

Based on the values obtained in the table, option (C) is correct.
Hence, option (C) is correct.

**5. (A)**

Based on the values obtained in the table, A stood 3rd in badminton.
Hence, option (A) is correct.

**6. (B)**

Let's create a table with the information given and denote the missing values by variables *x, y, x, p*, as shown below.

**Table 1**

| Number of Weights | | | | |
|---|---|---|---|---|
| | 1 gm | 2 gm | 10 gm | Total |
| Pendent | *X* | *y* | 35 | |
| Ring | 15 | 35 | *z* | |
| Bangle | *P* | 19 | *q* | |
| Total | | | | 180 |

Now, the total weight of the pendant = total weight – (total weight of ring and bangles).
Also, we have x pendants of 1 gm, y pendants of 2 gm, and 35 pendants of 10 gm.
So, $x + 2y + 350 = 1019 - 635$ [as per point (c), the total weight of rings and bangles put together is 635)
$\Rightarrow x = 34 - 2y$ ... (i)
It is also given that the total number of weights used is 180.
So, $x + y + z + p + q = 180 - (35 + 35 + 15 + 19) = 76$
$\Rightarrow z + q = 76 - x - y - p$ ... (ii)

Again, as per point (iii), the total weight of rings and bangles put together is 635.
$10z + 10q + p + 15 + 70 + 38 = 635$
(From Table 1)
$\Rightarrow 10z + 10q + p = 635 - (15 + 70 + 38) = 512$
$\Rightarrow 10(z + q) = 512 - p$ ... (iii)
From equation (ii), we can say that the value of p could be 2, 12, 22, or 32 and in that case value of $(z + q)$ will be 51, 50, 49, or 48.
Also, from equations (i), (ii), and (iii),
$10(z + q) = 512 - p$
$\Rightarrow 10(76 - x - y - p) = 512 - p$ [replaced $z + q$ as per equation (ii)]
$\Rightarrow 10(76 - 34 + 2y - y) = 512 - p + 10p$
[replaced x as per equation (i)]
$\Rightarrow 420 + 10y = 512 + 9p$
$\Rightarrow 9p + 92 = 10y$ ... (iv)
Now on putting the possible values of *p* in equations (iv) and (i) we get the following data.

**Table 2**

| *x* | *y* | *p* | *q* | *z* |
|---|---|---|---|---|
| 12 | 11 | 2 | | |
| – 6 (Not possible) | 20 | 12 | | |
| – 24(again not possible) | 29 | 22 | | |

Hence, the only possible values for *p, x,* and *y* are:
$p = 2$
$x = 12$
$y = 11$
Now, for *q* and *z*, only one case is possible, i.e., $q + z = 51$, and the value of *q* must be a prime number.
So, some of the possibilities are:

**Table 3**

| *q* | *z* |
|---|---|
| 31 | 20 |
| 29 | 22 |
| 23 | 28 |
| 19 | 32 |
| 17 | 34 |

So, by now, we know that the total weight of pendants is 384 (by putting the values of $x$ and $y$ as obtained in $(x + 2y + 350)$.

Also, the total weight of the ring and bangle is 635, and as per the information given, the weight of a bangle is less than that of a ring. So, the weight of a ring should be more than half of the total weight of the ring and bangle. (i.e., half of 635).

So, we can conclude the following:

$384 >$ weight of ring (i.e., $15 + 2 \times 35 + 10z$) $\geq 318$

Only one value of $z$ satisfies the above condition i.e., $z = 28$ (Taken from Table 3)

So, as per Table 3, $q = 23$.

The final table will be as shown below.

| | Number of Weights | | | |
|---|---|---|---|---|
| | **1 gm** | **2 gm** | **10 gm** | **Total** |
| **Pendent** | x = 12 | y = 11 | 35 | **58** |
| **Ring** | 15 | 35 | z = 28 | **78** |
| **Bangle** | p = 2 | 19 | q = 23 | **44** |
| **Total** | 29 | 65 | 86 | **180** |

The total number of 2 gm weights that the goldsmith had was 65.

Hence, option (B) is correct.

**7. (B)**

As explained earlier, the 10 gm weight the goldsmith used to weigh the ring was 28.

Hence, option (B) is correct.

**8. (D)**

As explained earlier, the weight of the ring = 365 gm

The weight of the bangle = 270 gm

The difference between the weight of the ring and the weight of the bangle = 95 gm

Hence, option (D) is correct.

**9. 78**

As explained earlier, the total number of weights that the goldsmith used to weigh the ring was 78.

Hence, the answer is 78.

**10. 270**

As explained earlier, the weight of the bangle is 270 gm.

