

Grade 4: NGN LOGIC OLYMPIAD 2023 - Section B & C

Student Name: _____

Maximum Time: 90 minutes

Maximum Marks: 100

EXAM INSTRUCTIONS

- There are **33** questions in this paper.
 - Section A (Basic Level):** 2 Marks, 15 Questions
 - Section B (Moderate Level):** 3 Marks, 10 Questions
 - Section C (Difficult Level):** 5 Marks, 8 Questions
- No points will be deducted for each incorrect answer. Do not skip any questions. Use your logical reasoning skills to guess the answer.
- Types of Questions: **Section A:** Pick one correct answer. **Section B:** Pick all correct answers. **Section C:** Fill in the blanks and pick all correct answers.
- The questions in Sections B and C are based on questions related to social impact and global citizenship. The questions in Section B will focus on solving social issues logically. Section C will discuss international global problems that need rational solutions.
- Pencils, erasers, rulers, and rough paper for calculations are allowed.
- To mark your answer, darken the circle in the Answer sheet; use a Blue/Black Ball Point Pen only.
- For some questions in Sections B and C, mark your answer by filling in the bubbles. For Eg: 346.

<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input checked="" type="radio"/>	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	Ones
<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input checked="" type="radio"/>	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	Tens
<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input checked="" type="radio"/>	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	Hundreds

[NGNLearning.com/Logic-Olympiad](https://www.ngnlearning.com/Logic-Olympiad)

SECTION B: 3 MARKS EACH

1. **2022:** Asim is a teacher in Marib, Yemen, at the NGN Elementary School. Due to ongoing war and internal conflicts, Asim finds enrolling students at his school challenging. So, he now teaches his students online. In one instance, he conducts a math competition with three teams, A, B, and C. He has to select three team leaders from **eleven boys and eight girls**.

Choose from the options the number of ways he can select the leaders such that there are **at least 2 girl leaders**.

Credit: NGN Research

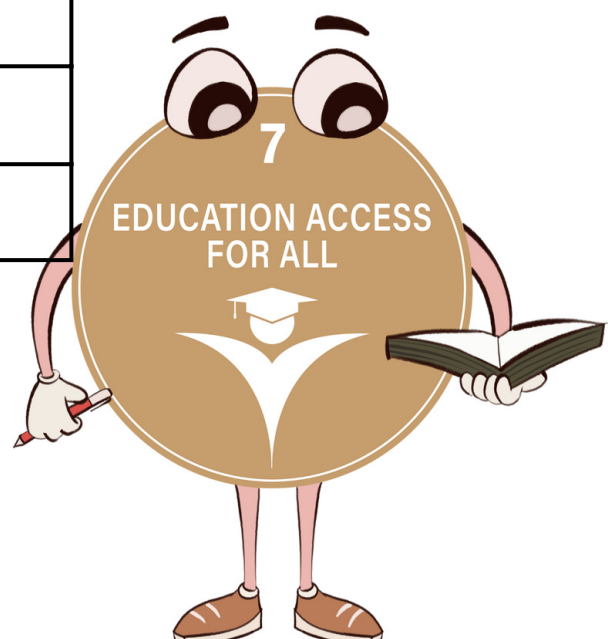
(A) 5814

(B) 1848

(C) 2640

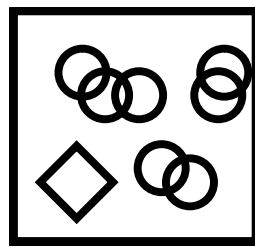
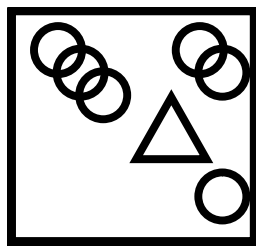
(D) 2184

(E) 1250

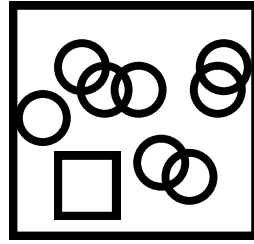
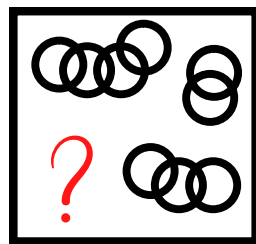


SECTION B: 3 MARKS EACH

2. **2022:** Jamal is a doctor in Karbala, Iraq. Due to negative perceptions surrounding certain women's health issues, there are only a few female patients in his hospital. He selects some female volunteers to get relevant data about females in the area. The selection is made based on their critical thinking skills. One of the questions is to find the following figure in the sequence shown below. **Choose** all the correct polygon(s) that can **complete the sequence**.



