CAT 2021 Question Paper Slot 1

LRDI

Instructions [25 - 30]

A journal plans to publish 18 research papers, written by eight authors (A, B, C, D, E, F, G, and H) in four issues of the journal scheduled in January, April, July and October. Each of the research papers was written by exactly one of the eight authors. Five papers were scheduled in each of the first two issues, while four were scheduled in each of the last two issues. Every author wrote at least one paper and at most three papers. The total number of papers written by A, D, G and H was double the total number of papers written by the other four authors. Four of the authors were from India and two each were from Japan and China. Each author belonged to exactly one of the three areas — Manufacturing, Automation, and Logistics. Four of the authors were from the Logistics area and two were from the Automation area. As per the journal policy, none of the authors could have more than one paper in any issue of the journal.

The following facts are also known.
1. F, an Indian author from the Logistics area, wrote only one paper. It was scheduled in the October issue.
2. A was from the Automation area and did not have a paper scheduled in the October issue.
3. None of the Indian authors were from the Manufacturing area and none of the Japanese or Chinese authors were from the Automation area.
4. A and H were from different countries, but had their papers scheduled in exactly the same issues.
5. C and E, both Chinese authors from different areas, had the same number of papers scheduled. Further, E had papers scheduled in consecutive issues of the journal but C did not.
6. B, from the Logistics area, had a paper scheduled in the April issue of the journal.
7. B and G belonged to the same country. None of their papers were scheduled in the same issue of the journal.
8. D, a Japanese author from the Manufacturing area, did not have a paper scheduled in the July issue.
9. C and H belonged to different areas.

25. What is the correct sequence of number of papers written by B, C, E and G, respectively?

A 1, 2, 2, 3

B 1, 3, 3, 1

C 3, 1, 1, 3

D 1, 2, 2, 1

26. How many papers were written by Indian authors?

27. Which of the following statement(s) MUST be true?
Statement A: Every issue had at least one paper by author(s) from each country.
Statement B: Every issue had at most two papers by author(s) from each area.

A Both the statements

B Only Statement B

C Only Statement A

D Neither of the statements

28. Which of the following statements is FALSE?

A Every issue had at least one paper by author(s) from Automation area.

B Every issue had exactly one paper by a Chinese author.

C Every issue had exactly two papers by authors from Logistics area.

D Every issue had exactly two papers by Indian authors.

29. Which of the following statements is FALSE?

A There were exactly two papers by authors from Manufacturing area in the January issue.

B There was exactly one paper by an author from Manufacturing area in the April issue.

C There was exactly one paper by an author from Logistics area in the October issue.

D There were exactly two papers by authors from Manufacturing area in the July issue.

30. Which of the following is the correct sequence of number of papers by authors from Automation, Manufacturing and Logistics areas, respectively?

A 6, 5, 7

B 6, 6, 6

C 6, 7, 5

D 5, 6, 7

Instructions [31 - 34]

Ganga, Kaveri, and Narmada are three women who buy four raw materials (Mango, Apple, Banana and Milk) and sell five finished products (Mango smoothie, Apple smoothie, Banana smoothie, Mixed fruit smoothie and Fruit salad). Table-1 gives information about the raw materials required to produce the five finished products. One unit of a finished product requires one unit of each of the raw materials mentioned in the second column of the table.

Table-1

Finished product	Raw materials required
Mango smoothie	Mango, Milk
Apple smoothie	Apple, Milk
Banana smoothie	Banana, Milk
Mixed fruit smoothie	Mango, Apple, Banana, Milk
Fruit salad	Mango, Apple, Banana

One unit of milk, mango, apple, and banana cost ₹5, ₹3, ₹2, and ₹1 respectively. Each unit of a finished product is sold for a profit equal to two times the number of raw materials used to make that product. For example, apple smoothie is made with two raw materials (apple and milk) and will be sold for a profit of ₹4 per unit. Leftover raw materials are sold during the last business hour of the day for a loss of ₹1 per unit.

The amount, in rupees, received from sales (revenue) for each woman in each of the four business hours of the day is given in Table-2.

Table-2

Business Hour	Ganga	Kaveri	Narmada
Hour 1	23	19	31
Hour 2	21	22	21
Hour 3	29	30	23
Hour 4 (last hour)	30	27	22

The following additional facts are known.
1. No one except possibly Ganga sold any Mango smoothie.
2. Each woman sold either zero or one unit of any single finished product in any hour.
3. Each woman had exactly one unit each of two different raw materials as leftovers.
4. No one had any banana leftover.

31. What BEST can be concluded about the number of units of fruit salad sold in the first hour?

A Either 1 or 2.

B Either 0 or 1 or 2.

C Exactly 2.

D Exactly 1.

32. Which of the following is NECESSARILY true?

A Ganga did not sell any leftover mangoes.

B Ganga did not sell any leftover apples.

C Narmada sold one unit of leftover milk.

D Kaveri sold one unit of leftover mangoes.

