Senior 3 Mathematics – Scenario-Based Questions (Batch 2)

Item 1– Numbers, Fractions & Percentages
A community decided to build a new well. The total cost of the project was 2,400,000 shillings. Different groups contributed as follows: Group A contributed 1/3 of the total cost, Group B contributed 25% of what Group A contributed, and Group C covered the remaining amount.
Task
A. Calculate the amount contributed by Group A.
B. Find how much Group B contributed.
C. Determine the contribution of Group C.
D. If Group C's amount was to be shared equally among 12 members, how much did each member contribute?

Item 2– Algebra and Linear Equations
A school organized a field trip and rented buses. Each bus can carry 50 students. The school had 250 students attending. The cost to rent one bus for the trip is 120,000 shillings. The school also budgeted 10,000 shillings per student for meals. The total budget spent was 1,550,000 shillings.
Task
A. Write an equation to represent the total cost based on the number of buses rented.
B. Calculate the number of buses rented by the school.
C. Find the exact amount spent on meals.
D. If 10 students could not attend and the number of buses stayed the same, what would be the new average meal cost per attending student?

Item 3 – Geometry and Trigonometry
A triangular plot of land has sides measuring 100 meters, 120 meters, and 150 meters. The owner wants to divide the plot into two smaller plots by drawing a straight fence from one vertex perpendicular to the opposite side.
Task
A. Calculate the area of the whole plot using Heron's formula.
B. Find the length of the perpendicular fence dividing the plot.
C. Calculate the area of each smaller plot.
D. If the owner sells the smaller plot with the larger area at 15,000 shillings per square meter, how much will he earn?

Item 4 – Data Handling and Statistics
A researcher collected data on daily rainfall (in mm) in a town over two weeks as follows:
12, 8, 0, 5, 20, 18, 15, 10, 0, 7, 25, 22, 10, 5
Task
A. Calculate the mean daily rainfall.
B. Find the median rainfall.
C. Determine the mode(s) of the rainfall data.

D. Represent the data in a grouped frequency distribution table using intervals: 0–5, 6–10, 11–15, 16–20, 21–25.

Item 5 – Ratios and Proportions
A factory produces two types of products: Product X and Product Y. The daily production ratio of X to Y is 7:5. Product X sells at 2,500 shillings each, and Product Y sells at 3,000 shillings each. The factory produces 2,400 products in total per day.
Task
A. Calculate the number of each product produced daily.
B. Find the total daily revenue from selling both products.
C. If the factory increases production of Product X by 20% and decreases Product Y by 10%, what will be the new production numbers?
D. Calculate the new total daily revenue after the change.

Item 6 – Probability and Statistics
A bag contains 8 red balls, 5 blue balls, and 7 green balls. Two balls are drawn randomly without replacement.
Task
A. Find the probability that both balls drawn are of the same color.
B. Calculate the probability that the two balls are of different colors.
C. If the balls are replaced after each draw, what is the probability of drawing a red ball twice in a row?

Item 7 – Sequences and Patterns
A bacteria culture grows such that the number of bacteria doubles every hour. Initially, there were 500 bacteria.
Task
A. Write an expression for the number of bacteria after n hours.
B. Calculate the number of bacteria after 6 hours.
C. How many hours will it take for the bacteria population to exceed 50,000?
D. If after 8 hours some antibiotics reduce the bacteria count by 70%, what will be the remaining number?

Item 8 – Measurement and Conversion
A rectangular water tank measures 4 meters in length, 3 meters in width, and 2.5 meters in height. The tank is filled at a rate of 60 liters per minute.
Task
A. Calculate the volume of the tank in cubic meters and liters.
B. How long will it take to fill the tank completely?
C. If the water is used at a rate of 40 liters per minute, how long will the full tank last?
D. Convert the tank's volume to gallons (1 cubic meter = 264.172 gallons).

Item 9 – Geometry: Circles and Arcs

A circular park has a radius of 14 meters. A path 3 meters wide surrounds the park.

Task

A. Calculate the area of the park.

B. Find the area of the path surrounding the park.

C. Calculate the circumference of the outer edge of the path.

D. If it costs 5,000 shillings per square meter to pave the path, what is 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:

$h = -4.9t^2 + 20t + 1.5$

Task

A. Calculate the time when the ball reaches maximum height.

B. Find the maximum height attained by the ball.

C. Determine when the ball hits the ground.

D. Sketch the height against time graph, marking the key points.