DIRECTIONS for the question: *The four sentences (labelled 1,2,3 and 4) given in this question, when properly sequenced, from a coherent paragraph. Decide on the proper order for the sentence and key in this sequence of four numbers as your answer.*

Question No. : 22

1. In the central nervous systems of other animal species, such a comprehensive regeneration of neurons has not yet been proven beyond doubt.
2. Biologists from the University of Bayreuth have discovered a uniquely rapid form of regeneration in injured neurons and their function in the central nervous system of zebrafish.
3. They studied the Mauthner cells, which are solely responsible for the escape behaviour of the fish, and previously regarded as incapable of regeneration.
4. However, their ability to regenerate crucially depends on the location of the injury.

A) 2341 B) C) D)

Explanation:-
Sentence 2 is a standalone complete and introductory sentence. 'They' is sentence 3 refers to Biologists mentioned in '2'.Sentence 4 lists the specific aspect and Statement 1 aptly sums up the discussion.

DIRECTIONS for the question: *The four sentences (labelled 1,2,3 and 4) given in this question, when properly sequenced, from a coherent paragraph. Decide on the proper order for the sentence and key in this sequence of four numbers as your answer.*

Question No. : 23

1. A popular response is the exhortation to plant more trees.
2. It seems all but certain that global warming will go well above two degrees—quite how high no one knows yet.
3. Burning them releases it, which is why the scale of forest fires in the Amazon basin last year garnered headlines.
4. This is because trees sequester carbon by absorbing carbon dioxide.

A) 2143 B) C) D)

Explanation:-
Statement 2 raises a concern. Statement 1 lists a popular response to counter 'global warming'. Sentence 4 explains the mechanism. 'It' in Sentence 3 refers to carbon mentioned in statement 4.

DIRECTIONS for the question: *The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.*

Question No. : 24

Foreign peacekeepers often exist in a bubble in the poor countries in which they are deployed; they live in posh compounds, drive fancy vehicles, and distance themselves from locals. This may be partially justified as they are outsiders, living in constant fear, performing a job that is emotionally draining. But they are often despised by the locals, and many would like them to leave. A better solution would be bottom-up peace building, which would involve their spending more time working with communities, understanding their grievances and earning their trust, rather than only meeting government officials.

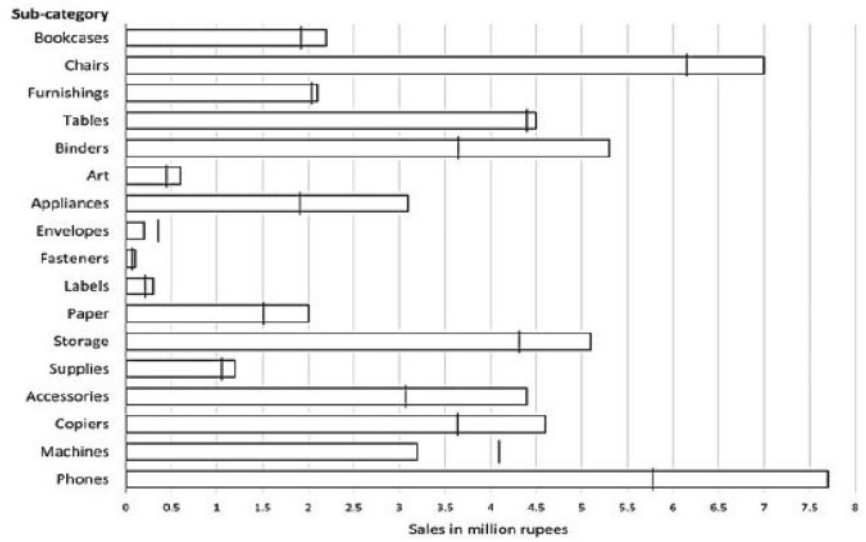
A) The environment in poor countries has tended to make foreign peacekeeping forces live in enclaves, but it is time to change this scenario.
B) Extravagant lifestyles and an aloof attitude among the foreigners working as peacekeepers in poor countries have justifiably make them the target of local anger.
C) Peacekeeping duties would be more effectively performed by local residents given their better understanding, knowledge and rapport with their own communities.
✓D) Peacekeeping forces in foreign countries have tended to be aloof for valid

Explanation:-
Option A is wrong as it shifts the onus on the 'environment' and hampers the need to mix up and listen to the grievance of the locals. Option B is wrong as this has not been stated as the reason for foreign peacekeepers being despised by the locals. Option C is wrong as the passage states that –"their spending more time working with communities, understanding their grievances and earning their trust, rather than only meeting government officials."
Their refers to the foreign peacekeepers and not locals.

Section : DI & Reasoning

DIRECTIONS for the question: *Analyse the graph/s given below and answer the question that follows.*

Question No. : 25



The horizontal bars in the above diagram represent 2020 aggregate sales (in ₹ million) of accompany 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.

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

A) 18.0 B) 12.5 C) 16.5 ✓D) 13.5

Explanation:- *Total sales in 2019 of office supply*
= 3.65 + 0.4 + 1.8 + 0.3 + 0.1 + 0.3 + 1.5 + 4.3 + 1.1 = 13.5 million

Question No. : 26

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

A) 20% B) 1% ✓C) 8% D) 25%

Explanation:- *Sales of Furniture in 2019 = 1.9 + 6.2 + 2.0 + 4.4 = 14.5 million*
Sales of furniture in 2020 = 22 + 70 + 201 + 45 = 15.8 million

$$\% \text{ increase} = \frac{15.8-14.5}{14.5} = 100$$

$$= \frac{1.3}{14.5} \times 100 = 8\%$$

Question No. : 27

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

A) 1 B) C) D)

Explanation:- *By Visualisation*
The increase should be 1/4 of Bar
It is only of Phones. Hence only 1

Question No. : 28

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) technology, furniture, office supply B) office supply, furniture, technology C) office supply, technology, furniture
✓D) furniture, technology, office supply

Explanation:- *In Technology*
The improvement index is for
Accessories and is $\frac{4.4-3.1}{3.1}\times 100 = 41\%$
In Furniture improvement index is
For book case and is $\frac{2.2-1.9}{1.9}\times 100 = 15\%$
In office supply improvement index is for
Appliance and is $\frac{3.2-1.8}{1.8}\times 100 = 77\%$
Hence order is Furniture technology office supply

DIRECTIONS for the question: *Go through the graph and the information given below and answer the question that follows.*

Question No. : 29

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 I

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 II

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.