Credit: NGN Research



(A) Rhombus

(B) Regular Hexagon

(C) Square

(D) Pentagon

(E) Hexagon



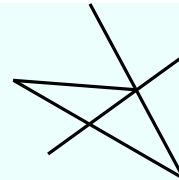
SECTION B: 3 MARKS EACH

3. **2022:** NGN Foundation builds a school in Cape Town, South Africa. The school focuses on STEM (Science, Technology, Engineering, and Mathematics) education to ensure students with relevant skills can successfully acquire 21st-century skills. To improve their critical thinking skills, Erik asks his students to find the diagram in which Figure (X) is hidden.

Credit: NGN Research

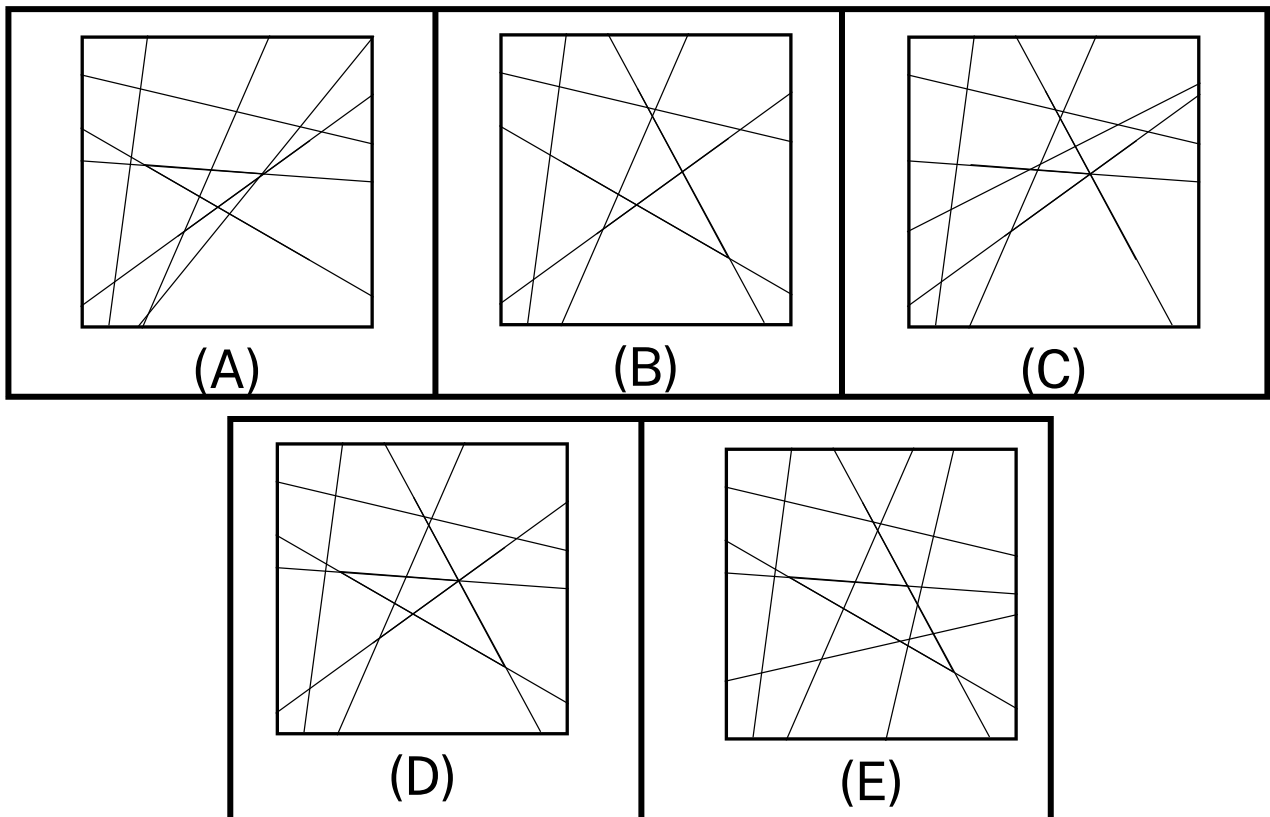
Choose the correct answer from the options.

