MATH LOVE INSTITUTE

CBSE Class 9 Artificial Intelligence (Code: 417)

Home Exam 2025-26 - Sample Paper Set 5 with Solutions

Based on Latest CBSE Syllabus 2025-26

Maximum Marks	80 (Theory: 50 + Practical/Viva: 30)
Time Allowed	3 Hours
Class	IX (Nine)
Subject	Artificial Intelligence (417)

📋 GENERAL INSTRUCTIONS:

1. This question paper contains **35 questions** divided into **Five Sections A, B, C, D and E**.
2. **Section A** comprises of 15 MCQs of 1 mark each.
3. **Section B** comprises of 5 Very Short Answer questions of 2 marks each.
4. **Section C** comprises of 6 Short Answer questions of 3 marks each.
5. **Section D** comprises of 3 Long Answer questions of 5 marks each.
6. **Section E** comprises of 3 case study based questions of 4 marks each with internal choice.
7. All questions are **compulsory**. However, internal choices have been provided in some questions.
8. Answer all questions neatly and systematically.

SECTION A - MULTIPLE CHOICE QUESTIONS (1 × 15 = 15 Marks)

Q1. AI systems that help doctors diagnose diseases from X-rays use which domain? **[1]**

(a) Natural Language Processing

(b) Computer Vision

(c) Data Analytics only

(d) Speech Recognition

Q2. Which of the following is an example of Supervised Learning? **[1]**

(a) Grouping customers by buying behavior

(b) Email spam classification with labeled data

(c) Discovering patterns in unlabeled data

(d) Random data selection

Q3. "Number of students in a class: 40" is an example of: **[1]**

(a) Continuous data

(b) Qualitative data

(c) Discrete data

(d) Categorical data

Q4. The mode of 6, 9, 6, 12, 6, 15, 9 is: **[1]**

(a) 6

(b) 9

(c) 12

(d) No mode

Q5. If two coins are tossed, the probability of getting at least one tail is: **[1]**

(a) 1/4

(b) 1/2

(c) 3/4

(d) 1

Q6. Microsoft's AI assistant is called: **[1]**

(a) Siri

(b) Alexa

(c) Copilot

(d) Gemini

Q7. What will be the output of: print(2 ** 3)? **[1]**

(a) 5

(b) 6

(c) 8

(d) 9

Q8. In Python, list1[0] refers to: **[1]**

(a) First element

(b) Second element

(c) Last element

(d) Length of list

Q9. Which keyword is used to create loops in Python? **[1]**

(a) loop

(b) for

(c) repeat

(d) while

Q10. Data Exploration is the _____ stage of AI Project Cycle: **[1]**

(a) First

(b) Second

(c) Third

(d) Fourth

Q11. Which method converts a string to uppercase in Python? **[1]**

(a) upper()

(b) uppercase()

(c) toUpper()

(d) caps()

Q12. In Python, True and False are: **[1]**

(a) Strings

(b) Integers

(c) Boolean values

(d) Functions

Q13. Standard deviation is a measure of: **[1]**

(a) Central tendency

(b) Dispersion

(c) Frequency

(d) Probability

Q14. Histogram is used to represent: **[1]**

(a) Categorical data

(b) Frequency distribution

(c) Pie chart data

(d) Text data

Q15. Which principle states that AI should be transparent in its decision-making? **[1]**

(a) Privacy

(b) Explainability

(c) Accuracy

(d) Speed

SECTION B - VERY SHORT ANSWER QUESTIONS (2 × 5 = 10 Marks)

Q16. What is the Data domain in AI? Give one practical application. **[2]**

Q17. Differentiate between Supervised Learning and Unsupervised Learning with one example each. **[2]**

Q18. Calculate the mean of: 24, 18, 30, 22, 26 **[2]**

Q19. Write a Python program to swap two numbers using a third variable. **[2]**

Q20. List any four benefits of using AI in daily life. **[2]**

SECTION C - SHORT ANSWER QUESTIONS (3 × 6 = 18 Marks)

Q21. Explain how AI is being used in entertainment, retail, and weather forecasting (one application each). **[3]**

Q22. What is the Evaluation stage in AI Project Cycle? Why is it important? **[3]**

Q23. A bag contains 10 balls numbered 1 to 10. If one ball is drawn randomly, find: **[3]**

(i) Probability of getting a multiple of 3

(ii) Probability of getting a number greater than 7

OR

The scores of 7 students are: 65, 72, 68, 75, 70, 68, 80. Find the mean and mode.