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

A) Exactly 2 B) Either 0 or 1 or 2 ✓C) Either 1 or 2 D) Exactly 1

Explanation:- *As per information following are SP of finished product (will be represented by (a, b, c, d, e)*

a	Mango smoothie	12
b	Apple smoothie	11
c	Banana smoothie	10
d	Mix fruit smoothie	19
e	Fruit salad	12

Now following are possible product sale of each of them in every hour and in last hour sale of left over and product in shown

	Ganga	Kavari	Narmada
Hour 1	a/b or e/b	b/d	d/e
Hour 2	b/c	(a/c) or (e/c)	b/c
Hour 3	c/d	b/d	a/b or e/b
Hour 4	Left over milk + mango sold a/e	Case 1: (2+1) Sold a/c Case 2: (4+1) sold a/c or e/c	Left over mango+apple (2+1) sold (d)

As shown fruit salad is represented by e. So it could be 1 or 2.

Question No. : 30

Which of the following is NECESSARILY true?

A) Narmada sold one unit of leftover milk. B) Ganga did not sell any leftover mangoes.
✓C) Ganga did not sell any leftover apples. D) Kaveri sold one unit of leftover mangoes

Explanation:- *As per information following are SP of finished product (will be represented by (a, b, c, d, e)*

a	Mango smoothie	12
b	Apple smoothie	11
c	Banana smoothie	10
d	Mix fruit smoothie	19
e	Fruit salad	12

Now following are possible product sale of each of them in every hour and in last hour sale of left over and product in shown

	Ganga	Kavari	Narmada
Hour 1	a/b or e/b	b/d	d/e
Hour 2	b/c	(a/c) or (e/c)	b/c
Hour 3	c/d	b/d	a/b or e/b
Hour 4	Left over milk + mango sold a/e	Case 1: (2+1) Sold a/c Case 2: (4+1) sold a/c or e/c	Left over mango+apple (2+1) sold (d)

As shown Ganga sold only left over milk and Mango not Apple. Hence option 3 is true.

Question No. : 31

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

A) Either 17 or 18 or 19 units. B) Either 19 or 20 units. C) Either 18 or 19 units. ✓D) Either 18 or 19 or 20 units.

Explanation:- *As per information following are SP of finished product (will be represented by (a, b, c, d, e)*

a	Mango smoothie	12
b	Apple smoothie	11
c	Banana smoothie	10
d	Mix fruit smoothie	19
e	Fruit salad	12

Now following are possible product sale of each of them in every hour and in last hour sale of left over and product in shown

	Ganga	Kavari	Narmada
Hour 1	a/b or e/b	b/d	d/e
Hour 2	b/c	(a/c) or (e/c)	b/c
Hour 3	c/d	b/d	a/b or e/b
Hour 4	Left over milk + mango sold a/e	Case 1: (2+1) Sold a/c Case 2: (4+1) sold a/c or e/c	Left over mango+apple (2+1) sold (d)

As shown it is 18 or 19 or 20

Question No. : 32

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?

A) 6 B) C) D)

Explanation:- *As per information following are SP of finished product (will be represented by (a, b, c, d, e)*

a	Mango smoothie	12
b	Apple smoothie	11
c	Banana smoothie	10
d	Mix fruit smoothie	19
e	Fruit salad	12

Now following are possible product sale of each of them in every hour and in last hour sale of left over and product in shown

	Ganga	Kavari	Narmada
Hour 1	a/b or e/b	b/d	d/e
Hour 2	b/c	(a/c) or (e/c)	b/c
Hour 3	c/d	b/d	a/b or e/b
Hour 4	Left over milk + mango sold a/e	Case 1: (2+1) Sold a/c Case 2: (4+1) sold a/c or e/c	Left over mango+apple (2+1) sold (d)

It means each of them sold 1 left over Mango. So we have to count Apple smoothie i.e. b
So 2 + 2 + 2 = 6 is the answer

DIRECTIONS for the question: *Read the information given below and answer the question that follows.*

Question No. : 33

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.

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

A) 3, 1, 1, 3 B) 1, 3, 3, 1 ✓C) 1, 2, 2, 3 D) 1, 2, 2, 1

Explanation:-
Before drawing the table following Summarization should be done

Authors (eight) : A,B,C,D,E,F,G,H
Research paper (18) : 5 in Jan, 5 in April, 4 in July, 4 in Oct.
Also ratio of (A,D,G,H) to B,C,E,F) is 2:1
So, A,D,E,G must have published total 12 and BCEF total 6 papers

Further no one can publish more than 3 papers, so A,D,E,H each must have published 3 each .
Now B,C,E,F could have published 3, 1, 1, 1 or 2, 2, 1, 1 in any order.
According to point 6 both C and E have published same number and for 2 months.
So C and E have published 2 each and B and F 1 each respectively.
So whole points are summarized in following table.