Figure(X) →



Find the missing figure (X).

Note: Figure(X) should be in exact shape and size.



SECTION B: 3 MARKS EACH

4. **2022:** The local government in Shanghai, China, decided to charge tolls to drivers in congested areas. The basic idea of this initiative is to encourage people to use public transport instead of using their cars for non-essential trips. Min, a college student, writes a paragraph noting the advantages and disadvantages of the charging system. But some grammatical things could be improved. **Choose** all the parts of the sentences with grammatical errors in them.

(1) Congestion charges in a metropolitan city can reduce traffic congestion significantly.

(2) These charges can encourage the public to use public transport and bikes, which are eco-friendly.

(3) Also, congestion charges will increase the revenue that can be used to improve public transport infrastructure. **(4)** But some issues can arise due to these charges. **(5)** Mainly, it can negatively impact low-income families with no alternative means of transportation.

Credit: NGN Research

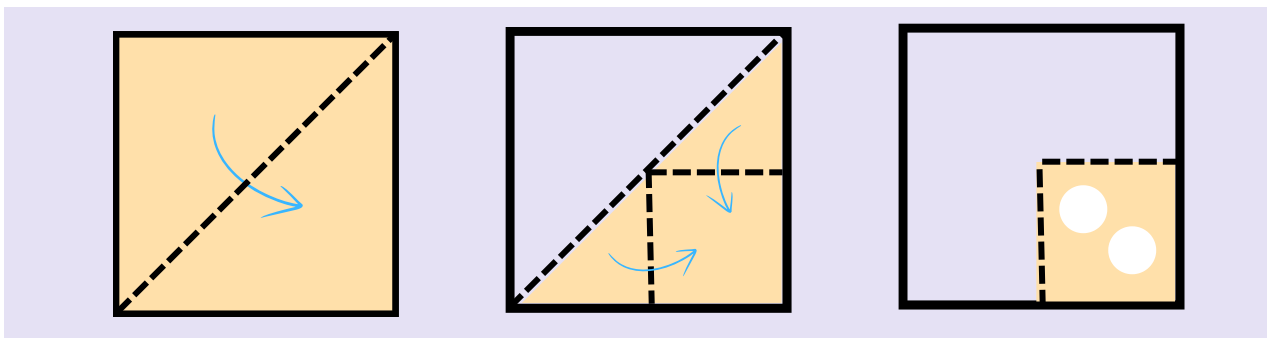
(A) Sentence 1	(B) Sentence 2
(C) Sentence 3	(D) Sentence 4
(E) Sentence 5	