33. What BEST can be concluded about the total number of units of milk the three women had in the beginning?

A Either 19 or 20 units.

B Either 18 or 19 or 20 units.

C Either 18 or 19 units.

D Either 17 or 18 or 19 units.

34. If it is known that three leftover units of mangoes were sold during the last business hour of the day, how many apple smoothies were sold during the day?

Instructions [35 - 40]

Amudha, Bharatan, Chandran, Dhinesh, Ezhil, Fani and Gowtham are seven people in a town. Any pair of them could either be strangers, acquaintances, or friends. All relationships are mutual. For example, if Amudha is a friend of Bharatan, then Bharatan is also a friend of Amudha. Similarly, if Amudha is a stranger to Bharatan, then Bharatan is also a stranger to Amudha.

Partial information about the number of friends, acquaintances, and strangers of each of these people among them is given in the table below.

	No. of Friends	No. of Acquaintances	No. of Strangers
Amudha		1	4
Bharatan			
Chandran		1	
Dhinesh			2
Ezhil			1
Fani	1		
Gowtham		3	2

The following additional facts are also known.
1. Amudha, Bharatan, and Chandran are mutual strangers.
2. Amudha, Dhinesh, and Fani are Ezil's friends.
3. Chandran and Gowtham are friends.
4. Every friend of Amudha is an acquaintance of Bharatan, and every acquaintance of Bharatan is a friend of Amudha.
5. Every friend of Bharatan is an acquaintance of Amudha, and every acquaintance of Amudha is a friend of Bharatan.

35. Who are Gowtham's acquaintances?

A Dhinesh, Ezhil and Fani

B Amudha, Dhinesh and Fani

C Bharatan, Dhinesh and Ezhil

D Amudha, Bharatan and Fani

36. Which of these pairs share the same type of relationship?

A (Amudha, Gowtham) and (Ezhil, Fani)

B (Bharatan, Chandran) and (Dhinesh, Ezhil)

C (Chandran, Ezhil) and (Dhinesh, Gowtham)

D (Bharatan, Ezhil) and (Fani, Gowtham)

37. Who is an acquaintance of Amudha?

A Dhinesh

B Fani

C Gowtham

D Ezhil

38. Who is an acquaintance of Chandran?

A Dhinesh

B Fani

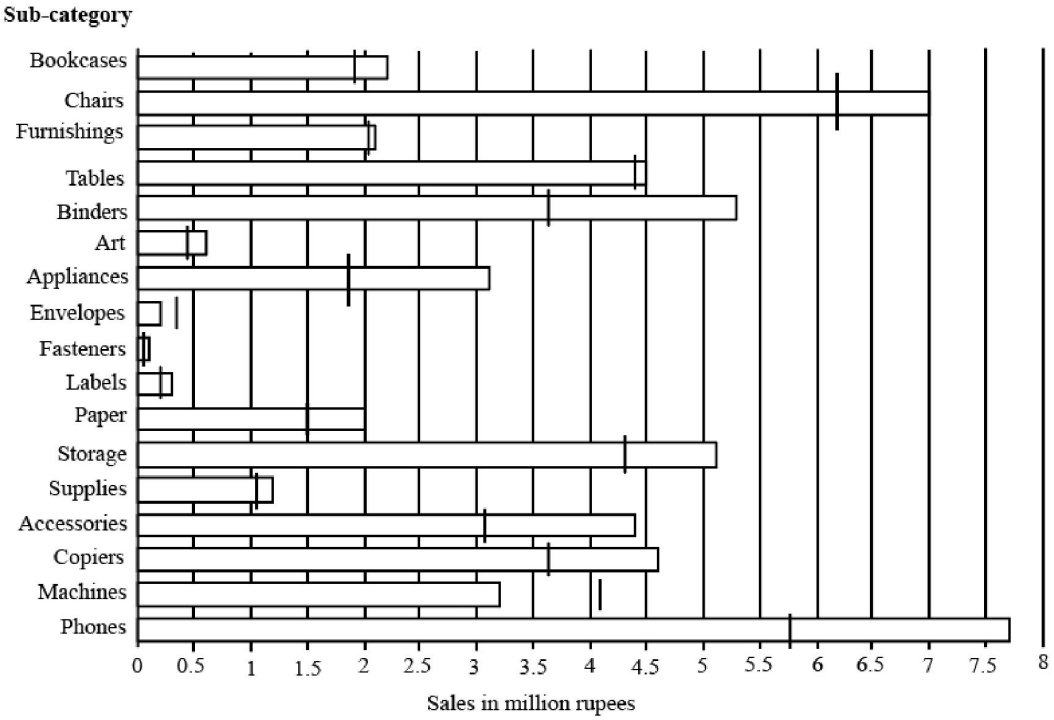
C Ezhil

D Bharatan

39. How many friends does Ezhil have?

40. How many people are either a friend or a friend-of-a-friend of Ezhil?

Instructions [41 - 44]



The horizontal bars in the above diagram represent 2020 aggregate sales (in ₹ million) of a company for the different subcategories of its products. The top four product subcategories (Bookcases, Chairs, Furnishings, Tables) belong to furniture product category; the bottom four product subcategories (Accessories, Copiers, Machines, Phones) belong to the technology product category while all other product subcategories belong to the office supply product category. For each of the product subcategories, there is a vertical line indicating the sales of the corresponding subcategory in 2019.