Authors	No. of Papers	Everyday	Area	Months
A	3	Indian	Automation	Jan, April, July
B	1	Indian	Logistics	April
C	2	Chinese	Manufacturing	Jan, Oct
D	3	Japanese	Manufacturing	Jan, April, Oct
E	2	Chinese	Logistics	April, July
F	1	Indian	Logistics	Oct.
G	3	Indian	Automation	Jan, July, Oct
H	3	Japanese	Logistics	Jan, April, July

As shown it is 1,2,2,3

Question No. : 34

How many papers were written by Indian authors?

A) 8 B) C) D)

Explanation:-
Before drawing the table following Summarization should be done

Authors (eight) : A,B,C,D,E,F,G,H
Research paper (18) : 5 in Jan, 5 in April, 4 in July, 4 in Oct.
Also ratio of (A,D,G,H) to B,C,E,F) is 2:1
So, A,D,E,G must have published total 12 and BCEF total 6 papers

Further no one can publish more than 3 papers, so A,D,E,H each must have published 3 each .
Now B,C,E,F could have published 3, 1, 1, 1 or 2, 2, 1, 1 in any order.
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C	2	Chinese	Manufacturing	Jan, Oct
D	3	Japanese	Manufacturing	Jan, April, Oct
E	2	Chinese	Logistics	April, July
F	1	Indian	Logistics	Oct.
G	3	Indian	Automation	Jan, July, Oct
H	3	Japanese	Logistics	Jan, April, July

Total papers by Indian Authors are 3 + 1 + 1 + 3 = 8

Question No. : 35

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) Neither of the statements ✓C) Only Statement A D) Only Statement B

Explanation:-
Before drawing the table following Summarization should be done

Authors (eight) : A,B,C,D,E,F,G,H
Research paper (18) : 5 in Jan, 5 in April, 4 in July, 4 in Oct.
Also ratio of (A,D,G,H) to B,C,E,F) is 2:1
So, A,D,E,G must have published total 12 and BCEF total 6 papers

Further no one can publish more than 3 papers, so A,D,E,H each must have published 3 each .
Now B,C,E,F could have published 3, 1, 1, 1 or 2, 2, 1, 1 in any order.
According to point 6 both C and E have published same number and for 2 months.
So C and E have published 2 each and B and F 1 each respectively.
So whole points are summarized in following table.

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B	1	Indian	Logistics	April
C	2	Chinese	Manufacturing	Jan, Oct
D	3	Japanese	Manufacturing	Jan, April, Oct
E	2	Chinese	Logistics	April, July
F	1	Indian	Logistics	Oct.
G	3	Indian	Automation	Jan, July, Oct
H	3	Japanese	Logistics	Jan, April, July

Only option A is true

Question No. : 36

Which of the following statements is FALSE?

✓A) Every issue had exactly two papers by authors from Logistics area.
B) Every issue had at least one paper by author(s) from Automation area.
C) Every issue had exactly two papers by Indian authors D) Every issue had exactly one paper by a Chinese author

Explanation:-
Before drawing the table following Summarization should be done

Authors (eight) : A,B,C,D,E,F,G,H
Research paper (18) : 5 in Jan, 5 in April, 4 in July, 4 in Oct.
Also ratio of (A,D,G,H) to B,C,E,F) is 2:1
So, A,D,E,G must have published total 12 and BCEF total 6 papers

Further no one can publish more than 3 papers, so A,D,E,H each must have published 3 each .
Now B,C,E,F could have published 3, 1, 1, 1 or 2, 2, 1, 1 in any order.
According to point 6 both C and E have published same number and for 2 months.
So C and E have published 2 each and B and F 1 each respectively.
So whole points are summarized in following table.

Authors	No. of Papers	Everyday	Area	Months
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B	1	Indian	Logistics	April
C	2	Chinese	Manufacturing	Jan, Oct
D	3	Japanese	Manufacturing	Jan, April, Oct
E	2	Chinese	Logistics	April, July
F	1	Indian	Logistics	Oct.
G	3	Indian	Automation	Jan, July, Oct
H	3	Japanese	Logistics	Jan, April, July

Option 1 is false

Question No. : 37

Which of the following statements is FALSE?

A) There were exactly two papers by authors from Manufacturing area in the January issue.
B) There were exactly two papers by authors from Manufacturing area in the July issue.
C) There was exactly one paper by an author from Logistics area in the October issue.
D) There was exactly one paper by an author from Manufacturing area in the April issue

Explanation:-
Before drawing the table following Summarization should be done

Authors (eight) : A,B,C,D,E,F,G,H
Research paper (18) : 5 in Jan, 5 in April, 4 in July, 4 in Oct.
Also ratio of (A,D,G,H) to B,C,E,F) is 2:1
So, A,D,E,G must have published total 12 and BCEF total 6 papers

Further no one can publish more than 3 papers, so A,D,E,H each must have published 3 each .
Now B,C,E,F could have published 3, 1, 1, 1 or 2, 2, 1, 1 in any order.
According to point 6 both C and E have published same number and for 2 months.
So C and E have published 2 each and B and F 1 each respectively.
So whole points are summarized in following table.

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C	2	Chinese	Manufacturing	Jan, Oct
D	3	Japanese	Manufacturing	Jan, April, Oct
E	2	Chinese	Logistics	April, July
F	1	Indian	Logistics	Oct.
G	3	Indian	Automation	Jan, July, Oct
H	3	Japanese	Logistics	Jan, April, July

Option 2 is false

Question No. : 38

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

Explanation:-
Before drawing the table following Summarization should be done

Authors (eight) : A,B,C,D,E,F,G,H
Research paper (18) : 5 in Jan, 5 in April, 4 in July, 4 in Oct.
Also ratio of (A,D,G,H) to B,C,E,F) is 2:1
So, A,D,E,G must have published total 12 and BCEF total 6 papers

Further no one can publish more than 3 papers, so A,D,E,H each must have published 3 each .
Now B,C,E,F could have published 3, 1, 1, 1 or 2, 2, 1, 1 in any order.
According to point 6 both C and E have published same number and for 2 months.
So C and E have published 2 each and B and F 1 each respectively.
So whole points are summarized in following table.