Hence, the answer is 270.

**11. 2**

As explained earlier, the number of 1 gm weights that the goldsmith used to weigh the bangle was 2.

Hence, the answer is 2.

**12. (C)**

In the DILR section of CAT and other MBA entrance exams, questions based on time-work, time-speed-distance, permutations-combinations, and number theory are quite common. However, as mentioned at the beginning, you aren't required to tackle a tough math problem in such sets. Instead, just a smart approach would help you get the solution.

As we know that D completed 30% of project X's work in 15 days, he would have taken 50 days to complete project X alone.

So, he would take 100 days to complete double the work as Project X.

Hence, option (C) is correct.

**13. (A)**

A completed 20% work of project X in 8 days, so she would have taken 40 days to complete the whole project X (or project Y) alone.

Also, B completed 10% work of project X in 3 days, so she would have taken 30 days to complete the whole project X (or project Y) alone.

Now let us assume that the work in project Y (which is similar to project X) is equal to 120 units. So, A will be doing 3 units of work per day and B will be doing 4 units of work per day.

So, in 10 days, they will complete 70 units of work. Now, the remaining 50 units of work is done by Ms. F in 5 days, so she can do 10 units of work per day.

So, she will take 12 days to complete the whole project, working alone.
Hence, option (A) is correct.

**14. (C)**

C completed 25% work of project X in 6 days, so she would have taken 24 days to complete the whole Project X (or Project Y) alone.
Also, D completed 30% work of project X in 15 days so she would have taken 50 days to complete the whole project X (or project Y) alone.
Now, let us assume that project Y work as 600 units (LCM of 50 and 24).
So, C does 25 units of work per day and D does 12 units of work per day.
Now, out of every 3 days, C works for 2 days and D works all 3 days. So, total work that will be completed in 3 days = 25 x 2 + 12 x 3 = 86 units.
So, in 21 days, 602 units of work will be completed, which is very close to 600 units.
So, the work will be completed on the 21st day.
Hence, option (C).

**15. (B)**

This question can better be solved with the Unitary method, i.e., by assuming the work to be completed as 1 unit.
We know that B can complete the project Y alone in 30 days
C can complete the project Y alone in 24 days
D can complete the project Y alone in 50 days
As we know that C and D are surely working for 15 days, so they will complete
$15/24 + 15/50 = 37/40^{th}$ part of the work.
So, the remaining $3/40^{th}$ part of the work has to be done by B. So, she will take:
$30 \times 3/40 = 2.25$ days
So, out of 15 days, B can remain absent fully for 12 days.
Hence, option (B) is correct.

## Level of Difficulty - 2

**1. (B)**

The average T-shirt size of the six people is

$$\frac{6+7+8+9+10+11}{6} = 8.5$$

So, the average size of the T-shirts gifted to them should be 8.5 – 0.33 = 8.17

The sum of the size of T-shirts gifted to them should be 8.17 × 6 = 49.

If three people are gifted T-shirts of the same size, they can only be people with consecutive T-shirt sizes. So, the possible people who received the same size can be (P, Q, R), (Q, R, S), (R, S, T), (S, T, U).

Further analysis shows that there are a total of six cases possible, as shown below:

| Person | P | Q | R | S | T | U |
|---|---|---|---|---|---|---|
| Actual Size | 6 | 7 | 8 | 9 | 10 | 11 |
| Case 1 | 6 | 6 | 7 | 10 | 10 | 10 |
| Case 2 | 5 | 7 | 7 | 10 | 10 | 10 |
| Case 3 | 6 | 6 | 9 | 9 | 9 | 10 |
| Case 4 | 5 | 8 | 8 | 8 | 10 | 10 |
| Case 5 | 7 | 7 | 7 | 8 | 10 | 10 |
| Case 6 | 7 | 7 | 7 | 9 | 9 | 10 |

Hence, option (B) is correct.

**2. (D)**

As it can be seen in the table created earlier, in all the possible cases, U has got T-shirt of size 10.

Hence, option (D) is correct.

**3. (D)**

As it can be seen in the table created earlier, two cases are possible when P got T-shirt of size 6, i.e., Case – 1 and Case – 3.

In Case 1, R got size 7, while in Case 3, R got T-shirt of size 9.

So, it can be 7 or 9.

Hence, option (D) is correct.

**4. 2**

As it can be seen in the table created earlier, 3 cases are possible when Q got T-shirt of size 7 i.e. Case 2, 5, and 6.

In each of the above cases, R got size 7 and U got size 10. So, it can uniquely be determined only for two persons.

Hence, the answer is 2.

**5. (D)**

All the incomes and expenses are in ('000) rupees.