41. The total sales (in ₹ million) in 2019 from products in office supplies category is closest to

A 18.0

B 16.5

C 13.5

D 12.5

42. The percentage increase in sales in Furniture category from 2019 to 2020 is closest to

A 20%

B 8%

C 25%

D 1%

43. How many subcategories had sales of ₹ 4 million or more in 2019 and registered an increase in sales in excess of 25% in 2020?

44. The improvement index for a category is the maximum percentage increase in sales from 2019 to 2020 among any of its subcategories. The correct order of categories in increasing order of this improvement index is

A furniture, technology, office supply

B technology, furniture, office supply

C office supply, technology, furniture

D office supply, furniture, technology

Answers

LRDI

25.**A**	26.**8**	27.**C**	28.**C**	29.**D**	30.**A**	31.**A**	32.**B**
33.**B**	34.**6**	35.**A**	36.**D**	37.**A**	38.**B**	39.**3**	40.**4**
41.**C**	42.**B**	43.**1**	44.**A**				

Explanations

LRDI

Explanation [25 - 30]:
In the information, it is provided that there are four authors in the logistics department, 2 authors in automation, and 2 authors in manufacturing. There are 4 Indian authors, 2 Chinese authors, and 2 Japanese authors.

The total issues publicized were 18 of which the publications done by A, D, G, H are twice the papers written by the other four authors. Hence A+D+G+H has written 12 papers in total and B+C+E+F has written 6 in total. Since an author can write a minimum of 4 papers and a maximum of 3 papers. Each of A, D, G, H must have written 3 papers each.

In statement 3 it was provided that none of the Indian authors were from the Manufacturing area and none of the Japanese or Chinese authors were from the Automation area.

Since none of the Japanese and Chinese authors belonged to automation. Hence the two automation authors must be from India. In statement 1 it was given that F an Indian author is from logistics.

Of the remaining 5 authors 3 from logistics and 2 from manufacturing, in statement 5 it is given that the two Chinese authors are from different areas and hence they must be from manufacturing and logistics.

Of the remaining 3 authors 2 in logistics and 1 in manufacturing, in statement 8 is given that a Japanese author belonged to manufacturing, and hence of the remaining 2 in logistics one of them was from India and the other from Japan.

Of the four Indian authors, 2 belonged to logistics and 2 automation. Of the two authors from Japan, one belonged to manufacturing and one logistics. Of the two Chinese authors, one of them belonged to logistics and the other manufacturing.

Five papers were scheduled in each of the January and April issues, while four were scheduled in each of July and October issues.

Using statement 1, F an Indian author wrote a single paper in logistics published in October.

Using statement 2, A was from Automation and did not have a paper scheduled in October. Since A wrote 3 papers in total he must have written in the other three months and since only Indian authors worked in Automation he must have been from India.

Using statement 5, C, E are Chinese and wrote an equal number of papers. Since B+C+E+F have written a total of 6 papers. The two possibilities are 2+2+1+1 or 3+1+1+1.. Since it was given that E had papers scheduled in consecutive issues and C did not. So the only possible case is C = 2, E =2, F = 1, B = 1.

Using statement 4, A and H were from different countries and wrote papers in the same months. Hence H must be Japanese and must have written in Jan, April, July.

Author	Country	Area of Interest	Publications	Months of publication
A	India	Automation	3	Jan, April, July
B			1	
C	Chinese		2	
D			3	
E	Chinese		2	
F	India	Logistics	1	October
G			3	
H	Japan		3	Jan, April, July

In statement 6, B, from the Logistics area, had a paper scheduled in the April issue of the journal.

In statement 7, B and G belonged to the same country. None of their papers were scheduled in the same issue of the journal. Since B and G belonged to the same country the only possibility is that both of them belonged to the same country and since they published Journals in different months. G must have published in January, July, and October.

In statement 8, D, a Japanese author from the Manufacturing area, did not have a paper scheduled in the July issue. Hence he must have had the three issues in Jan, April, Oct. The other Japanese author H must have written in logistics.

The fourth Indian author G must have written a paper in Automation.

In January, one more paper needs to be publicized, one in April, 1 in July, and one in October.
In statement 5, E had papers scheduled in consecutive issues of the journal but C did not.

Hence C must have written in Jan and October, and E in April and July.

In statement 9, C and H belonged to different areas. Hence C must be from Manufacturing and E must be from Logistics.