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C	2	Chinese	Manufacturing	Jan, Oct
D	3	Japanese	Manufacturing	Jan, April, Oct
E	2	Chinese	Logistics	April, July
F	1	Indian	Logistics	Oct.
G	3	Indian	Automation	Jan, July, Oct
H	3	Japanese	Logistics	Jan, April, July

Papers by Authors from Automation are 3 + 3 = 6
BY Manufacturing are 2 + 3 = 5
By Logistics are 1 + 2 + 1 + 3 = 7
Hence option 1 is the answer

DIRECTIONS for the question: *Study the following information carefully and answer the given question.*

Question No. : 39

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.

Who are Gowtham's acquaintances?

A) Bharatan, Dhinesh and Ezhil ✓B) Dhinesh, Ezhil and Fani C) Amudha, Dhinesh and Fani
D) Amudha, Bharatan and Fani

Explanation:-
Before solving we have to understand the following :
(i) Each one will have total 6 relation (Friend, Acquaintances, strangers). So in first row for Amudha number of friends are 6 -(1+4) = 6.5 = 1.

Similarly for Gowtham the number of friends for Gowtham are also 6-(2 + 3) = 6-5= 1
(ii) The best way of solving is by Grid e.g. if C and G are friends we write in intersection of C and G as Fr and intersection of G and C also Fr

Proceeding in this way we will conclude the whose information in following Grid:

.	A	B	C	D	E	F	G
A	X	S	S	Ac	Fr	S	S
B	S	X	S	Fr	Ac	S	S
C	S	S	X	S	S	Ac	Fr
D	Ac	Fr	S	X	Fr	S	Ac
E	Fr	Ac	S	Fr	X	Fr	Ac
F	S	S	Ac	Ac	Fr	X	Ac
G	S	S	Fr	Ac	Ac	Ac	X

As shown Gowtham's Acquaintances are Dhinesh, Ezhil and Fani

Question No. : 40

Which of these pairs share the same type of relationship?

✓A) (Bharatan, Ezhil) and (Fani, Gowtham) B) (Amudha, Gowtham) and (Ezhil, Fani)
C) (Chandran, Ezhil) and (Dhinesh, Gowtham) D) (Bharatan, Chandran) and (Dhinesh, Ezhil)

Explanation:-
Before solving we have to understand the following :
(i) Each one will have total 6 relation (Friend, Acquaintances, strangers). So in first row for Amudha number of friends are 6 -(1+4) = 6.5 = 1.

Similarly for Gowtham the number of friends for Gowtham are also 6-(2 + 3) = 6-5= 1
(ii) The best way of solving is by Grid e.g. if C and G are friends we write in intersection of C and G as Fr and intersection of G and C also Fr

Proceeding in this way we will conclude the whose information in following Grid:

.	A	B	C	D	E	F	G
A	X	S	S	Ac	Fr	S	S
B	S	X	S	Fr	Ac	S	S
C	S	S	X	S	S	Ac	Fr
D	Ac	Fr	S	X	Fr	S	Ac
E	Fr	Ac	S	Fr	X	Fr	Ac
F	S	S	Ac	Ac	Fr	X	Ac
G	S	S	Fr	Ac	Ac	Ac	X

As in option 1 both pairs above same relation of Acquaintance. Hence the Answer

Question No. : 41

Who is an acquaintance of Amudha?

A) Fani B) Ezhil ✓C) Dhinesh D) Gowtham

Explanation:-
Before solving we have to understand the following :
(i) Each one will have total 6 relation (Friend, Acquaintances, strangers). So in first row for Amudha number of friends are 6 -(1+4) = 6.5 = 1.

Similarly for Gowtham the number of friends for Gowtham are also 6-(2 + 3) = 6-5= 1
(ii) The best way of solving is by Grid e.g. if C and G are friends we write in intersection of C and G as Fr and intersection of G and C also Fr

Proceeding in this way we will conclude the whose information in following Grid:

.	A	B	C	D	E	F	G
A	X	S	S	Ac	Fr	S	S
B	S	X	S	Fr	Ac	S	S
C	S	S	X	S	S	Ac	Fr
D	Ac	Fr	S	X	Fr	S	Ac
E	Fr	Ac	S	Fr	X	Fr	Ac
F	S	S	Ac	Ac	Fr	X	Ac
G	S	S	Fr	Ac	Ac	Ac	X

As shown it is Dhinesh

Question No. : 42

Who is an acquaintance of Chandran?

✓A) Fani B) Ezhil C) Dhinesh D) Bharatan

Explanation:-
Before solving we have to understand the following :
(i) Each one will have total 6 relation (Friend, Acquaintances, strangers). So in first row for Amudha number of friends are 6 -(1+4) = 6.5 = 1.

Similarly for Gowtham the number of friends for Gowtham are also 6-(2 + 3) = 6-5= 1
(ii) The best way of solving is by Grid e.g. if C and G are friends we write in intersection of C and G as Fr and intersection of G and C also Fr

Proceeding in this way we will conclude the whose information in following Grid:

.	A	B	C	D	E	F	G
A	X	S	S	Ac	Fr	S	S
B	S	X	S	Fr	Ac	S	S
C	S	S	X	S	S	Ac	Fr
D	Ac	Fr	S	X	Fr	S	Ac
E	Fr	Ac	S	Fr	X	Fr	Ac
F	S	S	Ac	Ac	Fr	X	Ac
G	S	S	Fr	Ac	Ac	Ac	X

As shown it is Fani

Question No. : 43

How many friends does Ezhil have?