SECTION B: 3 MARKS EACH

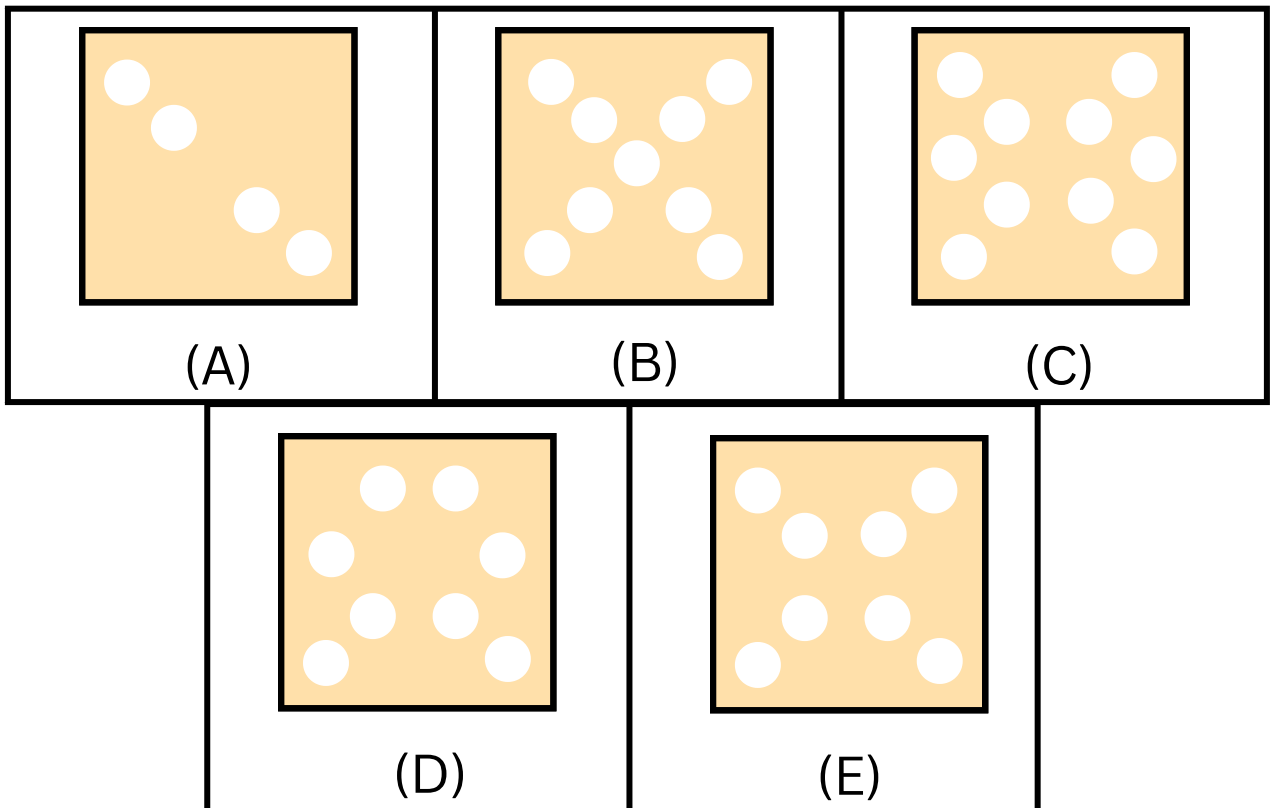
5. **2022:** In Tokyo, Japan, Chiyo leads a group of scientists to find a more efficient and safer way for space travel. She learns about optimizing space by folding some elements inside a spaceship. A paper is folded and punched in a certain way, as shown below.

Choose the correct unfolded paper from the options.

Credit: NGN Research



Choose the correct unfolded options.



SECTION B: 3 MARKS EACH

6. **2022:** NGN Foundation provides logical and mathematical instruction to children with special needs in Moscow, Russia. Vlad introduces the students to essential logic skills by showing them a **square grid** of numbers in which the sum of the numbers in each row, column, and diagonal is the same. But some of the numbers still need to be included. The numbers are **consecutive odd numbers starting from 5**.

Credit: NGN Research

Choose all the missing numbers in the middle row.

11		
?	?	5
7		15

- | |
|--------|
| (A) 19 |
| (B) 9 |
| (C) 21 |
| (D) 13 |
| (E) 17 |



SECTION B: 3 MARKS EACH

7. **2022:** A local university in Khartoum, Sudan, wants to promote volunteerism among its students. They establish a program where students can earn academic credit for participating in volunteer projects in the community. Ahmed writes about his project, as shown below. However, some of the sentences in the paragraph may be out of context.

Choose all the odd sentences in the paragraph.

(1) In communities and individuals alike, volunteering is a powerful way to address the issues they care about. **(2)** Volunteering can be emotionally demanding, leading to burnout. **(3)** Volunteering can also help promote social justice and equity by addressing systemic issues and the needs of marginalized populations. **(4)** Sometimes, volunteers may feel their contributions are not valued or recognized by the organization. **(5)** Additionally, volunteering can bring benefits to the volunteer, such as personal growth, a sense of purpose, and even physical and mental health benefits.

Credit: NGN Research

(A) Sentence 2	(B) Sentence 3
(C) Sentence 4	(D) Sentence 5
(E) None of these	

SECTION B: 3 MARKS EACH

8. **2022:** In Delhi, India, the local government monitors cyberbullying activities of bullies and hackers. In one instance, they received coded messages that required decoding. The word "CATCH" is coded as "BBSDG," and the word "BAD" is coded as "ABC."

What does the code "ZMDSS" stand for?

Choose the correct answer from the options given below.

(A) ANGER
(B) CLEAR
(C) ALERT
(D) ALARM
(E) AVATAR



Credit: NGN Research

SECTION B: 3 MARKS EACH

9. **2022:** NGN Foundation deploys a satellite to gather useful information about poverty-stricken areas in Ohio, USA. The satellite collects numbers in the grid format. The numbers in each grid follow a pattern. Determine the pattern to find the missing numbers.

Credit: NGN Research

Choose all the correct numbers from the options.