Consider the incomes given (i.e., 25, 30, 40, 45, 60, and 80).

Using points (i) and (ii), only two arithmetic progressions are possible: (30, 45, 60) and (40, 60, 80).
60 is common in both arithmetic progressions. DEF is the only family common in both the progressions. So, DEF = 60.
So, the remaining incomes of 30, 45, 40, and 80 must belong to GHI, JKL, ABC, and MNO (in no particular order). So, PQR = 25.

Using point (iv), we can deduce that JKL = 30 and ABC = 80. Using (i) and (ii), we can infer that GHI = 45 and MNO = 40.

So, the incomes can be tabulated as follows:

| Family | Income ('000) rupees | Expenditure ('000) rupees |
|---|---|---|
| ABC | 80 | |
| DEF | 60 | |
| GHI | 45 | |
| JKL | 30 | |
| MNO | 40 | |
| PQR | 25 | |

Considering the expenditures (15, 25, 30, 30, 40, and 50).
The only possible arithmetic progression among expenses is (30, 40, 50).
From (iii), these three expenses belong to DEF, GHI, and ABC (in no particular order).
Consequently, expenses of (15, 25, 30) must belong to JKL, MNO, and PQR (in no particular order). Out of these, the expenses of PQR can only be 15, and JKL = 25 because it is mentioned that every family saves some part of their income.
So, MNO = 30.
A partially filled table is shown below:

| Family | Income ('000) rupees | Expenditure ('000) rupees |
|---|---|---|
| ABC | 80 | 30/ 40/ 50 |
| DEF | 60 | 30/ 40/ 50 |
| GHI | 45 | 30/ 40/ 50 |
| JKL | 30 | 25 |
| MNO | 40 | 30 |
| PQR | 25 | 15 |

Also, GHI's expenses cannot be more than 45, so GHI = 30/40.

Now, we have the following information:

| Family | Income ('000) rupees | Expenditure ('000) rupees |
|---|---|---|
| ABC | 80 | 30/ 40/ 50 |
| DEF | 60 | 30/ 40/ 50 |
| GHI | 45 | 30/ 40 |
| JKL | 30 | 25 |
| MNO | 40 | 30 |
| PQR | 25 | 15 |

Hence, the income of MNO (in '000 rupees) is 40.
Hence, option (D) is correct.

**6. (D)**
As explained earlier, ABC's expenses (in '000 rupees) could be 30, 40, or 50. Hence, savings cannot be determined.
Hence, option (D) is correct.

**7. (B)**

Savings = income – expenditure.
From the table prepared earlier, savings of PQR is:
25 – 15 = 10 (In '000 rupees) is the savings of PQR.
Hence, option (B) is correct.

**8. (C)**

Based on the table prepared earlier,
GHI's income = 45 (In '000 rupees).
Expenses = 30 or 40 (In '000 rupees).
Possible savings = (45 – 40) = 5 or (45 – 30) = 15.
Only 15 is given in the options.
Hence, option (C) is correct.

**Common explanation for Questions 9 to 13**

Let the weights of:
Lightest be $l_1$,
2nd lightest be $l_2$,
3rd lightest be $l_3$,
4th lightest be $l_4$, and the heaviest flower be $l_5$.

Given that they are weighed in groups of three, the possible combinations are
$(l_1, l_2, l_3)$
$(l_1, l_2, l_4)$
$(l_1, l_2, l_5)$
$(l_1, l_3, l_4)$
$(l_1, l_3, l_5)$
$(l_1, l_4, l_5)$
$(l_2, l_3, l_4)$
$(l_2, l_3, l_5)$
$(l_2, l_4, l_5)$
$(l_3, l_4, l_5)$
When we add all the possible combinations with the weights given to us we get:
$6 (l_1 + l_2 + l_3 + l_4 + l_5) = 106 + 116 + 122 + 126 + 132 + 146 + 120 + 126 + 136 + 142$