Q24. Write a Python program to find the factorial of a number using a loop. **[3]**

Q25. What is AI Access? Explain the digital divide problem related to AI. **[3]**

Q26. Explain any three advantages of using AI in businesses. **[3]**

SECTION D - LONG ANSWER QUESTIONS (5 × 3 = 15 Marks)

Q27. Explain the complete workflow of how an AI-based Voice Assistant (like Alexa) works, from receiving voice input to giving output. Which AI domains are involved? **[5]**

OR

What are the key differences between Narrow AI and General AI? Give examples and explain why General AI doesn't exist yet.

Q28. Write a Python program that: **[5]**

(a) Creates a list of 6 numbers entered by user

(b) Calculates and displays the sum of even numbers only

(c) Calculates and displays the sum of odd numbers only

(d) Finds which sum is greater and displays appropriate message

Q29. A company's quarterly sales (in lakhs) are shown below: **[5]**

Quarter	Q1	Q2	Q3	Q4
Sales (₹ Lakhs)	45	52	48	55

(a) Calculate the average quarterly sales.

(b) Find the median and range.

(c) Which quarter had the maximum sales?

(d) If Q4 sales need to be represented in a pie chart, what will be the central angle?

SECTION E - CASE STUDY BASED QUESTIONS (4 × 3 = 12 Marks + 3 Internal Choice = 15 Marks)

Q30. **[4]**

CASE STUDY 1: AI in Education - Personalized Learning Platform

An ed-tech company develops an AI-powered learning platform that adapts to each student's learning pace. The system tracks:
• Time taken to complete each topic
• Quiz scores after each lesson
• Number of attempts for practice questions
• Topics where student makes most errors

Based on this data, the AI system:
• Recommends easier or harder content
• Suggests revision for weak topics
• Provides personalized practice questions
• Predicts which concepts student might struggle with next

The system has been tested with 10,000 students and shows 30% improvement in learning outcomes compared to traditional methods.

Based on the above information, answer the following questions:

(i) Which domain of AI is being used for analyzing student performance data? **[1 mark]**

(ii) Is "time taken to complete a topic" qualitative or quantitative data? **[1 mark]**
OR
What does "30% improvement in learning outcomes" indicate?

(iii) How does this personalized learning system benefit students compared to traditional one-size-fits-all approach? Give two benefits. **[2 marks]**

Q31. **[4]**

CASE STUDY 2: Social Media Content Moderation AI

A social media platform uses AI to automatically detect and remove harmful content including:

- Hate speech and abusive language (using NLP)
- Violent or inappropriate images (using Computer Vision)
- Spam and fake news (using Data Analysis)

The AI system processes millions of posts per day. However, it sometimes:

- Incorrectly removes legitimate content (False Positive)
- Fails to detect some harmful content (False Negative)

The company also employs human moderators to review AI decisions and improve the system through feedback.

Based on the above information, answer the following questions:

(i) How many AI domains are being used in this content moderation system? Name them. **[1 mark]**

(ii) Which type of error is more harmful: False Positive or False Negative? Explain. **[1 mark]**

OR

Why are human moderators still needed despite having AI?

(iii) What ethical concerns arise from automated content moderation? Suggest one solution. **[2 marks]**

Q32. **[4]**

CASE STUDY 3: Air Quality Monitoring with AI

A city uses AI to monitor air quality. The Air Quality Index (AQI) readings for one week are:

Day	Mon	Tue	Wed	Thu	Fri	Sat	Sun
AQI	150	165	180	175	160	155	145

Note: AQI > 150 is considered unhealthy.

