Senior 2 Mathematics – Complex Scenario-Based Questions (Batch 2)

Item 1 – Numbers and Percentages
A farmer has a total of 450 fruit trees consisting of mango, avocado, and orange trees. Mango trees make up 40% of the total trees. The number of avocado trees is twice the number of orange trees.
Task
A. Calculate the number of mango trees.
B. Find the number of avocado trees and orange trees.
C. If each mango tree yields 25 fruits, each avocado tree yields 40 fruits, and each orange tree yields 30 fruits, calculate the total number of fruits harvested.
D. The farmer sells 75% of the total fruits. How many fruits are left unsold?

Item 2 – Algebra: Simultaneous Equations
Two friends, Amina and Brian, are saving money. Amina has three times as much money as Brian. Together they have 32,000 shillings. After Amina spends 5,000 shillings and Brian spends 2,000 shillings, they still have equal amounts.
Task
A. Let x represent the amount Brian has. Write simultaneous equations for the situation.
B. Find how much money Amina and Brian initially had.
C. Verify the solution by checking the equality after spending.

Item 3 – Geometry: Angles and Shapes
A regular hexagon is inscribed in a circle of radius 10 cm. A triangle is formed by joining every alternate vertex of the hexagon.
Task
A. Calculate the measure of each interior angle of the hexagon.
B. Find the perimeter of the hexagon.
C. Calculate the length of the sides of the triangle formed inside the circle.
D. Calculate the area of the triangle.

Item 4 – Data Handling: Frequency Distribution and Averages
A survey on the number of books read by 30 students in a month gave the following data:
0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Frequency: 1, 2, 4, 5, 7, 4, 3, 2, 1, 0, 1
Task
A. Organize the data in a grouped frequency table with intervals 0-2, 3-5, 6-8, 9-11.
B. Calculate the mean number of books read.
C. Find the mode of the data.
D. Draw a bar graph to represent the grouped data.

Item 5 – Ratios and Proportions: Mixtures
A chemist mixes two solutions, A and B, in the ratio 5:3 to prepare 40 liters of a new solution. Solution A costs 1500 shillings per liter, and Solution B costs 2000 shillings per liter.
Task
A. Calculate the amount of each solution used in the mixture.
B. Find the total cost of the mixture.
C. If the chemist wants to prepare 60 liters of the mixture with the same ratio, calculate the amount of each solution required.
D. Calculate the cost of the 60 liters mixture.

Item 6 – Probability: Cards and Dice
A game uses a pack of 52 cards. A player draws two cards one after the other without replacement.
Task
A. Calculate the probability of drawing two kings.
B. Find the probability of drawing a heart and then a club.
C. If the player rolls two dice, calculate the probability that the sum of the dice is 7.

Item 7 – Sequences and Patterns: Growth
A plant grows such that its height increases by 8 cm every week. After 3 weeks, its height is 28 cm.
Task
A. Write an expression for the height of the plant after n weeks.
B. Calculate the height after 10 weeks.
C. After how many weeks will the plant reach 100 cm?
D. If after 12 weeks the plant stops growing and loses 20% of its height due to drought, what will be its height?

Item 8 – Measurement: Area and Volume
A swimming pool is 20 meters long, 10 meters wide, and 1.5 meters deep. The pool is being filled with water at 100 liters per minute.
Task
A. Calculate the volume of the pool in cubic meters and liters.
B. How long will it take to fill the pool completely?
C. If 3 people use the pool for an hour and each uses 50 liters of water (due to evaporation and splash), calculate the new water level after usage.
D. Convert the volume lost to cubic meters.

Item 9 – Geometry: Circles and Arcs
A circular garden has a radius of 12 meters. A path 4 meters wide surrounds the garden.
Task
A. Calculate the area of the garden.
B. Find the area of the path surrounding the garden.
C. Calculate the length of the outer edge of the path.

D. If paving the path costs 6,000 shillings per square meter, find the total cost.

Item 10 – Algebra: Quadratic Equations
The height (h) in meters of a ball thrown into the air after t seconds is given by:
$h = -5t^2 + 30t + 2$
Task
A. Calculate the time when the ball reaches its highest point.
B. Find the maximum height attained.
C. Determine when the ball will hit the ground.
D. Sketch the graph of height against time, marking the maximum height.