8	4
6	12

15	7
3	5

?	?
2	11

- | |
|--------|
| (A) 7 |
| (B) 8 |
| (C) 9 |
| (D) 10 |
| (E) 11 |



SECTION B: 3 MARKS EACH

10. **2022:** Arya writes a letter to Jessica, who lives in Adelaide, Australia, about environmental issues. In her letter, Arya discusses the new technologies used to protect the environment. Embarrassingly, she makes some grammatical errors. **Find the total** number of grammatical mistakes in the paragraph given below. Incorrect use of punctuation also should be counted.

Choose the correct answer.

Carbon capture and storage (CCS) is a technology that captures carbon dioxide emissions from power plants and industrial facilities and stores them underground. The captured carbon dioxide can then be used for enhanced oil recovering or stored in deep underground formations where it will not contribute to climate change. While CCS technology is considered one of the most promising ways to reduce CO₂ emissions, its still in the early stages of development. Also, the cost of capturing and storing CO₂ still needs to be lowered.

Credit: NGN Research

(A) 1	(B) 2
(C) 3	(D) 4
(E) 5	

SECTION C: 5 MARKS EACH

11-14. **2022:** As a result of the Russo-Ukrainian conflict, Europe faced a considerable fuel crisis. However, Europe's fuel shortage was not solely caused by the Russo-Ukrainian conflict but by a cascade of crises and poor decisions over time. Aside from the Russian invasion of Ukraine, the backlash from the 2020 pandemic was the most immediate cause. Many homes in Eastern and Central Europe used coal and wood to heat them. So the fuel shortage worsened the coal shortage. In addition, people's health and well-being were adversely affected by the increased use of dirty fossil fuels and wood. As a result, a new EU package was passed to meet the immediate needs of Europeans. To mitigate the fuel crisis, alternative energy sources, such as wind and solar energy, can be utilized more effectively, and intelligent power grids can aid in energy distribution and management.

Credit: THE BORGES PROJECT,
<https://borgenproject.org>

SECTION C: 5 MARKS EACH

11. **Choose all** the reasons for the energy crisis in Europe.

(A) The Russo-Ukrainian war

(B) The new EU package

(C) The food scarcity

(D) The 2020 pandemic

(E) The increased use of dirty fossil fuels

12. What will be the possible sentence(s) that can immediately follow the paragraph? **Choose** all the options.

(A) A significant concern remains the fuel crisis in Europe, and long-term solutions remain a challenge.

(B) To mitigate the impact of the fuel crisis, the EU has improved energy efficiency in buildings and transportation.

(C) The ongoing conflict in eastern Europe has disrupted agricultural production and damaged infrastructure.

(D) Also, the pandemic has had an impact on Europe, both in terms of public health.

(E) None of these.

SECTION C: 5 MARKS EACH

13. Yulia participated in an event in Kyiv, Ukraine, where a cubical cake was prepared to bring joy to older adults affected by the ongoing conflict. She puts chocolate sauce on all the faces of the cake except the base and cuts it into 27 small cubical cake pieces **having exactly two faces covered with chocolate sauce**.

Choose the correct number from the options.

(A) 23	(B) 16
(C) 19	(D) 18
(E) 12	

14. A local company in Lviv, Ukraine, loads coal cargoes of dimensions 3 m x 4 m x 5 m into a container of dimensions 50 m x 20 m x 30 m to meet the urgent needs of people in Kharkiv, Ukraine. Find the number of cargoes that can be loaded into the container.

Choose all the correct answers.

(A) 500	(B) 320
(C) 480	(D) 432
(E) 420	

SECTION C: 5 MARKS EACH

29. In Tokyo, Japan, NGN Foundation wants to create a team out of 5 men and 6 women to find solutions to tackle ocean acidification. How many ways can they seat a five-member team on a bench if there are at least 3 women on the team?

Choose the correct answer.

0	1	2	3	4	5	6	7	8	9	Ones
0	1	2	3	4	5	6	7	8	9	Tens
0	1	2	3	4	5	6	7	8	9	Hundreds
0	1	2	3	4	5	6	7	8	9	Thousands



ANSWER KEY

Preparatory Classes Available

Step-Wise Solution Available

NGNLearning.com/Logic-Olympiad

SECTION B: ANSWER KEY

1. (D)

Step 1: There are four cases in which at least two girls are leaders.