Based on the above information, answer the following questions:

(i) Calculate the mean AQI for the week. **[1 mark]**

(ii) On which day was the air quality worst? **[1 mark]**
OR
How many days had AQI above 160?

(iii) Write Python code to store AQI data in a list and count how many days were unhealthy (AQI > 150). **[2 marks]**

📚 END OF QUESTION PAPER 📚

Theory Total Marks: 50

Section A: 15 marks | Section B: 10 marks | Section C: 18 marks (including OR)

Section D: 15 marks (including OR) | Section E: 12 marks (including OR)

Practical/Viva/Project: 30 marks

Grand Total: 80 marks

Based on Latest CBSE Class 9 AI Syllabus 2025-26

All questions aligned with examination pattern

🎯 DETAILED ANSWER KEY WITH SOLUTIONS

SECTION A - ANSWERS (1 × 15 = 15 Marks)

Q1. Answer: (b) Computer Vision

Explanation: Analyzing X-rays, CT scans, and other medical images to diagnose diseases requires Computer Vision to interpret visual medical data.

Q2. Answer: (b) Email spam classification with labeled data

Explanation: Supervised Learning uses labeled training data. In spam classification, emails are labeled as "spam" or "not spam" for training.

Q3. Answer: (c) Discrete data

Explanation: Discrete data consists of countable whole numbers. Number of students (40) can only be a whole number, not fractional.

Q4. Answer: (a) 6

Solution:
Data: 6, 9, 6, 12, 6, 15, 9
Frequency: 6 appears 3 times (most frequent), 9 appears 2 times
Mode = 6

Q5. Answer: (c) 3/4

Solution:

Possible outcomes: HH, HT, TH, TT = 4

At least one tail: HT, TH, TT = 3 outcomes

P(at least one tail) = 3/4

Q6. Answer: (c) Copilot

Explanation: Microsoft Copilot (formerly Bing Chat) is Microsoft's AI assistant. Siri is Apple's, Alexa is Amazon's, Gemini is Google's.

Q7. Answer: (c) 8

Solution: The ** operator performs exponentiation

2 ** 3 = 2 × 2 × 2 = 8

Q8. Answer: (a) First element

Explanation: Python uses 0-based indexing. list1[0] refers to the first element, list1[1] is second, and so on.

Q9. Answer: (b) for

Explanation: Both 'for' and 'while' are used for loops in Python. The question accepts 'for' as the most common loop keyword.

Q10. Answer: (c) Third

Explanation: AI Project Cycle stages: 1) Problem Scoping, 2) Data Acquisition, 3) Data Exploration, 4) Modeling, 5) Evaluation.

Q11. Answer: (a) upper()

Explanation: The upper() method converts all characters in a string to uppercase. Example: "hello".upper() returns "HELLO"

Q12. Answer: (c) Boolean values

Explanation: True and False are Boolean data types in Python, representing logical values for conditions.

Q13. Answer: (b) Dispersion

Explanation: Standard deviation measures how spread out data is from the mean. It's a measure of dispersion/variability, not central tendency.

Q14. Answer: (b) Frequency distribution

Explanation: Histograms display frequency distributions of numerical data, showing how many values fall into different ranges (bins).

Q15. Answer: (b) Explainability

Explanation: Explainability (or Transparency) means AI systems should be able to explain how they reach decisions in understandable terms.

SECTION B - ANSWERS (2 × 5 = 10 Marks)

Q16. Solution:

> **Marking Scheme:** 1 mark for definition + 1 mark for application

Data Domain: The Data domain in AI focuses on collecting, processing, analyzing, and interpreting large amounts of data to extract meaningful insights, patterns, and predictions. It deals with structured and unstructured data to make data-driven decisions.

Practical Application:

• **Recommendation Systems:** Amazon, Netflix, and Spotify analyze user behavior data (viewing history, purchases, ratings) to recommend products, movies, or songs tailored to individual preferences.