Author	Country	Area of Interest	Publications	Months of publication
A	India	Automation	3	Jan, April, July
B	India	Logistics	1	April
C	China	Manufacturing	2	Jan, October
D	Japan	Manufacturing	3	Jan, April, October
E	China	Logistics	2	April, July.
F	India	Logistics	1	October
G	India	Automation	3	Jan, July, October
H	Japan	Logistics	3	Jan, April, July

25. **A**
.Number of papers written by B, C, E, and G are: 1, 2, 2, 3

26. **8**
e a total of 3+1+1+3 = 8 papers

27. **C**
April has three authors from logistics. Hence false

28. **C**
in the issue of April there were three authors from logistics department.

29. **D**
In the information, it is provided that there are four authors in the logistics department, 2 authors in automation, and 2 authors in manufacturing. There are 4 Indian authors, 2 Chinese authors, and 2 Japanese authors.

The total issues publicized were 18 of which the publications done by A, D, G, H are twice the papers written by the other four authors. Hence A+D+G+H has written 12 papers in total and B+C+E+F has written 6 in total. Since an author can write a minimum of 4 papers and a maximum of 3 papers. Each of A, D, G, H must have written 3 papers each.

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E	China	Logistics	2	April, July.
F	India	Logistics	1	October
G	India	Automation	3	Jan, July, October
H	Japan	Logistics	3	Jan, April, July

There are no authors from Manufacturing in the July issue and hence option D is false.

30. **A**

In the information, it is provided that there are four authors in the logistics department, 2 authors in automation, and 2 authors in manufacturing. There are 4 Indian authors, 2 Chinese authors, and 2 Japanese authors.

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H	Japan		3	Jan, April, July

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D	Japan	Manufacturing	3	Jan, April, October
E	China	Logistics	2	April, July.
F	India	Logistics	1	October
G	India	Automation	3	Jan, July, October
H	Japan	Logistics	3	Jan, April, July

In Automation, there are a total of 6 papers, Logistics 7 papers, and Manufacturing a total of 5 papers.

Explanation [31 - 34]:

Given that each item is sold for a profit of 2 times the number of materials required for the dish.

Hence for different finished products: The cost price and selling price are :

Finished Product	Cost Price	Profit	Selling Price
Mango Smoothie	8	4	12
Apple Smoothie	7	4	11
Banana Smoothie	6	4	10
Mixed Fruit	11	8	19
Fruit Salad	6	6	12

31. **A**

Given that in any hour only either zero or one unit of a single finished product is sold. Hence the price distribution for the first three hours sales distribution is given by :

Business Hour	Ganga	Kaveri	Narmada
Hour 1	11 + 12	19	19+12
Hour 2	11+ 10	12+ 10	11 + 10
Hour 3	19+ 10	19+ 11	11 + 12

Additionally, it has been mentioned that no one except Ganga possibly sold Mango smoothies.

Considering Apple Smoothie : (AS), Mango Smoothie : (M.S), Banana Smoothie : (B. S), Mixed Fruit : (M.F), Fruit Salad : (F.S)

Business Hour	Ganga	Kaveri	Narmada
Hour 1	A.S + F.S/M.S	M.F	M.F + F.S
Hour 2	A.S + B.S	F.S + B.S	A.S + B.S
Hour 3	M.F+ B.S	M.F + A.S	A.S + F.S

In the last one hour everyone had one unit each of two different materials as leftovers:

Each leftover item is sold at Re1 less than their cost price. Hence

One unit of milk, mango, and apple will cost ₹4, ₹2, ₹1,

The three possible combinations for the last hour in which raw materials can be sold is :

One unit of milk+ One unit of mango = Rs 4+2 = Rs 6.

One unit of milk+ One unit of apple = Rs 4+1 = Rs 5.

One unit of mango+ One unit of apple = Rs 2+1 = Rs 3.

In the last one hour :

Total sale of Ganga is Rs 30. This is the total cost earned by considering selling the finished items and raw materials :

Hence the possible cases are :

(24 + 6) or (25 + 5) or (27 + 3). It is not possible to earn 25 and 27 by selling finished products.

Hence she earns Rs 24 which is possible by selling one (M.S + F.S) and one raw unit of milk and mango each.

Total sale of Kaveri is Rs 27. This is the total cost earned by considering selling the finished items and raw materials :

Hence the possible cases are :

(21 + 6) or (22+5) or (24+3).

Since Kaveri cannot sell mango smoothies the possible cases are :

(21+6) Selling one apple smoothie and one banana smoothie and one raw unit of Milk and Mango.

(22+5) Selling one Banana smoothie and Fruit Salad, one unit of raw milk, and one unit of Raw Apple.

Total sale for Narmada is Rs 22. The possible cases are :

(16+6), (17+5), (19+3).

Among these, the only possible case is 19 + 3. Selling one unit Mixed Fruit, and one raw unit of Mango and Apple.