Step 2: Girls are leaders of A and B - $8 \times 7 \times 11 = 616$,

Girls are leaders of B and C - $11 \times 8 \times 7 = 616$,

Girls are leaders of A and C - $8 \times 11 \times 7 = 616$,

Girls are leaders of A, B, and C - $8 \times 7 \times 6 = 336$

Step 3: $616 + 616 + 616 + 336 = 2184$

(A) 5814
(B) 1848
(C) 2640
(D) 2184
(E) 1250

SECTION B: ANSWER KEY

2. (B) (E)

Step 1: The number of circles will increase by one after each pattern. The number of overlaps will equal the number of sides on the polygon in the pattern.

Step 2: There are 6 overlaps in the last figure. So, the polygon in the last figure will be six-sided, i.e., regular hexagon and hexagon.

(A) Rhombus

(B) Regular Hexagon

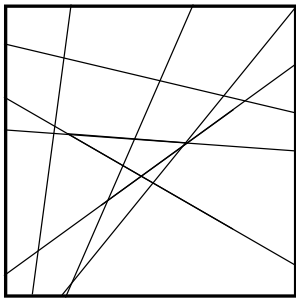
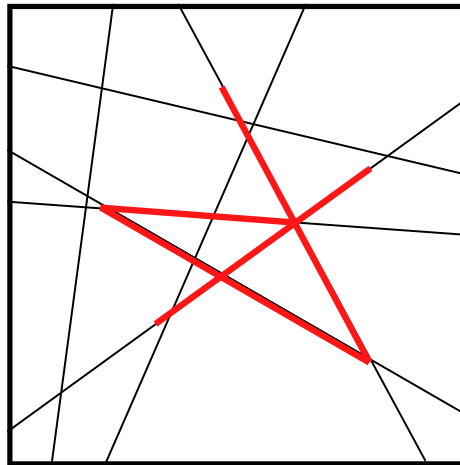
(C) Square

(D) Pentagon

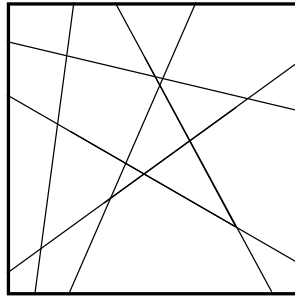
(E) Hexagon

SECTION B: ANSWER KEY

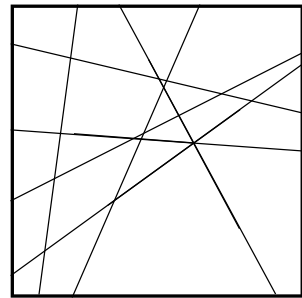
3. (D)



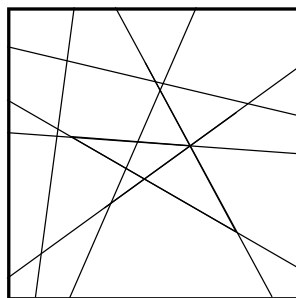
(A)



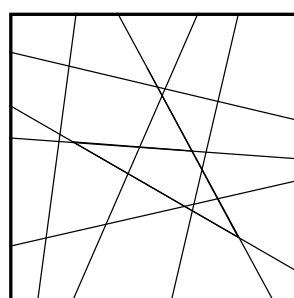
(B)



(C)



(D)



(E)