Therefore, $(l_1 + l_2 + l_3 + l_4 + l_5) = \frac{1,272}{6} = 212$ ...(i)
Since, we have taken the weights in order $(l_1 + l_2 + l_3 + l_4 + l_5)$,
The lowest weight would be: $(l_1 + l_2 + l_3) = 106$ kg ... (ii)
The heaviest weight would be: $(l_3 + l_4 + l_5) = 146$ kg ... (iii)
From equations (ii) and (iii), we get:
$(l_1 + l_2 + l_3) + (l_3 + l_4 + l_5) = 106 + 146$
$l_1 + l_2 + 2l_3 + l_4 + l_5 = 252$ kg ...(iv)
From equations (i) and (iv),
$(l_1 + l_2 + l_3 + l_4 + l_5) = 212$ ...(i)
$l_1 + l_2 + 2l_3 + l_4 + l_5 = 252$ ... (iv)
We get $l_3 = 40$kg
From equations (ii) and (iii),
$l_1 + l_2 = 106 – 40 = 66$ kg
$l_4 + l_5 = 146 – 40 = 106$ kg
The group of the second heaviest weight would be $(l_2, l_4, l_5)$ and we can see that the second heaviest weight is 142 kg.
So, $l_2 = 142 – 106 = 36$ kg and $l_1 = 66 – 36 = 30$ kg
The group of the second lightest weight is $l_1, l_2, l_4 = l_1 + l_2 + l_4 = 116$ kg
We get $l_4 = 116 – 66 = 50$ kg and $l_5 = 106-50 = 56$ kg
We get all the weights:
$l_1 = 30$
$l_2 = 36$
$l_3 = 40$
$l_4 = 50$ and
$l_5 = 56$

Given that the weight of tuberose is the average of tulips and hydrangeas, and hydrangeas is heavier than freesia but lighter than orchids.

Fressia < Hydrangeas < Orchids
So, Tulip = 30 kg
Tuberose = 40 kg
Hydrangeas = 50 kg
Freesia = 36 kg
Orchids = 56 kg

**9. (B)**

The heaviest weight of the flower stands of orchids, i.e., 56 kg.
Hence, option (B) is correct.

**10. (A)**

The weight of a tulip is 30 kg.
Hence, option (A) is correct.

**11. (C)**

The total weight of all the flowers is 212 kg.
So, the average weight $\frac{212}{5}$ = 42.4 kg
Hence, option (C) is correct.

**12. (B)**

The weight of freesia is 36 kg.
Hence, option (B) is correct.

**13. (B)**

Hydrangeas = 50 kg
Orchids = 56 kg
So, two types of flowers weigh more than 40 kg.
Hence, option (B) is correct.

**14. (D)**

In this question, we just need to identify the number of students who have (surely) scored more than 4 points in at least two electives.
Remember that there are only 10 students and students can select more than one elective.
Now, we can just check for electives C, E, and F, as in all the other electives, students have scored maximum of 4 points or less.

- In elective C, the average score of seven students is 4, i.e., the total score of 28. Also, at least one student has got a score of 1, so the remaining 6 students have got a total score of 27. Since the maximum score of a particular student in this elective is '5', at least three students must have scored 5 points each (even if consider others' scores as the next maximum possible value, i.e., 4)
- Similarly, for elective E, we can say that at least two students must have scored 5 points.
- Similarly, in elective F, we can say that it is not necessary that anyone has scored more than 4 points.
- So, we cannot decide exactly how many students scored more than 4 points in at least two electives.
- Hence, option (D) is correct.

**15. (C)**

- In this question, we need to find out the students with less than 2 points. So, we just need to look at electives A, C, and D (as, in all the other electives, the minimum scores of the students are 2 or more points).
- In elective A, the average score of 6 students is 3.5, i.e., the total score of 21. Also, at least one student has got a score of 1, so all the other students must have scored 4 points each.
- Similarly, in elective C, one student scored 1 point and the remaining six students have scored a total of 27 points. So, none of these six students scored 1 point.
- Also, in elective D, the range of scores is 1 to 2, the total score by the students is 4, and the number of students is 3. Therefore, two students scored 1 point each, and the third student scored 2 points.
- Since a student can opt for more than one elective, the minimum number of students who have scored less than 2 points in at least one elective is 2. (Considering the scenario where out of the two students who scored 1 point in elective D, one of them scored 1 point in A, and the other scored 1 point in C).

Hence, option (C) is correct.

**16. (D)**

With the information provided, we cannot determine the average marks of elective N, as we do not know the number of common students between the two electives.
Hence, option (D) is correct.

**17. (A)**

It is given to us that none of the students of elective A and elective B are common. Also, elective H has all those students

who have opted for elective A and elective B. Therefore, the number of students in elective H = 6 + 3 = 9
Total score by students in elective A = 6 × 3.5 = 21
Total score by students in elective B = 3 × 3 = 9
Therefore, the average score of elective H = (21 + 9)/9 = 10/3
Hence, option (A) is correct.

## Level of Difficulty – 3

**1. (D)**

Let's analyse the given information in a step-by-step manner.