A) 3 B) C) D)

Explanation:-
Before solving we have to understand the following :
(i) Each one will have total 6 relation (Friend, Acquaintances, strangers). So in first row for Amudha number of friends are 6 -(1+4) = 6.5 = 1.

Similarly for Gowtham the number of friends for Gowtham are also 6-(2 + 3) = 6-5= 1
(ii) The best way of solving is by Grid e.g. if C and G are friends we write in intersection of C and G as Fr and intersection of G and C also Fr

Proceeding in this way we will conclude the whose information in following Grid:

.	A	B	C	D	E	F	G
A	X	S	S	Ac	Fr	S	S
B	S	X	S	Fr	Ac	S	S
C	S	S	X	S	S	Ac	Fr
D	Ac	Fr	S	X	Fr	S	Ac
E	Fr	Ac	S	Fr	X	Fr	Ac
F	S	S	Ac	Ac	Fr	X	Ac
G	S	S	Fr	Ac	Ac	Ac	X

As shown 3 Friends

Question No. : 44

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

A) 4 B) C) D)

Explanation:-
Before solving we have to understand the following :
(i) Each one will have total 6 relation (Friend, Acquaintances, strangers). So in first row for Amudha number of friends are 6 -(1+4) = 6.5 = 1.

Similarly for Gowtham the number of friends for Gowtham are also 6-(2 + 3) = 6-5= 1
(ii) The best way of solving is by Grid e.g. if C and G are friends we write in intersection of C and G as Fr and intersection of G and C also Fr

Proceeding in this way we will conclude the whose information in following Grid:

.	A	B	C	D	E	F	G
A	X	S	S	Ac	Fr	S	S
B	S	X	S	Fr	Ac	S	S
C	S	S	X	S	S	Ac	Fr
D	Ac	Fr	S	X	Fr	S	Ac
E	Fr	Ac	S	Fr	X	Fr	Ac
F	S	S	Ac	Ac	Fr	X	Ac
G	S	S	Fr	Ac	Ac	Ac	X

Friends are Amudha, Dhinesh and Fani. Also Dhani's friend Bhartan. So 4 is answer

Section : Quantitative Ability

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 45

The strength of an indigo solution in percentage is equal to the amount of indigo in grams per 100 cc of water. Two 800 cc bottles are filled with indigo solutions of strengths 33% and 17%, respectively. A part of the solution from the first bottle is thrown away and replaced by an equal volume of the solution from the second bottle. If the strength of the indigo solution in the first bottle has now changed to21% then the volume, in cc, of the solution left in the second bottle is

A) 200 B) C) D)

Explanation:- *Indigo in 1st bottle = 33% of 800 = 264gm*
Indigo in 2nd bottle = 17% of 800 = 136gm
New Indigo in 1st bottle = 21% of 800 = 168gm
Reduction in Indigo = 264 - 168 = 96gm
Now per 100cc reduction (if 100 cc are thrown form 1st bottle and replaced from 2nd bottle = 33 - 17 = 16gm
$\therefore$ solution transferred from 2nd bottle $= \frac{96}{16} \times 100 = 600$ cc
$\therefore$ *solution left in 2nd bottle = 800 - 600 = 200cc*

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 46

How many three-digit numbers are greater than 100 and increase by 198 when the three digits are arranged in the reverse order?

A) 70 B) C) D)

Explanation:- *Let digit at unit place = a*
Ten's place = b
Hundred's place = c
∴ Number = 100c + 10 b + a
On reversing number = 100a + 10b + c
∴ (100a + 10b+c) - (100c + 10 b + a) = 198
99a - 99c = 198
⇒ a-c = 2
Now (a,c) can have seven combination i.e. (3,1) (4, 2) (5,3) (6,4) (7,5) (8,6) (9,7) and b can take 10 values (0 to 9)
∴ 7 × 10 = 70 are possible three digits numbers

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 47

The amount Neeta and Geeta together earn in a day equals what Sita alone earns in 6days. The amount Sita and Neeta together earn in a day equals what Geeta alone earns in 2 days. The ratio of the daily earnings of the one who earns the most to that of the one who earns the least is

A) 7 : 3 B) 11 : 7 ✓C) 11 : 3 D) 3 : 2

Explanation:- *(Neeta + Geeta) : Sita = 6 : 1*

$\text{Means Sita} = \frac{1}{7}th \text{ of total}$

(Sita + Neeta) : Geeta = 2: 1

$\text{Means Geeta} = \frac{1}{3}rd \text{ of total}$

$\text{So Neeta} = 1-\frac{1}{7}-\frac{1}{3}$

$\frac{21-3-7}{21}=\frac{11}{21}$

$\therefore \text{Highest to lowest ratio} = \frac{11}{21}\,\frac{7}{7}$

$= \frac{11:3}{21} = 11:3$

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 48

Anu, Vinu and Manu can complete a work alone in 15 days, 12 days and 20 days, respectively. Vinu works everyday. Anu works only on alternate days starting from the first day while Manu works only on alternate days starting from the second day. Then, the number of days needed to complete the work is

A) 6 ✓B) 7 C) 8 D) 5

Explanation:- *Let total work = 60 units*

$\therefore$ Anu can do $\frac{60}{15} = 4$ units/day

Vinu can do $\frac{60}{12} = 5$ units/day

Manu can do $\frac{60}{20} = 3$ units/day

1st day work = (4+5) = 9 units
2nd day work = (5+3) = 8 units
$\therefore$ work done in 2 days= 9 + 8 = 17 units
Work done in 6 days = 17 × 3 = 51 units
So remaining 60-51 = 9 units are done in 7th day