SECTION B: ANSWER KEY

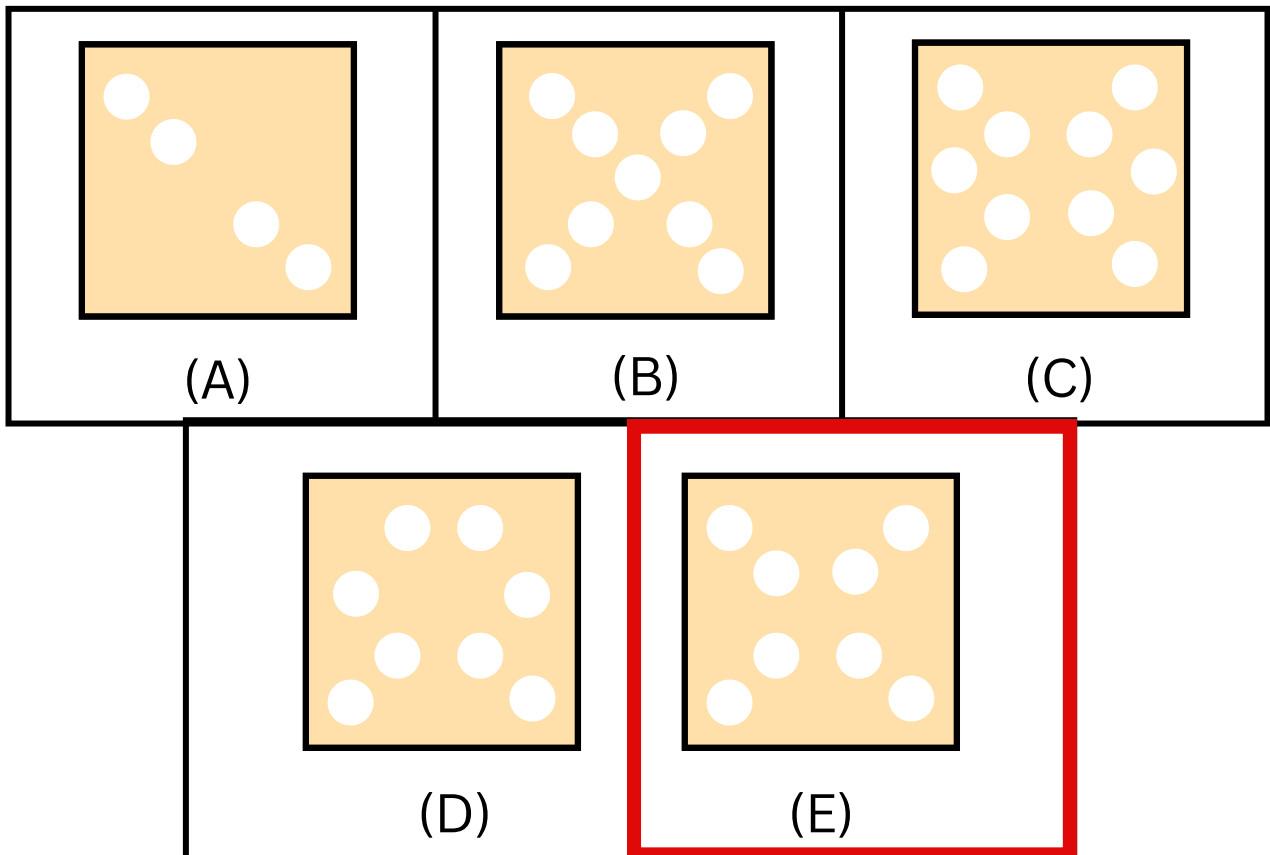
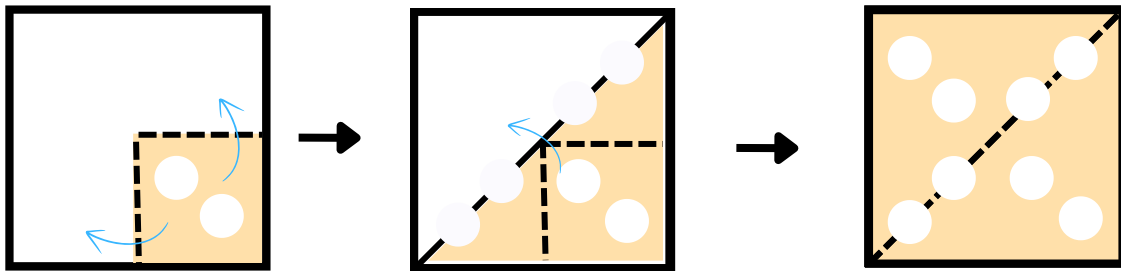
4. (B), (E)

(1) Congestion charges in a metropolitan city can reduce traffic congestion significantly. **(2) These** charges can encourage **the public** to use public transport and bikes, which are eco-friendly. **(3)** Also, congestion charges will increase the revenue that can be used to improve public transport infrastructure. **(4)** But some issues can arise due to these charges. **(5)** Mainly, it can negatively impact low-income families **who** do not have any alternative means of transportation.

(A) Sentence 1	(B) Sentence 2
(C) Sentence 3	(D) Sentence 4
(E) Sentence 5	

SECTION B: ANSWER KEY

5. (E)



SECTION B: ANSWER KEY

6. (C), (D)

11	9	19
21	13	5
7	17	15

(A) 19
(B) 9
(C) 21
(D) 13
(E) 17

SECTION B: ANSWER KEY

7. (A), (C)

Step 1: The letter talks about the advantages of volunteerism, as Sentence 1 is not an odd sentence.