- There are 14 multiples of 7, each less than 100, i.e. 07, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98.
- From point (ii), the number assigned to F had one digit as the square of the other. The only value of F which satisfies this condition is 42. Hence, F = 42
- From point (i), A and C got numbers with the same tens digit such that A is greater than C. Hence, (A, C) = (28, 21) or (49, 42) or (77, 70) or (98, 91)
- But A or C cannot get 42 since F got 42. Also, A cannot get 98, as the highest number was assigned to J. [Point (vi)]. ∴ (A, C) = (28, 21) or (77, 70)
- Now, F > B; B > G > I [From points (iv) and (vii)]
- Also, B + D = E and H ~ B = D [From points (v) and (iii)]
- If H – B = D, then B + D = H (making H = E). This is not possible as all the numbers are distinct. Hence, B – H = D
- This implies that F > B > G > I and B > H, D
- Thus, F (= 42) is greater than five numbers (including B) and B is greater than G, I, H, and D.
- Since 42 is the sixth multiple of 7, B has to be the fifth multiple of 7. ∴ B = 35
- Hence, (G, I, H, D) = (28, 21, 14, 07) in no specific order.
- Thus, (A, C) ≠ (28, 21) as the values are assigned to other people. Therefore, A = 77 and C = 70
- Because, I is assigned the least value among the numbers, I = 07
- From (vi), J/I = H – 1 i.e. J = 7(H – 1). So, H can be 14, 21, or 28.
- When H = 14, J = 7(13) = 91 (possible)
- When H = 21, J = 7(20) = 140 (not possible)
- When H = 28, J = 7(27) = 189 (not possible)
- Hence, H = 14 and J = 91
- Also, as explained earlier, B – H = D; ∴ D = 35 – 14, i.e., D = 21
- Also, B + D = E ∴ E = 35 + 21, i.e., E = 56
- Finally, G = 28 (only value left from 28, 21, 14 and 07).

Hence, the numbers assigned to each person (in ascending order) are:
I = 07, H = 14, D = 21; G = 28, B = 35, F = 42, E = 56, C = 70, A = 77, J = 91
Thus, no one is assigned the number 84.
Hence, option (D) is correct.

**2. (C)**

As explained earlier, the number 56 is assigned to E.
Hence, option (C) is correct.

**3. (A)**

As explained earlier, |B – C| = |35 – 70| = 35
Hence, option (A) is correct.

**4. (A)**

From the data given, we know that on that week, the opening price per unit of Adani Infrastructure equity on Monday was ₹1,660, and the closing price on Friday was ₹1,640.
So, the overall change from Monday to Friday was a reduction of ₹20 per equity.
Also, the fluctuation either way in the daily price per equity was ₹20, and it happened daily.
So, there must have been 3 decreases and 2 increases in price.
Now, on a particular day, both of them sold, it means that the price per equity

had increased from the previous day and had reached ₹1,700 per equity.

This is only possible for the following prices per day:

| | Mon Opening | Mon Closing | Tues Closing | Wed Closing | Thurs Closing | Fri Closing |
|---|---|---|---|---|---|---|
| **Price per equity** | 1660 | 1680 | 1700 | 1680 | 1660 | 1640 |
| **Mr. Hiralal** | | Sells | Sells | Buys | Buys | Buys |
| **Mr. Chandilal** | | | Sells | | | |

Hence, Thursday's opening price = Wednesday's closing price = ₹1,680
Hence, option (A) is correct.

**5. (B)**

If on a particular day, both of them bought equity, it means that the price per equity had decreased from the previous day and had reached ₹1,620 per equity.
The next day, Mr. Hiralal sold and Mr. Chandilal did not buy equity.
This is only possible for the following prices per day:

| | Mon Opening | Mon Closing | Tues Closing | Wed Closing | Thurs Closing | Fri Closing |
|---|---|---|---|---|---|---|
| **Price per equity** | 1,660 | 1,680 | 1,660 | 1,640 | 1,620 | 1,640 |
| **Mr. Hiralal** | | Sells | Buys | Buys | Buys | Sells |
| **Mr. Chandilal** | | | | | Buys | |

Hence Wednesday's closing price = ₹1,640
Hence, option (B) is correct.

**6. (C)**

For the minimum possible value of funds with Mr. Hiralal and Mr. Chandilal together at the end of Friday, both must have bought as many shares as possible (as when they buy the shares, their funds get reduced).

| | Mon Opening | Mon Closing | Tues Closing | Wed Closing | Thurs Closing | Fri Closing |
|---|---|---|---|---|---|---|
| **Price per equity** | 1660 | 1640 | 1620 | 1600 | 1620 | 1640 |
| **Mr. Hiralal** | | Buys | Buys | Buys | Sells | Sells |
| **Mr. Chandilal** | | | Buys | Buys | Buys | |

Total initial funds with Mr. Hiralal and Mr. Chandilal = ₹6,000 + ₹10,000 = ₹16,000
Total funds spent on buying the stocks by both together
= ₹(1,640 + 2 × 1620 + 2 × 1,600 + 0 – 1,640) = ₹6,440
Hence, the minimum possible funds with them both after Friday's closing = ₹(16,000 – 6,440) = ₹9,560
Hence, option (C) is correct.