Case 1 :

Business Hour	Ganga	Kaveri	Narmada
Hour 1	A.S + F.S/M.S	M.F	M.F + F.S
Hour 2	A.S + B.S	F.S + B.S	A.S + B.S
Hour 3	M.F+ B.S	M.F + A.S	A.S + F.S
Final Hour	M.S+F.S+Milk+Mango	A.S+B.S+Milk+Mango	M.F+Mango+ Apple

case 2 :

Business Hour	Ganga	Kaveri	Narmada
Hour 1	A.S + F.S/M.S	M.F	M.F + F.S
Hour 2	A.S + B.S	F.S + B.S	A.S + B.S
Hour 3	M.F+ B.S	M.F + A.S	A.S + F.S
Final Hour	M.S+F.S+Milk+Mango	F.S+B.S+Milk+Apple	M.F+Mango+ Apple

In the first one hour, either one or two fruit salads are sold.

32. **B**

Given that in any hour only either zero or one unit of a single finished product is sold. Hence the price distribution for the first three hours sales distribution is given by :

Business Hour	Ganga	Kaveri	Narmada
Hour 1	11 + 12	19	19+12
Hour 2	11+ 10	12+ 10	11 + 10
Hour 3	19+ 10	19+ 11	11 + 12

Additionally, it has been mentioned that no one except Ganga possibly sold Mango smoothies.

Considering Apple Smoothie : (AS), Mango Smoothie : (M.S), Banana Smoothie : (B. S), Mixed Fruit : (M.F), Fruit Salad : (F.S)

Business Hour	Ganga	Kaveri	Narmada
Hour 1	A.S + F.S/M.S	M.F	M.F + F.S
Hour 2	A.S + B.S	F.S + B.S	A.S + B.S
Hour 3	M.F+ B.S	M.F + A.S	A.S + F.S

In the last one hour everyone had one unit each of two different materials as leftovers:

Each leftover item is sold at Re1 less than their cost price. Hence

One unit of milk, mango, and apple will cost ₹4, ₹2, ₹1,

The three possible combinations for the last hour in which raw materials can be sold is :

One unit of milk+ One unit of mango = Rs 4+2 = Rs 6.

One unit of milk+ One unit of apple = Rs 4+1 = Rs 5.

One unit of mango+ One unit of apple = Rs 2+1 = Rs 3.

In the last one hour :

Total sale of Ganga is Rs 30. This is the total cost earned by considering selling the finished items and raw materials :

Hence the possible cases are :

(24 + 6) or (25 + 5) or (27 + 3). It is not possible to earn 25 and 27 by selling finished products.

Hence she earns Rs 24 which is possible by selling one (M.S + F.S) and one raw unit of milk and mango each.

Total sale of Kaveri is Rs 27. This is the total cost earned by considering selling the finished items and raw materials :

Hence the possible cases are :

(21 + 6) or (22+5) or (24+3).

Since Kaveri cannot sell mango smoothies the possible cases are :

(21+6) Selling one apple smoothie and one banana smoothie and one raw unit of Milk and Mango.

(22+5) Selling one Banana smoothie and Fruit Salad, one unit of raw milk, and one unit of Raw Apple.

Total sale for Narmada is Rs 22. The possible cases are :

(16+6), (17+5), (19+3).

Among these, the only possible case is 19 + 3. Selling one unit Mixed Fruit, and one raw unit of Mango and Apple.

Case 1 :

Business Hour	Ganga	Kaveri	Narmada
Hour 1	A.S + F.S/M.S	M.F	M.F + F.S
Hour 2	A.S + B.S	F.S + B.S	A.S + B.S
Hour 3	M.F+ B.S	M.F + A.S	A.S + F.S
Final Hour	M.S+F.S+Milk+Mango	A.S+B.S+Milk+Mango	M.F+Mango+ Apple

case 2 :

Business Hour	Ganga	Kaveri	Narmada
Hour 1	A.S + F.S/M.S	M.F	M.F + F.S
Hour 2	A.S + B.S	F.S + B.S	A.S + B.S
Hour 3	M.F+ B.S	M.F + A.S	A.S + F.S
Final Hour	M.S+F.S+Milk+Mango	F.S+B.S+Milk+Apple	M.F+Mango+ Apple

In both, cases Ganga did not sell any leftover apples. The other options are not necessarily true.

33. **B**

Given that in any hour only either zero or one unit of a single finished product is sold. Hence the price distribution for the first three hours sales distribution is given by :

Business Hour	Ganga	Kaveri	Narmada
Hour 1	11 + 12	19	19+12
Hour 2	11+ 10	12+ 10	11 + 10
Hour 3	19+ 10	19+ 11	11 + 12

Additionally, it has been mentioned that no one except Ganga possibly sold Mango smoothies.

Considering Apple Smoothie : (AS), Mango Smoothie : (M.S), Banana Smoothie : (B. S), Mixed Fruit : (M.F), Fruit Salad : (F.S)

Business Hour	Ganga	Kaveri	Narmada
Hour 1	A.S + F.S/M.S	M.F	M.F + F.S
Hour 2	A.S + B.S	F.S + B.S	A.S + B.S
Hour 3	M.F+ B.S	M.F + A.S	A.S + F.S

In the last one hour everyone had one unit each of two different materials as leftovers:

Each leftover item is sold at Re1 less than their cost price. Hence

One unit of milk, mango, and apple will cost ₹4, ₹2, ₹1,

The three possible combinations for the last hour in which raw materials can be sold is :

One unit of milk+ One unit of mango = Rs 4+2 = Rs 6.