Step 2: So, Sentences 2 and 4 are the odd ones out because they talk about the negatives of volunteering.

(A) Sentence 2	(B) Sentence 3
(C) Sentence 4	(D) Sentence 5
(E) None of these	

SECTION B: ANSWER KEY

8. (B), (C)

Step 1: The pattern will be "The sum of the numbers at the left bottom corner and right top corner always add up to 10. The sum of the numbers at the right bottom corner and right top corner always add up to 20."

Step 2: The number at the right top corner will be 8, and the number at the left top corner will be 9.

(A) 7

(B) 8

(C) 9

(D) 10

(E) 11

SECTION B: ANSWER KEY

9. (C)

Step 1: For CATCH, the letter before C is B, the letter after A is B, the letter before T is S, the letter after C is D, and the letter before H is G.

Step 2: For BAD, the letter before B is A, the letter after A is B, and the letter before D is C.

Step 3: Similarly, ALERT will be coded as ZMDSS.

(A) ANGER
(B) CLEAR
(C) ALERT
(D) ALARM
(E) AVATAR

SECTION B: ANSWER KEY

10. (C)

Step 1: The corrected paragraph is shown here:

Carbon capture and storage (CCS) is a technology that captures carbon dioxide emissions from power plants and industrial facilities and stores them underground. The captured carbon dioxide can then be used for enhanced oil **recovery** or stored in deep underground **formations**, where it will not contribute to climate change. While CCS technology is considered one of the most promising ways to reduce CO₂ emissions, **it's** still in the early stages of development. Also, the cost of capturing and storing CO₂ still needs to be lowered.

(A) 1	(B) 2
(C) 3	(D) 4
(E) 5	

SECTION C: ANSWER KEY

11. (A),(D)

Step 1: Reasons for the energy crisis include war and Covid-19 pandemic.

(A) The Russo-Ukrainian war

(B) The new EU package

(C) The food scarcity

(D) The 2020 pandemic

(E) The increased use of dirty fossil fuels

12. (A),(B)

Step 1: The following sentence should be about the energy crisis in Europe.

(A) A significant concern remains the fuel crisis in Europe, and long-term solutions remain a challenge.

(B) To mitigate the impact of the fuel crisis, the EU has improved energy efficiency in buildings and transportation.

(C) The ongoing conflict in eastern Europe has disrupted agricultural production and damaged infrastructure.

(D) Also, the pandemic has had an impact on Europe, both in terms of public health.

(E) None of these.

SECTION C: ANSWER KEY

13. (E)

Step 1: There will be 8 pieces having two faces covered with chocolate sauce along four vertical edges.

Step 2: There will be such 4 pieces on the edges of the top face of the cake.

Step 3: In total, there will be $8 + 4 = 12$ pieces.

(A) 23
(B) 16
(C) 19
(D) 18
(E) 12

SECTION C: ANSWER KEY

14. (A), (C), (E)

Step 1: One way is to do $50/5 \times 20/4 \times 30/3 = 500$ cargoes.

Step 2: Second way is to do $50/3 \times 20/4 \times 30/5 = 480$ cargoes.

Step 3: Third way is to do $20/3 \times 30/4 \times 50/5 = 420$ cargoes.

(A) 500

(B) 320

(C) 480

(D) 432

(E) 420

SECTION C: ANSWER KEY

15. 4920

Step 1: If there are three women on the team, there are $\underline{6} \times \underline{5} \times \underline{4} \times \underline{5} \times \underline{4} = 2400$ ways to sit.

Step 2: If there are four women on the team, there are $\underline{6} \times \underline{5} \times \underline{4} \times \underline{3} \times \underline{5} = 1800$ ways to sit.

Step 3: If there are five women on the team, there are $\underline{6} \times \underline{5} \times \underline{4} \times \underline{3} \times \underline{2} = 720$ ways to sit.

Step 4: In total, there are $2400 + 1800 + 720 = 4920$ ways to sit.

0	1	2	3	4	5	6	7	8	9	Ones
0	1	2	3	4	5	6	7	8	9	Tens
0	1	2	3	4	5	6	7	8	9	Hundreds
0	1	2	3	4	5	6	7	8	9	Thousands