



INDIAN SCHOOL AL WADI AL KABIR

Class: IX	Department: Computer Science
WORKSHEET-1	ARTIFICIAL INTELLIGENCE Unit 3-Math for AI

Part A: Multiple Choice Questions (15 Marks)

- In the context of AI, Mathematics is fundamentally defined as the study of:**
 - Hardware
 - Patterns
 - Coding
 - Connectivity
- Which mathematical concept is primarily used in AI for finding unknown or missing values?**
 - Statistics
 - Calculus
 - Linear Algebra
 - Probability
- AI models utilize Calculus specifically for which of the following tasks?**
 - Finding the most common value
 - Training and improving the AI model
 - Predicting coin toss results
 - Organizing data folders
- Which branch of mathematics is used to explore data and find middle values?**
 - Statistics
 - Linear Algebra
 - Calculus
 - Geometry
- A mathematical value of 0 in probability represents an event that is:**
 - Certain
 - Likely
 - Impossible
 - Even chance
- If an event is sure to happen, its probability value on the scale is:**
 - 0
 - 0.5
 - 1
 - 100
- What is the probability of getting "Heads" when you toss a fair coin once?**
 - 0
 - 0.5
 - 1
 - 0.75
- Which application uses Statistics to compare current conditions with past seasons to provide information to the public?**
 - Self-driving cars
 - Weather forecasting
 - Face recognition
 - Language translation
- Statistics is defined as the process of:**
 - Writing code for AI
 - Collecting, exploring, and analyzing data to draw conclusions
 - Creating 3D models from images
 - Designing computer hardware

10. **Which branch of math would be used to calculate the total number of cars in a city?**
 - a) Calculus
 - b) Probability
 - c) Linear Algebra
 - d) Statistics
11. **An "Even Chance" on the probability scale is represented by the value:**
 - a) 0.1
 - b) 0.5
 - c) 0.9
 - d) 1.0
12. **In a bag containing only blue balls, the probability of picking a red ball is:**
 - a) 0
 - b) 0.5
 - c) 1
 - d) Unlikely
13. **Which application of statistics helps governments identify areas where vaccination drives need to be improved?**
 - a) Sports
 - b) Disaster management
 - c) Disease prediction
 - d) Weather forecast
14. **When AI "sees" patterns in data like images and speech, it is acting similarly to:**
 - a) A calculator
 - b) A human being
 - c) A hard drive
 - d) A printer
15. **Probability is used in real life for which of the following?**
 - a) Finding middle values
 - b) Training models
 - c) Predicting heavy traffic during certain hours
 - d) Counting total students in a school

MCQ Answer Key: 1-b, 2-c, 3-b, 4-a, 5-c, 6-c, 7-b, 8-b, 9-b, 10-c, 11-b, 12-a, 13-c, 14-b, 15-c.

Part B: 2-Mark Questions (10 Marks)

1. **Explain the relationship between Math and AI using the concept of "patterns."**
 - Math is the study of patterns, while AI is a way to recognize those patterns (in numbers, images, or language) to take decisions.
 2. **Define "Statistics" and list two of its primary functions.**
 - Statistics is used for collecting, exploring, and analyzing data. Its primary functions include helping draw conclusions and making informed decisions based on data.
 3. **Differentiate between a "Certain" event and an "Impossible" event with one example for each.**
 - A **Certain** event has a probability of 1 (e.g., the sun rising), while an **Impossible** event has a probability of 0 (e.g., picking a red ball from a bag of blue balls).
 4. **Identify the specific use of Linear Algebra and Calculus in AI.**
 - **Linear Algebra** is used for finding unknown or missing values (e.g., total cars in a city), while **Calculus** is used for training and improving the AI model (e.g., determining the slant of a line).
 5. **How do computers use statistics for weather forecasting?**
 - Computers compare current weather conditions with information about past seasons and conditions to predict future weather patterns.
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Part C: 4-Mark Questions (20 Marks)

1. **Describe the four types of mathematical concepts essential for AI and provide a real-world example for each.**
 - **Statistics:** Exploring data (e.g., finding the middle value of a dataset).
 - **Calculus:** Training/improving models (e.g., reducing errors by adjusting model parameters).
 - **Linear Algebra:** Finding unknowns (e.g., estimating total students in a school).
 - **Probability:** Predicting events (e.g., estimating the chance of rain).
2. **Explain the "Probability Scale" and define the five markers from 0 to 1.**
 - The scale measures how likely an event is to happen. The markers are: **0 (Impossible)**, **Unlikely** (less than 0.5), **0.5 (Even Chance)**, **Likely** (more than 0.5), and **1 (Certain)**.
3. **Discuss the importance of Statistics in "Disaster Management" and "Disease Prediction."**
 - In **Disaster Management**, statistics help authorities alert citizens and assess risks. In **Disease Prediction**, governments use statistics to track where cases (like COVID-19) are increasing to improve treatments or vaccination drives.
4. **State the mathematical formula for Probability and use it to calculate the probability of rolling an even number on a standard 6-sided die.**
 - Formula:
$$P(A) = \frac{\text{Number of favorable outcomes to A}}{\text{Total number of possible outcomes}}$$
 - Calculation: Favorable outcomes (2, 4, 6) = 3; Total outcomes = 6. Probability = 3/6 or 1/2 (0.5).
5. **Using a real-world scenario like "Traffic Estimation," explain how probability helps individuals make decisions.**
 - If there is a 90% probability of heavy traffic during peak hours (6:00 PM to 7:30 PM), a person can use this data to decide to wait or choose an alternative route, demonstrating how probability aids in informed decision-making.