One unit of milk+ One unit of apple = Rs 4+1 = Rs 5.

One unit of mango+ One unit of apple = Rs 2+1 = Rs 3.

In the last one hour :

Total sale of Ganga is Rs 30. This is the total cost earned by considering selling the finished items and raw materials :

Hence the possible cases are :

(24 + 6) or (25 + 5) or (27 + 3). It is not possible to earn 25 and 27 by selling finished products.

Hence she earns Rs 24 which is possible by selling one (M.S + F.S) and one raw unit of milk and mango each.

Total sale of Kaveri is Rs 27. This is the total cost earned by considering selling the finished items and raw materials :

Hence the possible cases are :

(21 + 6) or (22+5) or (24+3).

Since Kaveri cannot sell mango smoothies the possible cases are :

(21+6) Selling one apple smoothie and one banana smoothie and one raw unit of Milk and Mango.

(22+5) Selling one Banana smoothie and Fruit Salad, one unit of raw milk, and one unit of Raw Apple.

Total sale for Narmada is Rs 22. The possible cases are :

(16+6), (17+5), (19+3).

Among these, the only possible case is 19 + 3. Selling one unit Mixed Fruit, and one raw unit of Mango and Apple.

Case 1 :

Business Hour	Ganga	Kaveri	Narmada
Hour 1	A.S + F.S/M.S	M.F	M.F + F.S
Hour 2	A.S + B.S	F.S + B.S	A.S + B.S
Hour 3	M.F+ B.S	M.F + A.S	A.S + F.S
Final Hour	M.S+F.S+Milk+Mango	A.S+B.S+Milk+Mango	M.F+Mango+ Apple

case 2 :

Business Hour	Ganga	Kaveri	Narmada
Hour 1	A.S + F.S/M.S	M.F	M.F + F.S
Hour 2	A.S + B.S	F.S + B.S	A.S + B.S
Hour 3	M.F+ B.S	M.F + A.S	A.S + F.S
Final Hour	M.S+F.S+Milk+Mango	F.S+B.S+Milk+Apple	M.F+Mango+ Apple

In except fruit salad, all the other finished products require one unit of milk :

For case 1: a minimum of 19 units of milk and a maximum of 20 units of milk can be used.

For case 2: a minimum of 18 units of milk and a maximum of 19 units of milk is used

34. **6**

Given that in any hour only either zero or one unit of a single finished product is sold. Hence the price distribution for the first three hours sales distribution is given by :

Business Hour	Ganga	Kaveri	Narmada
Hour 1	11 + 12	19	19+12
Hour 2	11+ 10	12+ 10	11 + 10
Hour 3	19+ 10	19+ 11	11 + 12

Additionally, it has been mentioned that no one except Ganga possibly sold Mango smoothies.

Considering Apple Smoothie : (AS), Mango Smoothie : (M.S), Banana Smoothie : (B. S), Mixed Fruit : (M.F), Fruit Salad : (F.S)

Business Hour	Ganga	Kaveri	Narmada
Hour 1	A.S + F.S/M.S	M.F	M.F + F.S
Hour 2	A.S + B.S	F.S + B.S	A.S + B.S
Hour 3	M.F+ B.S	M.F + A.S	A.S + F.S

In the last one hour everyone had one unit each of two different materials as leftovers:

Each leftover item is sold at Re1 less than their cost price. Hence

One unit of milk, mango, and apple will cost ₹4, ₹2, ₹1,

The three possible combinations for the last hour in which raw materials can be sold is :

One unit of milk+ One unit of mango = Rs 4+2 = Rs 6.

One unit of milk+ One unit of apple = Rs 4+1 = Rs 5.

One unit of mango+ One unit of apple = Rs 2+1 = Rs 3.

In the last one hour :

Total sale of Ganga is Rs 30. This is the total cost earned by considering selling the finished items and raw materials :

Hence the possible cases are :

(24 + 6) or (25 + 5) or (27 + 3). It is not possible to earn 25 and 27 by selling finished products.

Hence she earns Rs 24 which is possible by selling one (M.S + F.S) and one raw unit of milk and mango each.

Total sale of Kaveri is Rs 27. This is the total cost earned by considering selling the finished items and raw materials :

Hence the possible cases are :

(21 + 6) or (22+5) or (24+3).

Since Kaveri cannot sell mango smoothies the possible cases are :

(21+6) Selling one apple smoothie and one banana smoothie and one raw unit of Milk and Mango.

(22+5) Selling one Banana smoothie and Fruit Salad, one unit of raw milk, and one unit of Raw Apple.

Total sale for Narmada is Rs 22. The possible cases are :

(16+6), (17+5), (19+3).