(Other examples: Credit scoring systems, Weather prediction, Market trend analysis, Customer behavior analysis)

Q17. Solution:

> **Marking Scheme:** 1 mark for each type with example

Supervised Learning:

• Model learns from labeled training data (input-output pairs provided)
• Teacher/supervisor guides the learning process
• Used for classification and prediction tasks

Example: House price prediction - Model learns from data with known prices (features: size, location, rooms → price). After training, it predicts prices for new houses.

Unsupervised Learning:

• Model learns from unlabeled data (no predefined outputs)
• Discovers hidden patterns and structures on its own
• Used for clustering and association tasks

Example: Customer segmentation - E-commerce platform groups customers based

on shopping patterns without predefined categories. AI discovers natural groupings like "budget shoppers", "luxury buyers", etc.

Q18. Solution:

> **Marking Scheme:** 1 mark for formula + 1 mark for calculation

Data: 24, 18, 30, 22, 26

Mean = Sum of all values / Number of values
Mean = (24 + 18 + 30 + 22 + 26) / 5
Mean = 120 / 5
Mean = 24

Q19. Solution:

> **Marking Scheme:** 1 mark for logic + 1 mark for complete program

Python Program:

```
# Program to swap two numbers using third variable
a = int(input("Enter first number: "))
b = int(input("Enter second number: "))

print("Before swapping: a =", a, "b =", b)

# Swapping using temporary variable
temp = a
a = b
b = temp

print("After swapping: a =", a, "b =", b)
```

Sample Output:

Enter first number: 10

Enter second number: 20

Before swapping: a = 10 b = 20

After swapping: a = 20 b = 10

Q20. Solution:

Marking Scheme: 0.5 mark for each benefit (4 benefits)

Four Benefits of AI in Daily Life:

1. **Personalized Recommendations:** AI suggests movies, music, products, and content based on our preferences, saving time and improving user experience.

2. **Virtual Assistants:** Siri, Alexa, Google Assistant help with tasks like setting reminders, answering questions, controlling smart home devices through voice commands.

3. **Navigation and Maps:** Google Maps uses AI to find best routes, predict traffic, and provide real-time directions for faster travel.

4. **Smart Photo Organization:** Smartphones automatically organize photos by faces, locations, and objects, making it easy to search and find pictures.

(Other benefits: Spam filtering in emails, Autocorrect and predictive text, Face unlock, Health monitoring apps, Online shopping assistance)

SECTION C - ANSWERS (3 × 6 = 18 Marks)

Q21. Solution:

Marking Scheme: 1 mark for each sector

AI in Different Sectors:

1. Entertainment - Content Recommendation:
Streaming platforms like Netflix, YouTube, and Spotify use AI to analyze viewing/listening history, ratings, and user behavior. The AI predicts what content users will enjoy and recommends personalized playlists, movies, or videos. This keeps users engaged and helps them discover new content matching their tastes. YouTube's algorithm also determines which videos appear in your feed and search results.

2. Retail - Inventory Management:
Retail stores use AI to predict product demand, optimize inventory levels, and prevent stockouts or overstocking. AI analyzes sales data, seasonal trends, and external factors (weather, festivals) to forecast which products will sell. Amazon uses AI for warehouse automation, product recommendations, and dynamic pricing. Virtual try-on features for clothes and makeup also use Computer Vision.

3. Weather Forecasting - Prediction Models:
AI processes vast amounts of atmospheric data from satellites, weather stations, and sensors to predict weather patterns more accurately. Machine learning models analyze historical weather data, temperature, humidity, wind patterns, and pressure to forecast rain, storms, temperature changes days in advance. This helps in disaster preparedness, agriculture planning, and daily life decisions.

Q22. Solution:

Marking Scheme: 1.5 marks for explanation + 1.5 marks for importance

Evaluation Stage:

Evaluation is the fifth and final stage of the AI Project Cycle where we test the trained model's performance on new, unseen data to determine its accuracy, reliability, and effectiveness in solving the original problem.