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 49

If $x_0 = 1$, $x_1 = 2$, and $x_{n+2} = \frac{1 + x_{n+1}}{x_n}$, $n = 0, 1, 2, 3\ldots\ldots$, then x_{2021} is equal to

✓A) 2 B) 1 C) 4 D) 3

Explanation:- *$x_0 = 1$*
$x_1 = 2$

$As\ x_{n+2} = \frac{1+2n+1}{xn}$

$\therefore x_2 = \frac{1+x_1}{x_0} = \frac{1+2}{1} = 3$

$x_3 = \frac{1+x_2}{x_1} = \frac{1+3}{2} = 2$

$x_4 = \frac{1+x_3}{x_2} = \frac{1+2}{3} = 1$

So sequence become (1,2,3, 2,1) and it states replacing from x_5.
$\therefore$ x_{2021} which will be 2022nd term will be 2nd term i.e. 2

DIRECTIONS for the question *: Solve the following question and mark the best possible option.*

Question No. : 50

If $5-\log_{10}\sqrt{1+x}+4\log_{10}\sqrt{1-x}=\log_{10}\frac{1}{\sqrt{1-x^2}}$, then 100x equals

A) 99 B) C) D)

Explanation:-

$$5-\log_{10}\sqrt{1+x}+4\log_{10}\sqrt{1-x}=\log_{10}\frac{1}{\sqrt{1-x^2}}$$

$$\log 100000-\log\sqrt{1+x}+\log\left(\sqrt{1-x}\right)^4=\log\frac{1}{\sqrt{1-x^2}}$$

$$\log\left[\frac{100000\times\left(\sqrt{1-x}\right)^4}{\sqrt{1+x}}\right]=\log\frac{1}{\sqrt{1-x^2}}$$

$$\frac{100000\left(\sqrt{1-x}\right)^4}{\sqrt{1+x}}=\frac{1}{\sqrt{1+x}\sqrt{1-x}}$$

$$\frac{100000}{1}\left(\sqrt{1-x}\right)^4=\frac{1}{\left(\sqrt{1-x}\right)}$$

$$\Rightarrow\left(\sqrt{1-x}\right)^5=10^{-5}$$

$$\sqrt{1-x}=10^7$$

$$1-x=\frac{1}{100}$$

$$\Rightarrow x=\frac{99}{100}$$

$$\therefore 100x=\frac{99}{100}\times 100=99$$

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 51

Suppose hospital A admitted 21 less Covid infected patients than hospital B, and all eventually recovered. The sum of recovery days for patients in hospitals A and B were 200 and 152, respectively. If the average recovery days for patients admitted in hospital A was 3 more than the average in hospital B then the number admitted in hospital A was

A) 35 B) C) D)

Explanation:- *Let patient in hospital B = x*
Patient in hospital A = x - 21
Patient/day in B = B
Patient/day in A= B+3
According to question
xB = 152
(x-21) (B+3) = 200

$$B=\frac{152}{x}$$

$$(x-21)\left(\frac{152}{x}+3\right)=200$$

$152x - 3192 + 3x^2 + 630 = 200x$
$3x^2 - 11x - 3192 = 0$
$x^2 - 37x - 1064 = 0$
$(x-56)(x+19) = 0$
$\Rightarrow x = 56$
So patient in A = x - 21
= 56 - 21 = 35

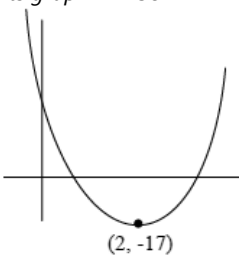
DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 52

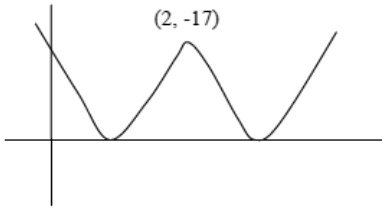
If r a constant such that $|x^2 - 4x - 13| = r$ has exactly three distinct real roots, then the value of r is

✓A) 17 B) 18 C) 15 D) 21

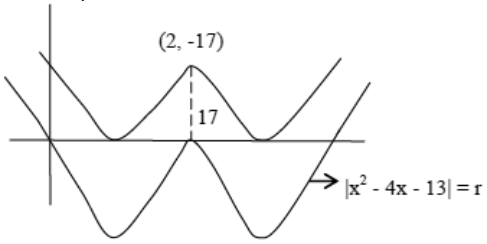
Explanation:- *Here $|x^2 - 4x - 13| = r$*
Let $f(x) = x^2 - 14x - 13 = (x - 2)^2 - 17$
Its graph will be



Now $|x^2 - 4x - 13| = 0$
⇒ $|(x-2)^2 - 17| = 0$, its graph will be



The original equation is $|x^2 - 4x - 13| = r$
⇒ $|(x-2)^2 - 17| - r = 0$
As it has exactly 3 roots so the above graph will tough x-axis thrice, so
∴ value of r = 17



DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 53

Anil invests some money at a fixed rate of interest, compounded annually. If the interests accrued during the second and third year are ₹ 806.25 and ₹ 866.72, respectively, the interest accrued, in INR, during the fourth year is nearest to 46/99

✓A) 931.72 B) 926.84 C) 934.65 D) 929.48

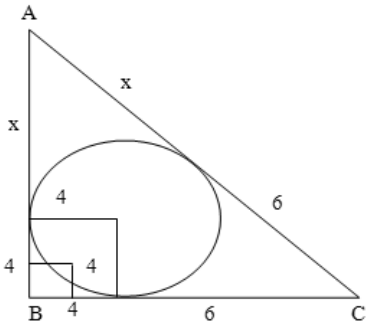
Explanation:- $\text{Required interest} = \frac{866.72}{806.25} \times 866.72 = 931.72$