**7. (D)**

Mr. Hiralal had 5 units of equity more than Mr. Chandilal on Monday.

For Mr. Hiralal to have 4 units of equity more than Mr. Chandilal at the end of Friday, the net sell must be 1 unit more or net purchase 1 unit less than Mr. Chandilal. This can happen as below:

| | Mon Opening | Mon Closing | Tues Closing | Wed Closing | Thurs Closing | Fri Closing |
|---|---|---|---|---|---|---|
| **Price per equity** | 1660 | 1640 | 1620 | 1640 | 1620 | 1640 |
| **Mr. Hiralal** | | Buys | Buys | Sells | Buys | Sells |
| **Mr. Chandilal** | | | Buys | | Buys | |

So Mr. Hiralal has 11 shares after Friday's closing, while Mr. Chandilal has 7 shares. The difference is 4.

Hence opening price on Thursday = ₹1,640

Hence, option (D) is correct.

**8. (D)**

Let the number of burgers consumed by Shreya, Aayush, and Muskan be $x$, $y$, and $z$, respectively. So the respective number of drinks are $2x$, $3y$, and $z + 3$.

$\therefore$ Total items = $(x + y + z) + (2x + 3y + z + 3) = 3x + 4y + 2z + 3 < 20$ (given)

The values of $x$, $y$, and $z$ can be 1, 2, or 3.

So depending on the values of $x$, $y$, and $z$ we can make a table as follows:

| Case | | | | Shreya | | | Aayush | | | Muskan | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $x$ | $y$ | $z$ | Burgers | Drinks | Total | Burgers | Drinks | Total | Burgers | Drinks | Total | |
| 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 3 | 4 | 1 | 4 | 5 | 12 |
| 2 | 2 | 1 | 1 | 2 | 4 | 6 | 1 | 3 | 4 | 1 | 4 | 5 | 15 |
| 3 | 1 | 2 | 1 | 1 | 2 | 3 | 2 | 6 | 8 | 1 | 4 | 5 | 16 |
| 4 | 1 | 1 | 2 | 1 | 2 | 3 | 1 | 3 | 4 | 2 | 5 | 7 | 14 |
| 5 | 2 | 2 | 1 | 2 | 4 | 6 | 2 | 6 | 8 | 1 | 4 | 5 | 19 |
| 6 | 2 | 1 | 2 | 2 | 4 | 6 | 1 | 3 | 4 | 2 | 5 | 7 | 17 |
| 7 | 1 | 2 | 2 | 1 | 2 | 3 | 2 | 6 | 8 | 2 | 5 | 7 | 18 |
| 8 | 2 | 2 | 2 | 2 | 4 | 6 | 2 | 6 | 8 | 2 | 5 | 7 | 21 |
| 9 | 3 | 1 | 1 | 3 | 6 | 9 | 1 | 3 | 4 | 1 | 4 | 5 | 18 |
| 10 | 1 | 3 | 1 | 1 | 2 | 3 | 3 | 9 | 12 | 1 | 4 | 5 | 20 |
| 11 | 1 | 1 | 3 | 1 | 2 | 3 | 1 | 3 | 4 | 3 | 6 | 9 | 16 |
| 12 | 2 | 1 | 3 | 2 | 4 | 6 | 1 | 3 | 4 | 3 | 6 | 9 | 19 |

Since the total number of items is less than 20, we can discard cases 8 and 10.

Now it's given that Shreya had at least 6 items, so the relevant cases are 2, 5, 6, 9, and 12. But it is also given that the total number of items consumed is not 17 so case 6 is discarded.