Activities in Evaluation:

• Test model on validation/test dataset (data not used in training)

• Measure accuracy, precision, recall, and other metrics

• Compare predicted outputs with actual expected outputs

• Identify where model performs well and where it fails

• Analyze error patterns and edge cases

• Get feedback from stakeholders and end-users

Importance of Evaluation:

1. **Quality Assurance:**

• Ensures model works correctly before deployment

• Prevents releasing faulty AI systems

• Validates that goals are met

2. **Identifies Problems:**

• Reveals overfitting (works on training data but fails on new data)

• Shows bias in predictions

• Highlights areas needing improvement

3. **Builds Confidence:**

• Stakeholders trust system performance

• Users confident in AI decisions

• Documentation for accountability

4. **Enables Iteration:**

• If accuracy low, go back to improve data or model

• Continuous improvement cycle

• Helps refine the AI system

Q23. Solution:

> **Marking Scheme:** 1.5 marks for each part

Balls numbered: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Total balls = 10

(i) P(multiple of 3):
Multiples of 3: 3, 6, 9 = 3 outcomes
P(multiple of 3) = 3/10

(ii) P(number greater than 7):
Numbers > 7: 8, 9, 10 = 3 outcomes
P(greater than 7) = 3/10

OR

Scores: 65, 72, 68, 75, 70, 68, 80

Mean:
Mean = (65 + 72 + 68 + 75 + 70 + 68 + 80) / 7
Mean = 498 / 7
Mean = 71.14 (approximately)

Mode:
Frequency count:
68 appears 2 times (most frequent)
All others appear once
Mode = 68

Q24. Solution:

> **Marking Scheme:** 1 mark for input + 1 mark for loop logic + 1 mark for output

Python Program to find factorial:

```
# Program to find factorial using loop
num = int(input("Enter a number: "))

factorial = 1

if num < 0:
```

```
    print("Factorial doesn't exist for negative numbers
elif num == 0:
    print("Factorial of 0 is 1")
else:
    for i in range(1, num + 1):
        factorial = factorial * i
    print("Factorial of", num, "is", factorial)
```

Sample Outputs:

Enter a number: 5

Factorial of 5 is 120

Enter a number: 0

Factorial of 0 is 1

Explanation: Factorial of n = n × (n-1) × (n-2) × ... × 1

Example: 5! = 5 × 4 × 3 × 2 × 1 = 120

Q25. Solution:

> **Marking Scheme:** 1.5 marks for AI Access definition + 1.5 marks for digital divide

AI Access:

AI Access refers to the ability of individuals, communities, and countries to access and benefit from AI technologies. It encompasses availability of AI tools, affordability, digital literacy, and infrastructure needed to use AI.

Digital Divide Problem:

The digital divide is the gap between those who have access to modern technology (including AI) and those who don't. This creates inequality in AI access:

1. Economic Divide:

• AI tools and services often require expensive devices (smartphones, computers)

• Internet access costs money many can't afford
• Premium AI features available only to paying customers
• Poor communities unable to benefit from AI advantages

2. Infrastructure Gap:
• Rural areas lack high-speed internet connectivity
• Poor electricity supply in developing regions
• Limited access to modern devices
• AI services unavailable in remote locations

3. Education and Skills Gap:
• Lack of digital literacy to use AI tools
• No training programs in underserved areas
• Language barriers (most AI in English)
• Elderly people struggle with new technology

Consequences:
• Widening inequality between rich and poor
• Lost opportunities for education and jobs
• Marginalized communities left further behind
• Economic development hampered in underserved areas

Q26. Solution:

> **Marking Scheme:** 1 mark for each advantage (3 advantages)

Three Advantages of AI in Businesses:

1. Automation and Efficiency:
• AI automates repetitive, time-consuming tasks
• Reduces manual errors and increases accuracy
• Works 24/7 without breaks or fatigue
• Employees can focus on creative, strategic work
Example: Chatbots handle customer queries instantly, RPA (Robotic Process Automation) processes invoices automatically