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 54

A circle of diameter 8 inches is inscribed in a triangle ABC where ∠ABC= 90^{o}. If BC = 10 inches then the area of the triangle in square inches is

A) 120 B) C) D)



Explanation:-

$$\text{In radius} = \frac{Area\ of\ \Delta}{Semi\ perimeter}$$

$$\therefore 4 = \frac{\frac{1}{2} \times BC \times AB}{\frac{x+4+10+x+6}{2}}$$

$$4 = \frac{\frac{1}{2} \times 10(x+4)}{\frac{2x+20}{2}}$$

$$4 = \frac{5(x+4)}{x+10}$$

4x + 40 = 5x + 20

⇒ x = 20

$$\text{Area of } \Delta\ \frac{1}{2} \times BC \times AB$$

$$= \frac{1}{2} \times 10 \times 24$$

= 120 sq. inch

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 55

Two trains cross each other in 14 seconds when running in opposite directions along parallel tracks. The faster train is 160 m long and crosses a lamp post in 12 seconds. If the speed of the other train is 6 km/hr less than the faster one, its length, in m, is

✓A) 190 B) 1 84 C) 192 D) 180

Explanation:-

$$\text{Speed of 1st train } = \frac{160}{12} = \frac{40}{3} \text{ m/sec}$$

$$\text{Speed of 2nd train} = \frac{40}{3} - \frac{6 \times 5}{18}$$

$$= \frac{40}{3} - \frac{5}{3} = \frac{35}{3} m/\sec$$

$$\text{Relative speed} = = \frac{40}{3} + \frac{35}{3} = \frac{75}{3} = 25m/\sec$$

∴ time = 14 sec
∴ Sum of lengths of two trains = 25 × 14 = 350m
∴ length of 2nd train = 350 - 160 = 190m

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 56

A basket of 2 apples, 4 oranges and 6 mangoes costs the same as a basket of 1 apple,4 oranges and 8 mangoes, or a basket of 8 oranges and 7 mangoes. Then the number of mangoes in a basket of mangoes that has the same cost as the other baskets is

A) 12 ✓B) 13 C) 10 D) 11

Explanation:- *2A + 4 O + 6 M = 1 A + 4 O + 8 M*
⇒ 1A = 2M ..... (1)
1 A+ 4 O + 8 M = 8 O + 7 M
2 M + 4 O + 8 M = 8 O + 7 M
10 M + 4 O = 8 O + 7 M
3 M = 8 O - 4 O
3 M = 4 O
So 1st basket in terms of M can be 2 A + 4 O + 6 M
= 4 M + 3 M + 6 M
= 13 Mangoes

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 57

Amar, Akbar and Anthony are working on a project. Working together Amar and Akbar can complete the project in 1 year, Akbar and Anthony can complete in 16months, Anthony and Amar can complete in 2 years. If the person who is neither the fastest nor the slowest works alone, the time in months he will take to complete the project is

A) 32 B) C) D)

Explanation:- *Amar and Akbar can do work in 12 months*
Akbar and Anthony in 16 months
Anthony and Amar in 24 months
Let total work = 48 units
∴ Amar + Akbar will 48/12 = 4 units/month
Akbar + Anthony will 48/16 = 3 units/month
Anthony + Amar will do 48/24 = 2 units/months
∴ 2 (Amar + Akbar + Anthony) will do 4 + 3 + 2 = 9 units/month
∴ Amar + Akbar + Anthony do 9/2 = 4.5 units/month
∴ Anthony will do 4.5 - 4 = .5 units/month
Hence will do work in 48/.5 = 96 months

$$\text{Amar will do } \frac{48}{(4.5-3)} = \frac{48}{1.5} = 32 \text{ months}$$

$$\text{Akbar will do in } \frac{48}{(4.5-2)} = \frac{48}{2.5} = 19.2 \text{ months}$$

So neither fastest non slowest will do in 32 months.

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 58

If the area of a regular hexagon is equal to the area of an equilateral triangle of side 12 cm, then the length, in cm, of each side of the hexagon is

A) 6√6 ✓B) 2√6 C) √6 D) 4√6

Explanation:- *Let side of hexagon = a*

$$\therefore \frac{6\times\sqrt{3}}{4}\times a^2 = \frac{\sqrt{3}}{4}\times 12^2$$

$$a^2 = \frac{12\times 12}{6} = 24$$

$$\Rightarrow a = \sqrt{24} = 2\sqrt{6}$$

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 59

Amal purchases some pens at ₹ 8 each. To sell these, he hires an employee at a fixed wage. He sells 100 of these pens at ₹ 12 each. If the remaining pens are sold at₹ 11 each, then he makes a net profit of ₹ 300, while he makes a net loss of ₹ 300 if the remaining pens are sold at ₹ 9 each. The wage of the employee, in INR, is

A) 1000 B) C) D)

Explanation:-
Let number of pens = n
Fixed salary = k
CP of n pens = 8n Rs.
So According to question
[12 × 100 + (n-100)×11] - [k+8n] = 300 ..... (1)
Also
[12 × 100 + (n-100) × 9] - [k+8n] = -300
Solving we get = n = 400
and k = 1000
∴ Salary = 1000 Rs.