Among these, the only possible case is 19 + 3. Selling one unit Mixed Fruit, and one raw unit of Mango and Apple.

Case 1 :

Business Hour	Ganga	Kaveri	Narmada
Hour 1	A.S + F.S/M.S	M.F	M.F + F.S
Hour 2	A.S + B.S	F.S + B.S	A.S + B.S
Hour 3	M.F+ B.S	M.F + A.S	A.S + F.S
Final Hour	M.S+F.S+Milk+Mango	A.S+B.S+Milk+Mango	M.F+Mango+ Apple

case 2 :

Business Hour	Ganga	Kaveri	Narmada
Hour 1	A.S + F.S/M.S	M.F	M.F + F.S
Hour 2	A.S + B.S	F.S + B.S	A.S + B.S
Hour 3	M.F+ B.S	M.F + A.S	A.S + F.S
Final Hour	M.S+F.S+Milk+Mango	F.S+B.S+Milk+Apple	M.F+Mango+ Apple

3 units of leftover mangoes were available in case 1 and in here a total of 6 apple shakes were sold.

Explanation [35 - 40]:

Since A, B, C are mutual strangers,(B, C)are strangers for A, (A, C) are strangers for B, (A, B) are strangers for C.

Since the total number of strangers+ acquaintances+ friends for any among the 7 is 6.

The number of friends for Amudha is 1, the number of friends for Gowtham is 1.

Using statement 3 Chandran and Gowtham are friends.

Using statement 2: Amudha, Dinesh, and Fani are Ezil's friends. Similarly, Ezil is a friend of Amudha, Dhinesh, and Fani.

Using statement 4 Every friend of Bharatan is an acquaintance of Amudha, and every acquaintance of Amudha is a friend of Bharatan, Hence the number of acquaintances of Bharatan is equal to the number of friends of Amudha.

Using statement 5 Every friend of Amudha is an acquaintance of Bharatan, and every acquaintance Bharatan is a friend of Amudha, Hence the number of acquaintances of Amudha is equal to the number of friends of Bharatan.

Hence Bharatan has one friend, 1 Acquaintance, 4 strangers.

For Amudha we are yet to find a relationship with Dhinesh, Fani, and Gowtham. Any among the three can be the stranger for Amudha, considering the three different cases.

Case 1 :

Considering Fani as an acquaintance of Amudha, then Dhinesh and Gowtham are strangers to Amudha.

Every acquaintance of Amudha is a friend of Bharathan and since the friend and acquaintance of Bharatan are known the strangers are found for Bharatan.

Fani is an acquaintance of Amudha, hence Amudha is an Acquaintance of Fani, Fani is a friend of Bharathan and hence Bharathan is a friend of Fani. But Fani has only one friend and Ezhil is already a friend of Fani.

Hence this case fails.

	No of friends	No of Acquaintances	No of Strangers
Amudha	1, (E)	1, (F)	4 (B, C, D, G)
Bharatan	1, (F)	1, (E)	4, (A, C, D, G)
Chandran	G	1	(A, B)
Dhinesh	E		2
Ezhil	A, D, F		1
Fani	1 (E)		
Gowtham	1 (C)	3	2

Case 2 :

Considering Gowtham as an acquaintance of Amudha, then Dhinesh and Fani are strangers to Amudha.

Every acquaintance of Amudha is a friend of Bharathan and since the friend and acquaintance of Bharatan are known the strangers are found for Bharatan.Since Gowtham is a friend of Bharatan, Bharatan must be a friend of Gowtham. But Gowtham can only have one friend and it already mentioned that Chandran is a friend of Gowtham and hence this case fails.

	No of friends	No of Acquaintances	No of Strangers
Amudha	1, (E)	1 (G)	4 (B, C, D, F)
Bharatan	1, (G)	1, (E)	4, (A, C, D, F)
Chandran	G	1	(A, B)
Dhinesh	E		2
Ezhil	A, D, F		1
Fani	1 (E)		
Gowtham	1 (C)	3	2

Case 3 :

Considering Dhinesh as an acquaintance of Amudha, then Fani and Gowtham are strangers to Amudha.

Every acquaintance of Amudha is a friend of Bharathan and since the friend and acquaintance of Bharatan are known the strangers are found for Bharatan.

Since Fani, Gowtham are strangers to Amudha, Bharatan. Amudha, Bharatan are strangers to Fani, Gowtham.

The 2 strangers to Gowtham and his only friend are known. Hence his three acquaintances are (Dhinesh, Ezhil, Fani).

Hence Gowtham is an acquaintance of Dhinesh, Ezhil, and Fani.

Dhinesh is an acquaintance of Amudha and hence Amudha must be an acquaintance of Dhinesh.

Dhinesh is a friend of Bharatan and hence Bharatan is a friend of Dhinesh.