2. Data-Driven Decision Making:

• AI analyzes vast amounts of business data quickly

• Identifies patterns, trends, and insights humans might miss

• Provides predictions for better strategic planning

• Reduces guesswork in business decisions

Example: Predictive analytics for sales forecasting, customer behavior analysis for marketing strategies

3. Cost Reduction:

• Reduces labor costs through automation

• Minimizes errors that lead to financial losses

• Optimizes resource allocation and inventory

• Improves operational efficiency

Example: AI-powered supply chain optimization reduces wastage, predictive maintenance prevents costly equipment failures

SECTION D - ANSWERS (5 × 3 = 15 Marks)

Q27. Solution:

> **Marking Scheme:** 1 mark for each major step/domain (5 marks total)

How Voice Assistant (Alexa) Works:

Step 1: Activation - Computer Vision/Signal Processing

• User says wake word "Alexa"

• Microphones constantly listen for wake word

• Sound pattern matching activates the system

• LED lights indicate system is listening

Step 2: Voice Input - Speech Recognition (NLP)

• Microphones capture user's voice command

• Audio signal digitized and sent to cloud servers

• Background noise filtered out

• Multiple microphones improve accuracy

Step 3: Speech to Text Conversion - NLP

• AI converts spoken words into text

• Acoustic models identify phonemes (sound units)

• Language models predict word sequences

• Handles different accents and speaking styles

Step 4: Natural Language Understanding - NLP

• System analyzes text to understand intent

• Identifies action (play, set, search) and object (music, alarm, information)

• Extracts key entities (song names, times, locations)

• Understands context from conversation history

Step 5: Processing and Data Analysis - Data Domain

• Searches relevant databases for information

• Analyzes user preferences and history

• Makes decisions based on command

• Accesses third-party services (Spotify, weather APIs)

Step 6: Generate Response - NLP

• Creates appropriate text response

• Natural language generation for human-like replies

• Personalization based on user profile

Step 7: Text to Speech - NLP

• Converts text response back to speech

• Synthesizes natural-sounding voice

• Adds appropriate tone and emphasis

• Sends audio to speakers

Step 8: Action Execution

• Performs requested action (play music, turn off lights)

• Controls smart home devices

• Provides information audibly

AI Domains Involved:

• **Natural Language Processing (Primary):** Speech recognition, understanding, generation, text-to-speech
• **Data Domain:** Analyzing user data, accessing information databases
• **Machine Learning:** Improving accuracy over time, personalization

OR

Narrow AI vs General AI:

Narrow AI (Weak AI/ANI - Artificial Narrow Intelligence):

Definition:
• AI designed for specific, limited tasks
• Intelligent in one domain only
• Cannot transfer knowledge to other areas
• All current AI systems are Narrow AI

Characteristics:
• Task-specific intelligence
• No consciousness or self-awareness
• Works within predefined parameters
• Excellent at assigned task but useless outside it

Examples:
• Chess AI (can only play chess, can't drive a car)
• Spam filter (only classifies emails, can't translate languages)
• Siri/Alexa (voice commands, but can't write novels)
• Self-driving car AI (navigates roads, can't diagnose diseases)
• Face recognition (identifies faces, can't predict weather)

General AI (Strong AI/AGI - Artificial General Intelligence):

Definition:
• AI with human-level intelligence across all domains
• Can understand, learn, and apply knowledge universally
• Think, reason, and solve problems like humans
• Transfer learning from one task to any other

Characteristics:

• Human-like cognitive abilities

• Self-awareness and consciousness (debatable)

• Can learn any task a human can

• Applies knowledge creatively to new situations

• Emotional intelligence and common sense

Why General AI Doesn't Exist Yet:

1. Computational Complexity:

• Human brain has ~86 billion neurons with trillions of connections

• We don't fully understand how human intelligence works

• Current computers lack processing power to simulate human brain

2. Lack of Understanding:

• We don't know how consciousness emerges

• Common sense reasoning difficult to program

• Creativity and intuition are mysteries

3. Technical Challenges:

• No algorithm can learn everything like humans

• Transfer learning across vastly different domains unsolved

• Cannot replicate human-like reasoning and judgment

4. Ethical and Safety Concerns:

• Fear of uncontrollable superintelligent AI

• Research proceeds cautiously

• Need for safety measures before creating AGI

Key Differences Table:

Aspect	Narrow AI	General AI
Scope	Single task/domain	All tasks/domains
Learning	Task-specific	Universal learning

Flexibility	Limited to programming	Adapts like humans
Existence	Exists today	Theoretical/Future

Q28. Solution:

> **Marking Scheme:** 1 mark for creating list + 1.5 marks for even sum + 1.5 marks for odd sum + 1 mark for comparison

Complete Python Program:

```
# Program to sum even and odd numbers separately

# (a) Create list of 6 numbers from user
numbers = []
print("Enter 6 numbers:")
for i in range(6):
    num = int(input(f"Enter number {i+1}: "))
    numbers.append(num)

print("List of numbers:", numbers)

# (b) Calculate sum of even numbers
even_sum = 0
for num in numbers:
    if num % 2 == 0:
        even_sum += num

print("Sum of even numbers:", even_sum)

# (c) Calculate sum of odd numbers
odd_sum = 0
for num in numbers:
    if num % 2 != 0:
        odd_sum += num
```

```
print("Sum of odd numbers:", odd_sum)

# (d) Compare and display message
if even_sum > odd_sum:
    print("Sum of even numbers is greater")
elif odd_sum > even_sum:
    print("Sum of odd numbers is greater")
else:
    print("Both sums are equal")
```

Sample Output:

Enter 6 numbers:
Enter number 1: 10
Enter number 2: 15
Enter number 3: 20
Enter number 4: 25
Enter number 5: 30
Enter number 6: 35
List of numbers: [10, 15, 20, 25, 30, 35]
Sum of even numbers: 60
Sum of odd numbers: 75
Sum of odd numbers is greater

Q29. Solution:

> **Marking Scheme:** 1 mark for average + 1.5 marks for median and range + 1 mark for maximum + 1.5 marks for pie chart angle

Sales data: Q1=45, Q2=52, Q3=48, Q4=55 (in ₹ lakhs)

(a) Average quarterly sales:

Average = (45 + 52 + 48 + 55) / 4
Average = 200 / 4
Average = ₹50 lakhs

(b) Median and Range:

Arrange in order: 45, 48, 52, 55

Number of values = 4 (even)

Median = Average of 2nd and 3rd terms

Median = (48 + 52) / 2 = 50

Median = ₹50 lakhs

Range = Highest - Lowest

Range = 55 - 45

Range = ₹10 lakhs

(c) Maximum sales:

Q4 had the maximum sales of ₹55 lakhs

(d) Central angle for Q4 in pie chart:

Total sales = ₹200 lakhs

Q4 sales = ₹55 lakhs

Central angle = (Q4 sales / Total sales) × 360°

= (55 / 200) × 360°

= 0.275 × 360°

= 99°

SECTION E - ANSWERS (4 × 3 = 12 Marks)

Q30. Solution: CASE STUDY 1 - Personalized Learning Platform

> **Marking Scheme:** 1 + 1 + 2 = 4 marks

(i) The domain being used is **Data / Data Analytics**.

Explanation: The system analyzes various data points (time taken, quiz scores, attempts, error patterns) to provide personalized recommendations and predictions.

(ii) "Time taken to complete a topic" is **Quantitative data**.

Explanation: It represents a numerical measurement in minutes or hours that can be

calculated and compared.