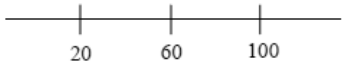
DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 60

The number of integers n that satisfy the inequalities |n -60| < |n-100| <| n-20| is

✓A) 19 B) 20 C) 18 D) 21

Explanation:-



(i) |n - 60| is the distance of n from 60 or number line
(ii) |n - 100| is the distance of n from 100 or number line
(iii) |n - 20| is distance of n from 20 on number line

Given that |n-60| < |n-100| < |n-20|
At n = 60, |n-20| and |n-100| are equal
∴ n > 60
Mid-point of 60 and 100 is 80
At n = 80, |n-60| = |n-100|
∴ n < 80
So n lines between 60 and 80
n = (61, 62, ...79)
Hence 19 values possible

DIRECTION for the question: *Solve the following question and mark the best possible option.*

Question No. : 61

Identical chocolate pieces are sold in boxes of two sizes, small and large. The large box is sold for twice the price of the small box. If the selling price per gram of chocolate in the large box is 12% less than that in the small box, then the percentage by which the weight of chocolate in the large box exceeds that in the small box is nearest to

✓A) 127 B) 124 C) 144 D) 135

Explanation:- *Let as suppose each chocolate weight k gm and n_1 are chocolate in small box and n_2 in second box and price are P and 88 p.*

$\therefore (n_2 \times k) \times .88P = 2(n_1 \times k) \times P$

$$\therefore \frac{n_2 \times k}{n_1 \times k} = \frac{2}{.88} = \frac{200}{88} = \frac{25}{11}$$

$$\therefore \%\ \text{increase} = \frac{25-11}{11} \times 100$$

$$= \frac{14}{11} \times 100$$

$$\approx 127\%$$

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 62

The natural numbers are divided into groups as (1), (2, 3, 4), (5, 6, 7, 8, 9), ... and soon. Then, the sum of the numbers in the 15th group is equal to

✓A) 6119 B) 6090 C) 7471 D) 4941

Explanation:- *In first group 1 element is there*
In second group 3 elements are there
In third group 5 elements are there
$\therefore$ in 14th group 27 elements are there
$\therefore$ Numbers used = 1 + 3 + 5 + ... + 27 = 14^2
$\therefore$ First elements of 15th group will be 197 and it will have 29 numbers
$\therefore$ S = 29/2 [2 × 197 + (28)] = 6119

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 63

Onion is sold for 5 consecutive months at the rate of Rs 10, 20, 25, 25, and 50 per kg, respectively. A family spends a fixed amount of money on onion for each of the first three months, and then spends half that amount on onion for each of the next two months. The average expense for onion, in rupees per kg, for the family over these 5months is closest to

A) 26 B) 16 ✓C) 18 D) 20

Explanation:- *Fixed amount for 1st 3 months will be LCM of 10, 20, 25 i.e. 100 Rs. And last two months will be 100/2 = 50 Rs.*

$$\therefore \text{Quantity purchase} = \frac{100}{10} + \frac{100}{20} + \frac{100}{25} + \frac{50}{25} + \frac{50}{50}$$

= 10 + 5 + 4 + 2 + 1
= 22kg

$$\therefore \text{Average Price} = \frac{100 + 100 + 100 + 50 + 80}{22}$$

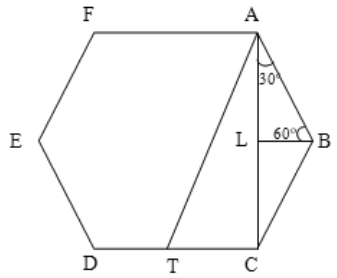
$$= \frac{400}{22} = 18\ \text{Rs./kg}$$

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 64

Suppose the length of each side of a regular hexagon ABCDEF is 2 cm. It T is the mod point of CD, then the length of AT, in cm, is

✓A) √13 B) √15 C) √14 D) √12



Explanation:-

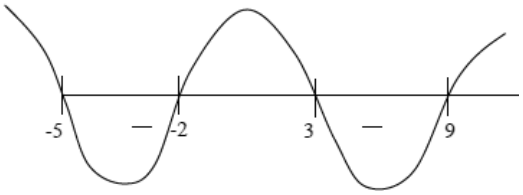
As shown BL = √3 (30°, 60°, 90° Δ)
Also LC = √3
∴ AC = 2√3
∴ A T² = (2 √3)² + (1)²
= 12 + 1
= 13
⇒ AT = √13

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 65

$f(x) = \frac{x^2 + 2x - 15}{x^2 - 7x - 18}$ is negative if and only if

A) x < - 5 or 3 < x < 9 ✓B) -5 < x < -2 or 3 < x < 9 C) x < -5 or -2 < x < 3 D) -2 < x < 3 or x > 9



Explanation:-

$f(x) = \frac{x^2 + 2x - 15}{x^2 - 7x - 18}$

$= \frac{x^2 + 5x - 3x - 15}{x^2 - 9x + 2x - 18} = \frac{(x+5)(x-3)}{(x-9)(x+2)}$

$\frac{(x+5)(x-3)}{(x-9)(x+2)} < 0$

∵ -5 < x <-2 or 3 < x < 9
is the answer

DIRECTIONS for the question: *Solve the following question and mark the best possible option.*

Question No. : 66

The number of groups of three or more distinct numbers that can be chosen from 1,2, 3, 4, 5, 6, 7 and 8 so that the groups always include 3 and 5, while 7 and 8 are never included together is

A) 47 B) C) D)

Explanation:- *As 3, 5 are fixed. So we have to select remaining digits such that 7, 8 are not together.*
Three digits number = $^{6}c_{1}$ *= 6 (as only 1 digit is selected out of)*
4 digit number = $^{6}c_{2}$ *-1 = 14*
5 digits number = $^{6}c_{3}$ *- 4 = 16*
6 digits number = $^{6}c_{4}$ *- 6 = 9*
7 digits number = $^{6}c_{5}$ *-* $^{4}c_{3}$ *= 2*
8 digit number will not be possible as (7,8) will be together'
∴ number of groups = 6 + 14 + 16 + 9 + 2 = 47