| Case | | | | Shreya | | | Aayush | | | Muskan | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $x$ | $y$ | $z$ | Burgers | Drinks | Total | Burgers | Drinks | Total | Burgers | Drinks | Total | |
| 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 3 | 4 | 1 | 4 | 5 | 12 |
| 2 | 2 | 1 | 1 | 2 | 4 | 6 | 1 | 3 | 4 | 1 | 4 | 5 | 15 |
| 3 | 1 | 2 | 1 | 1 | 2 | 3 | 2 | 6 | 8 | 1 | 4 | 5 | 16 |
| 4 | 1 | 1 | 2 | 1 | 2 | 3 | 1 | 3 | 4 | 2 | 5 | 7 | 14 |
| 5 | 2 | 2 | 1 | 2 | 4 | 6 | 2 | 6 | 8 | 1 | 4 | 5 | 19 |
| 6 | 2 | 1 | 2 | 2 | 4 | 6 | 1 | 3 | 4 | 2 | 5 | 7 | 17 |
| 7 | 1 | 2 | 2 | 1 | 2 | 3 | 2 | 6 | 8 | 2 | 5 | 7 | 18 |
| 9 | 3 | 1 | 1 | 3 | 6 | 9 | 1 | 3 | 4 | 1 | 4 | 5 | 18 |
| 11 | 1 | 1 | 3 | 1 | 2 | 3 | 1 | 3 | 4 | 3 | 6 | 9 | 16 |
| 12 | 2 | 1 | 3 | 2 | 4 | 6 | 1 | 3 | 4 | 3 | 6 | 9 | 19 |

Note that in the remaining cases, i.e., 2, 5, 9, and 12, the number of items consumed by Muskan is either 5 or 9.
Hence, option (D) is correct.

**9. (D)**

Refer to the final table obtained in the solution to the first question.

Note that in cases 2, 5, 9, and 12, the number of drinks consumed by Aayush is either 3 or 6.
Hence, option (D) is correct.

**10. (A)**

The cases in which Aayush had 6 drinks are cases 3, 5, and 7 as shown below. But since the total items consumed is greater than 16, case 3 is discarded.

| Case | | | | Shreya | | | Aayush | | | Muskan | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $x$ | $y$ | $z$ | Burgers | Drinks | Total | Burgers | Drinks | Total | Burgers | Drinks | Total | |
| 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 3 | 4 | 1 | 4 | 5 | 12 |
| 2 | 2 | 1 | 1 | 2 | 4 | 6 | 1 | 3 | 4 | 1 | 4 | 5 | 15 |
| 3 | 1 | 2 | 1 | 1 | 2 | 3 | 2 | 6 | 8 | 1 | 4 | 5 | 16 |
| 4 | 1 | 1 | 2 | 1 | 2 | 3 | 1 | 3 | 4 | 2 | 5 | 7 | 14 |
| 5 | 2 | 2 | 1 | 2 | 4 | 6 | 2 | 6 | 8 | 1 | 4 | 5 | 19 |
| 6 | 2 | 1 | 2 | 2 | 4 | 6 | 1 | 3 | 4 | 2 | 5 | 7 | 17 |
| 7 | 1 | 2 | 2 | 1 | 2 | 3 | 2 | 6 | 8 | 2 | 5 | 7 | 18 |
| 9 | 3 | 1 | 1 | 3 | 6 | 9 | 1 | 3 | 4 | 1 | 4 | 5 | 18 |
| 11 | 1 | 1 | 3 | 1 | 2 | 3 | 1 | 3 | 4 | 3 | 6 | 9 | 16 |
| 12 | 2 | 1 | 3 | 2 | 4 | 6 | 1 | 3 | 4 | 3 | 6 | 9 | 19 |

In either case out of 5 and 7, the sum of the number of burgers consumed by Shreya and the number of drinks consumed by Muskan = 2 + 4 = 1 + 5 = 6.
Hence, option (A) is correct.

**11. (D)**

Refer to the table in the previous question.

Note that in the relevant cases 5 and 7, the number of burgers consumed by Muskan is either 1 or 2.

Hence, option (D) is correct.

**12. (C)**

It can be observed that 30 strikes will occur in the interval of 29 min. So, to ensure that two motorcycles are produced every 29 min interval (i.e., in the interval of 30 strikes), we need to produce 1 motorcycle in the first 14 min and the other motorcycle in the next 15 min (as we also want to minimise the total production). So, the bikes will be produced as shown below:

1st bike: 1:13–1:14 pm
2nd Bike: 1:28–1:29 pm
3rd Bike: 1:42–1:43 pm
4th Bike: 1:57–1:58 pm
5th Bike: 2:11–2:12 pm
6th Bike: 2:26–2:27 pm
7th Bike: 2:40–2:41 pm
8th Bike: 2:55–2:56 pm
9th Bike: 3:09–3:10 pm
10th Bike: 3:24–3:25 pm
11th Bike: 3:38–3:39 pm
12th Bike: 3:53–3:54 pm

So, this way they will produce 12 motorcycles.

Hence, option (C) is correct.

