1 425/2
MATHEMATICS
PAPER 2
APRIL/MAY-2026
$2\frac{1}{4}$ HOURS

CANDIDATE'S NAME: .....
CANDIDATE'S SIGNATURE: .....


# OS E-LEARNING PLATFORM
# END OF TERM 1 ASSESSMENT.
# S6. MATHEMATICS 425/2.
# Paper 2
# 2hours and 15 minutes

## INSTRUCTIONS TO CANDIDATES:

- *This paper consists of* **two** *sections;* **A** and **B**. *It has four examinations items.*
- Sections **A** and **B** have two items each.
- Section A is compulsory.
- Respond to one item from each section B
- *Respond to a total of* **three** *items.*
- *Any additional item(s) responded to will* **not** *be scored.*
- **All** *responses* **must** *be written in the response booklets/sheets provided.*  *Graph paper is provided.*
- *Silent non-programmable scientific calculators and mathematical tables with a list of formulae may be used.*

| FOR OFFICIAL USE ONLY | | | | | |
|---|---|---|---|---|---|
| **Section** | **A** | | **B** | | |
| **Item number** | **1** | **2** | **3** | **4** | **Total weights scored** |
| **Weights scored** | | | | | |
| **Assessor's initials** | | | | | |

## SECTION A
**(Respond to all items in this section)**

**Item 1:**

A non-governmental organisation (NGO), has been running a farmer support program in Masaka district aimed at improving coffee yields. They assume that increased fertilizer application leads to higher coffee production. To evaluate this, a random sample of 20 household farmers who participated in this program were interviewed, each using a different amount of fertilizer. For each farmer, they recorded the total fertilizer applied (in kg/acre) and their average coffee yield in bags per acre for the most recent harvest.

The NGO has set the following criteria for future action:

- **Support Plan**: If the assumption is true, the NGO will support the farmers with more fertilizers.
- **Expansion Condition**: The NGO plans to expand its program to a new group only if the chance of finding at least 4 selected farmers achieving a yield of 30 bags or more per acre is greater than 0.54.
- **Program Success Criterion**: The overall program is considered a success if the range of the middle 60% of the coffee yield data is less than 25 bags.

| Farmer ID | Fertilizer Application (kg/acre) | Coffee yield (bags per acre) |
|---|---|---|
| **1** | **10** | **15** |
| **2** | **25** | **30** |
| **3** | **15** | **18** |
| **4** | **30** | **35** |
| **5** | **20** | **25** |
| **6** | **5** | **12** |
| **7** | **35** | **40** |
| **8** | **12** | **16** |
| **9** | **28** | **32** |
| **10** | **18** | **20** |
| **11** | **40** | **45** |
| **12** | **8** | **14** |
| **13** | **22** | **28** |
| **14** | **32** | **38** |
| **15** | **17** | **22** |
| **16** | **29** | **34** |
| **17** | **11** | **17** |
| **18** | **38** | **42** |
| **19** | **6** | **13** |
| **20** | **55** | **48** |

You have been selected to take part in the analysis of the data above.

Help the NGO to;

a) Ascertain whether the it will support farmers with more fertilisers.
b) Propose a framework for deciding whether to expand the programme. Based on this framework, what would your recommendation be?
c) Determine whether the programme is a success and propose strategic recommendations for program enhancement. (hint use groups of 10 from the smallest coffee yield).

**Item 2**

Kigulu High School recently enrolled 200 new students into its A-Level science program. During the selection process, the cut-off grade for Mathematics was set higher than that for Biology. The administration recorded data on subject combinations and found that the probability of a student offering either Biology (B), Mathematics (M), or both is 70%, while the probability of a student offering both Biology and Mathematics is

20%. It is also known that the offering Biology and offering mathematics are independent and that probability of students offering biology is bigger than that of those offering mathematics. The school administration is now interested in understanding student subject preferences. They wish to determine the probability that a randomly selected student offers Biology, offers Mathematics, and offers Biology but not Mathematics. Additionally, they are reviewing whether to lower the mathematics cut-off grade to a Grade B. This decision will be based on whether the number of students offering only Mathematics is less than 100.

**Task:**

Help the administration determine:

(i) The probability that a student offers Biology
(ii) The probability that a student offers Mathematics
(iii) The probability that a student offers Biology but not Mathematics

(iv) The number of students who offer only Mathematics, and advise on whether to lower the cut-off grade.

## SECTION B

**(Respond to only 1 item )**

**Item 3**

The Israel Ministry of Défense (IMOD) is tracking a cargo aircraft involved in a sensitive operation.

A cargo aircraft, flying horizontally at a constant velocity of $100ms^{-1}$ and at a constant altitude of 200 meters above the horizontal ground, releases a package of emergency supplies

At this exact instant IMOD radar spots the aircraft and communicates to their drone in space positioned 150 km away from the aircraft's current position on a bearing $150^0$ relative to the cargo aircraft's position. The drone remains stationary at the altitude of the aircraft. The cargo aircraft maintains its velocity but changes the course to $N30^0E$ after the supplies are released.

If a missile is immediately fired from the drone at a maximum constant speed of $190ms^{-1}$ .

The IMOD is struggling to determine the emergency supplies' landing point a critical data point for the operation and the course the missile should take to intercept the cargo aircraft in the shortest time and range possible, thereby minimizing the extent of damage.

**Task**

Analyse the motion patterns in the context above and provide justified solutions to challenge the IMOD is facing

**Item 4.**

Two students $A$ and $B$ of $S$. 5 Physics class in Kansanga SS found two small metallic balls $P$ and $Q$ in the Physics laboratory and when they inquired about the masses of the balls, the laboratory
attendant provided them with a weighing scale to determine the masses. The students discovered that the two balls each had a mass of $2000g$.

Ball $Q$ was set stationary on a long table and ball $P$ was thrown towards $Q$ with a speed of 36 $kmh^{-1}$ in a straight line, the two balls collided and it was observed that after collision, they separated and moved with different speeds and in different directions, with $P$ making an angle of $30^0$ and $Q$, an angle of $60^0$, respectively with their original direction of motion.

A heated argument broke out between the two students during a discussion, with, A; saying that according to her knowledge of collisions, such a collision elastic while B argued that it is an inelastic collision.
The two students further argued that if ball P initially moved with speed $u\ ms^{-1}$ in a straight line accelerating uniformly at a rate, $a\ ms^{-2}$, increased its speed to $v\ ms^{-1}$ after a time interval , $t$
$s$, it would consequently cover a distance, $s$, given by $s = ut + \frac{1}{2}at^2\ metres$.
As a result of these arguments, they decided to approach other members of the class for help.

**Task:**
As a student of Physics and a member of the same class, help the two students to:
(a) (i) Clearly identify and state the principle upon which such an argument can be settled.

(ii) Draw a sketch diagram of the two balls after collision.

(iii) Find the speeds of $P$ and $Q$ respectively after collision, in metres per second.

(iv) Determine whether the collision is elastic or not. Hence identify which student had a valid argument about the collisions.

(b) (i) Draw a suitable sketch diagram showing the motion of ball P in the second case of their argument.

(ii) Prove the given equation of motion in the second case of their argument using the sketch diagram in (b) (i) above.

**END**

***"let's not become weary in doing good, for at the proper time, we will reap a harvest if we don't give up –Galatians 6:9"***

**I wish you a blessed holiday. 0756649221 for item banks**