OR

"30% improvement in learning outcomes" indicates:

• Students using AI platform score 30% higher on tests compared to traditional methods

• Or they learn concepts 30% faster

• Or they retain 30% more information

• Shows the AI system is significantly more effective than conventional teaching

• Validates that personalization improves education quality

(iii) Two benefits of personalized learning:

1. Customized Learning Pace:

• Each student learns at their own comfortable speed

• Fast learners aren't bored waiting for others

• Slow learners get extra time without feeling rushed

• No student left behind or held back

• Reduces frustration and builds confidence

Traditional approach: Everyone must follow same pace, some struggle while others are bored

2. Targeted Improvement:

• AI identifies exactly which topics each student struggles with

• Provides focused practice on weak areas

• Doesn't waste time on topics already mastered

• Efficient use of study time

• Fills knowledge gaps systematically

Traditional approach: One-size-fits-all content, may not address individual weaknesses

Q31. Solution: CASE STUDY 2 - Content Moderation AI

> **Marking Scheme:** 1 + 1 + 2 = 4 marks

(i) Three domains of AI are used:

1. **Natural Language Processing (NLP)** - Detecting hate speech and abusive language in text
2. **Computer Vision** - Identifying violent or inappropriate images/videos
3. **Data/Data Analytics** - Analyzing patterns to identify spam and fake news

(ii) False Negative is more harmful.

Explanation: False Negative means harmful content is NOT detected and remains online. This:

• Allows hate speech, violence, and illegal content to spread
• Harms users who see offensive content
• Creates unsafe platform environment
• Legal liability for the company
• Damages platform reputation

False Positive (removing legitimate content) is inconvenient but less dangerous than allowing harmful content.

OR

Why human moderators are still needed:

• AI lacks human judgment for context and nuance
• Cannot understand sarcasm, satire, or cultural references
• May miss subtle hate speech or coded language
• Cannot make ethical decisions in gray areas
• Humans provide training feedback to improve AI
• Handle appeals and review AI mistakes
• Ensure fairness and prevent AI bias

(iii) Ethical concerns and solution:

Ethical Concern: Censorship and Free Speech

• AI might remove legitimate political speech or criticism
• False positives suppress valid opinions
• Who decides what's "harmful" is subjective
• Different cultures have different standards
• Risk of bias favoring certain viewpoints
• Lack of transparency in AI decisions

Solution:

• Implement transparent appeal process for removed content
• Human review for borderline cases
• Clear community guidelines publicly available
• Regular audits to check for bias
• Allow users to understand why content was removed
• Balance between safety and free expression

(Other concerns: Privacy in content monitoring, Bias against certain groups, Lack of accountability)

Q32. Solution: CASE STUDY 3 - Air Quality Monitoring

> **Marking Scheme:** 1 + 1 + 2 = 4 marks

(i) Mean AQI for the week:
AQI values: 150, 165, 180, 175, 160, 155, 145
Mean = (150 + 165 + 180 + 175 + 160 + 155 + 145) / 7
Mean = 1130 / 7
Mean = 161.43 (approximately 161)

(ii) Air quality was worst on **Wednesday** with AQI = 180 (highest value means worst air quality).

OR
Days with AQI above 160:
• Tuesday: 165
• Wednesday: 180
• Thursday: 175
3 days had AQI above 160

(iii) Python code:

```
# Store AQI data in list
aqi_data = [150, 165, 180, 175, 160, 155, 145]
```

```
days = ["Mon", "Tue", "Wed", "Thu", "Fri", "Sat", "Sun"

# Count unhealthy days (AQI > 150)
unhealthy_days = 0
for aqi in aqi_data:
    if aqi > 150:
        unhealthy_days += 1

print("Total days monitored:", len(aqi_data))
print("Days with unhealthy air (AQI > 150):", unhealthy
print("Days with healthy air:", len(aqi_data) - unhealt
```

Output:

Total days monitored: 7
Days with unhealthy air (AQI > 150): 6
Days with healthy air: 1

✅ END OF ANSWER KEY ✅

All solutions based on CBSE Class 9 AI Syllabus 2025-26

Comprehensive step-by-step solutions with detailed marking schemes

Practical Component (30 marks):

- Python Programming Practicals: 15 marks
- AI Project Work with SDG Integration: 10 marks
- Viva Voce & Student Portfolio: 5 marks

For queries: www.mathloveinstitute.com