	No of friends	No of Acquaintances	No of Strangers
Amudha	1, (E)	1 (D)	4 (B, C, F, G))
Bharatan	1, (D)	1, (E)	4, (A, C, F, G)
Chandran	G	1	(A, B)
Dhinesh	E, B	G, A	2
Ezhil	A, D, F	G	1
Fani	1 (E)	G	A, B
Gowtham	1 (C)	3 (D, E, F)	2 (A, B)

Ezhil is an acquaintance of Bharatan and hence Bharatan is an acquaintance of Ezhil. The only stranger to Ezhil who is left is Chandran. Hence Ezhil is a stranger to Chandran.

The two strangers to Dhinesh who are left are Chandran and Fani. Chandran is a stranger to Dhinesh and hence Dhinesh is a stranger to Chandran.

The only acquaintance of Chandran who is left is Fani.

The remaining relationships with Fani are Dhinesh and Chandran. Dhinesh is a stranger to Fani and Chandran is an acquaintance of Fani.

	No of friends	No of Acquaintances	No of Strangers
Amudha	1, (E)	1 (D)	4, (B, C, F, G))
Bharatan	1, (D)	1, (E)	4, (A, C, F, G)
Chandran	1, (G)	1 (F)	4, (A, B, E, D)
Dhinesh	2, (E, B)	2, (G, A)	2, (C, F)
Ezhil	3, (A, D, F)	2, (G, B)	1, (C).
Fani	1 (E)	2, (G, C)	3, (A, B, D)
Gowtham	1 (C)	3 (D, E, F)	2, (A, B)

35. **A**

Gowtham's Acquaintances are Ghinesh, Ezhil, Fani.

36. **D**

In the given options Bharatan and Ezhil are Acauaintances, Fani and Gowtham are acquaintances.

37. **A**

Dhinesh is an acquaintance of Amudha

38. **B**

Fani is an acquaintance of Chandran

39. **3**

Ezhil has a total of 3 friends.

40. **4**

Ezhil has Amudha, Dhinesh, Fani as his friends. Dinesh has Bharatan as his friend. Hence a total of 4 (Amudha, Bharatan, Dhinesh, and Fani) are his friends or friend of a friend

41. **C**

The total sales from products in the office supply category in 2019 is :

Sum of sales of :

Binders: 3.6 million

Art : 0.4 million.

Appliances: 1.9 million

Envelops: 0.3 million

Fasteners: 0.1 million

Labels: 0.2 million

Paper = 1.5 million.

Storage: 4.3 million.

Supplies: 1.1 million.

The sum of sales of these products = 3.6+0.4+1.9+0.3+0.1+0.2+1.5+4.3+1.1 = 13.4 million.

The closest among the option is 13.5 million.

42. **B**

The percentage increase in sales in the furniture category from 2019 to 2020 are :

Bookcases: 1.9 million in 2019 and 2.2 million in 2020.

Chairs: 6.2 million in 2019 and 7 million in 2020.

Furnishings: 2.05 million in 2019 and 2.1 million in 2020.

Tables: 4.4 million in 2019 and 4.5 million in 2020.

Hence the percentage increase is given by :

$\frac{((2.2+7+2.1+4.5)-(1.9+6.2+2.05+4.4))}{1.9+6.2+2.05+4.4}$

$\frac{(15.8-14.55)}{14.55} \cdot 100 = \frac{125}{14.55} = 8.53\%$

43. **1**

The number of subcategories had sales of ₹ 4 million or more in 2019 and registered an increase in sales in excess of 25% in 2020 :

The subcategories with more than 4 million in sales in 2019 are :

Chairs: 6.2 million in 2019 and 7 million in 2020. (For a 25 percent increase the sales must be at least 7.8 million and hence fails)

Tables: 4.4 million in 2019 and 4.5 million in 2020. (For a 25 percent increase the sales must be at least 5.5 million and hence fails)

Storage: 4.3 million sales in 2019 and 5.1 million in 2020. (For a 25 percent increase the sales must be at least 5.4 and hence fails)

Phones: 5.75 million in 2019 and 7.5 million in 2020. (An increase of 30.5 percent)

Hence only one subcategory satisfies the condition.

44. **A**

The improvement index for a category is the maximum percentage increase in sales from 2019 to 2020 among any of its subcategories.

Hence based on the information provided in the tabular data we need to look for the different subcategories where the rise in sales from 2019 to 2020 is higher.

Based on the visual data :

In the furniture category :

Bookcases and Chairs have a relatively high percentage increase :

Books cases: 1.9 million to 2.2 million (15.7 percent increase)

Chairs: 6.2 million to 7 million (12.9 percent increase)

In the office supply category :

Binders and Appliances have a relatively high percentage increase :

Binders: 3.6 million to 5.3 million (47 percent increase)

Appliances: 1.9 million to 3.15 million (65.7 percent increase)

In technology product category :

Accessories: 3.1 to 4.4 million. (41.9 percent increase)

Phones: 5.8 million to 7.7 million (32.7 percent increase)

Hence among the categories :

The highest increase among them is in the order :

Furniture < Technology product < office supply.