SENIOR FOUR MATHEMATICS

Scenario-Based Examination Paper 4

Time: 2 Hours 30 Minutes

Instructions

Answer all items in Section A

Answer ONE item from Part I and ONE item from Part II in Section B

Answer FOUR items in total

Silent non-programmable calculators may be used

Show all working clearly

Section A (Compulsory)

Item 1

A women's savings group started a small soap-making business. Amina invested 3,600,000 shillings, Grace invested 2,400,000 shillings, and Lydia invested 1,200,000 shillings. They agreed to share profits according to the ratio of their investments.

At the beginning of production, the total number of soap cartons in store was recorded as 132 written in base seven. After sales, the business made a total profit of 1,800,000 shillings, which was fully reinvested. As a result, the number of cartons increased to 180.

The group agreed to purchase raw materials every 12 days and to review financial records every 18 days. Both activities were first done on 10th February 2025.

Task

A. Calculate the amount of profit reinvested by Grace.

B. Determine the percentage increase in the number of soap cartons.

C. Find the next date on which both raw material purchase and financial review will occur on the same day.

Item 2

A school plans to produce desks and chairs for its classrooms. The school must produce at least 40 desks and at least 60 chairs. Each desk requires 5 hours of labor, while each chair requires 2 hours. The total labor time available is not more than 400 hours.

The profit from one desk is 25,000 shillings, while the profit from one chair is 15,000 shillings.

Task

A. Represent the above conditions using inequalities.

B. Draw the feasible region on a Cartesian plane.

C. Determine the number of desks and chairs that should be produced to maximize profit and state the maximum profit.

Section B

Part I (Answer ONE item from this part)

Item 3

A health officer carried out a survey in a community to study the use of three health services: vaccination, mosquito nets, and clean water supply. A total of 120 households were surveyed. Out of these households, 30 had none of the three services. A total of 50 households used vaccination services, 46 households used mosquito nets, and 40 households had access to clean water. Ten households used all the three services. Fourteen households used vaccination only, while 12 households used mosquito nets only. The number of households that used both vaccination and clean water only was 6 more than those that used both mosquito nets and clean water only.

Task

A. Determine the number of households that had access to clean water only.

B. Using your results, decide whether the health officer should recommend expansion of clean water services. Give a reason.

Item 4

A transport company recorded the number of passengers transported daily over a period of 60 days. The data obtained is shown below:

22, 35, 41, 28, 39, 45, 31, 26, 34, 48,
37, 29, 43, 36, 25, 40, 32, 27, 44, 38,
30, 46, 35, 28, 42, 33, 24, 41, 39, 47,
36, 31, 29, 45, 34, 26, 40, 37, 28, 43,
35, 32, 44, 38, 27, 41, 30, 46, 33, 29,
42, 36, 25, 39, 47, 34, 31, 28, 40, 35

Task

A. Present the data in a grouped frequency distribution table using class intervals of width 5.

B. Determine the median number of passengers transported.

C. Find the number of days on which fewer than 33.5 passengers were transported.

Part II (Answer ONE item from this part)

Item 5

A carpenter is designing a cylindrical water tank whose base area is 1,256 square centimeters. A client can either pay 850,000 shillings in cash or pay a deposit of 400,000 shillings followed by three equal monthly installments of 170,000 shillings.

The carpenter plans to cut the circular base of the tank from a triangular metal sheet with sides measuring 90 centimeters and 72 centimeters, with an included angle of 60 degrees.

Task

A. Advise the client on the cheaper payment option, giving a reason.

B. Determine whether the largest possible circular base that can be cut from the triangular sheet will fit the tank.

Item 6

A municipal council plans to construct a community park consisting of a triangular flower garden surrounded by a circular walking path. Two sides of the triangular garden measure 100 meters and 80 meters, with an angle of 45 degrees between them. The circular walking path passes through the three vertices of the triangular garden.

The region between the triangular garden and the circular path will be covered with paving stones at a cost of 28,000 shillings per square meter.

Task

A. Construct an accurate diagram representing the layout of the park.

B. Identify the type of triangle formed by the garden and give a reason.

C. Calculate the total cost of paving the region between the garden and the walking path.

END OF PAPER 4