**13. (C)**

As explained earlier, we can check that:
1.00 to 1.29–2 motorcycles minimum
1.29 to 1.58–2 motorcycles minimum
1.58 to 2.27–2 motorcycles minimum
2.27 to 2.56–2 motorcycles minimum
2.56 to 3.25–2 motorcycles minimum
3.25 to 3.54–2 motorcycles minimum
So 2 motorcycles between 1.20 to 1.29, and 2 motorcycles between 1.29 to 1.50. So total 4.

**14. (C)**

As explained earlier, there are already 4 motorcycles produced in this time span (i.e., 3 pm–4 pm). Now, if we shift production of any adjacent intervals in this interval (i.e., 3 pm–4 PM), it will violate the production requirements of 2 Bikes in some of the other intervals.

Hence, option (C) is correct.

**15. (C)**

P + U = YW.

As the maximum carry-over that can result in the given addition is 1, the maximum possible sum of P + U + Carryover would be when P/U is 9 or 8.

Hence, the maximum sum would be
P + U + Carry over = 9 + 8 + 1 = 18.

Hence even under maximum conditions, Y = 1

It is Given that T, W, < 5,

So, T, W can take the value of 0, 2, 3, 4.

Also, T, W cannot take 0 because T + W = R.

So, (T, W) = (3, 2), (4, 2), (4, 3)

So, T + W = 5, 6, 7 corresponding to each of the above combinations.

Also, T + W is the average of P and U,
P + U = 2 (T + W)

$\Rightarrow$ P + U = 10, 12, 14 corresponding to each of the above combinations.

But P + U should be of the form 1W.

If (T, W) = (3, 2), P + U = 10 and W = 0. This is a contradiction.

If (T, W) = (4, 2), P + U = 12 and W = 2. This is possible.

If (T, W) = (4, 3), P + U = 14 and W = 4. This is a contradiction. (As we have already considered T as 4.)

Hence, (T, W) can only be (4, 2)

So, S = 8, as 8 + 4 = 12, W = 2

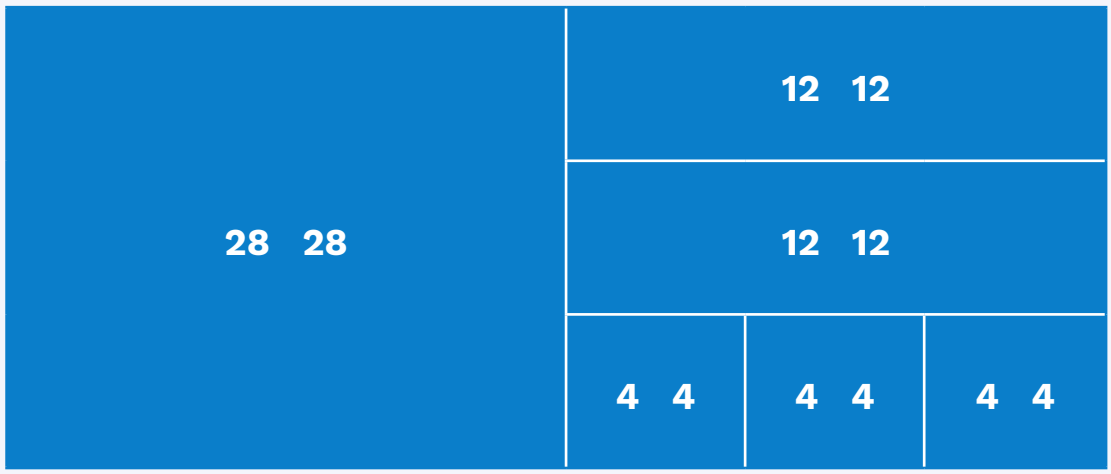
Hence, option (C) is correct.

## Rack Your Brain

**1.6**

Here, we are asked to divide a rectangular field of 40 m × 28 m into square plots, not necessarily equal.

So, it can be done as shown below:

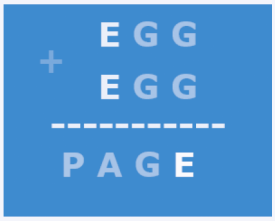



So, a minimum of 6 square plots will be created.

Hence, the answer is 6.

## Rack Your Brain - 2

**2.7**




In the two-digit addition, the maximum carry-over can be 1. Hence, P = 1

Also, E ≥ 5, only then there will be a carry-over and we will get the four-digit result.

Now, as per the rightmost column addition, G + G = E, So, G ≠ 0. Also, as per the middle column addition, G + G = G, so there has to be some carry over from the previous column as G is not '0'

The only value possible for G is '9' (Only then we will have G + G = G (9 + 9 = 18 + Carry, which will have the last digit as '9')

So, E is 8, and there will be a carryover from G+G.

So, 8 + 8 + Carry = 17, hence A is '7'.

Hence, the answer is 7.