ST MARK'S COLLEGE NAMAGOMA

S3 END OF YEAR ASSESSMENT ITEMS

535/1 - PHYSICS PAPER 1 2024

TIME: 2 HOURS

ITEM	SCORE
1	
2	
3	

INSTRUCTION:

Attempt all items each from a separate answer sheet.

NAME:…… ……. STREAM:……

ITEM 1

Two cars, **A** of mass **2000kg** and **B** of mass **1800kg** with speed **65km/hr** moving in the same direction collided at a junction. The driver of **car B** claims that **car A** driver was over speeding. The traffic police are not sure of who is in fault. A witness stated that the cars sticked **together** after collision making them move with a velocity **35km/hr** and one of the drivers was not wearing a seatbelt. To identify a vehicle that was over speeding before the crash, the high temperature of the brake pads was measured though using uncalibrated thermometer.

Hint:

Speed limit on this road is **70km/hr**

Length of mercury thread when in contact with the brake pad is **40cm**

Length of mercury thread at ice point is **10cm**

Length of mercury thread at steam point is **80cm**

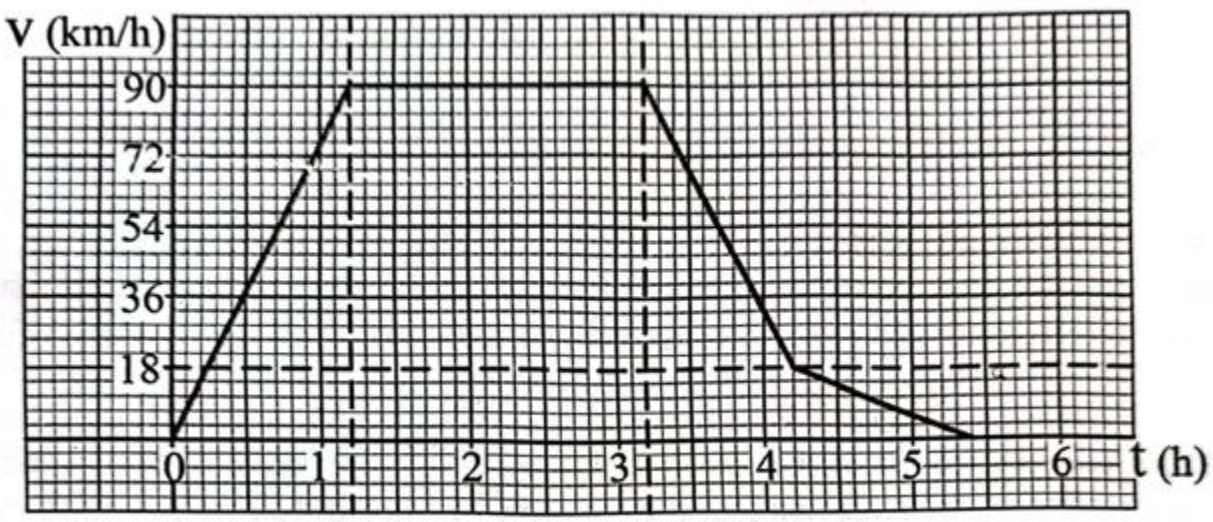
TASK

a) Guide the police on whether car A driver was over speeding
b) Advise the driver who was not putting on a seat belt on how it can safeguard his life
c) Assist the police to know the temperature of the brake pad.

ITEM 2

Your father has hired a black taxi to take the whole family to the village but is not aware of the total distance from your home to village. The taxi driver has informed your father that he charges **shs. 3000 per km** moved and that your father should not worry about the distance since he installed a machine in his car that shows the motion of the taxi in form of a velocity-time graph.

On your way to village people kept complaining of much heat in the taxi and on reaching village the taxi driver requested for his payment however your dad has refused to pay until he is helped to understand the graph drawn by the machine as shown below.



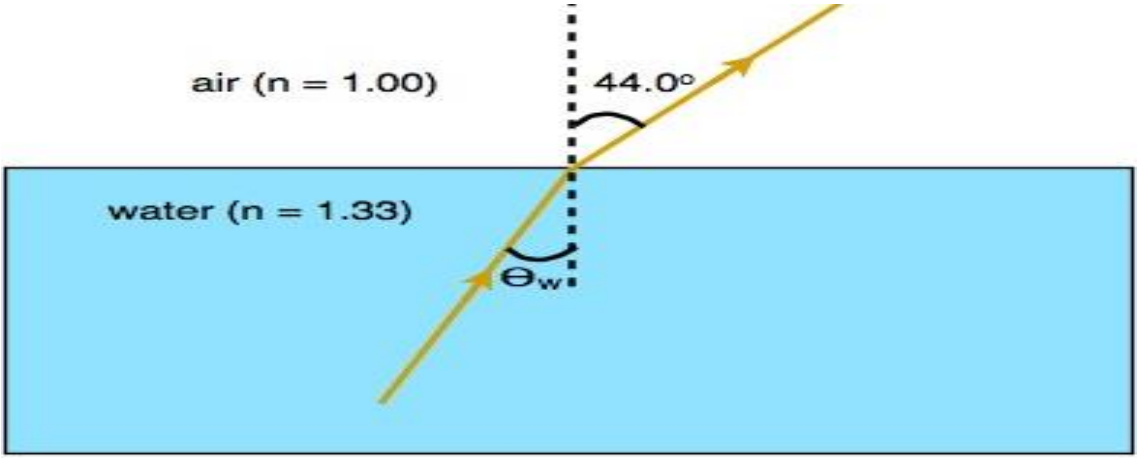
Task: help your father understand,

a) The motion of the graph from your home to village
b) Determine the amount of money he has to pay the driver
c) Why the family members were complaining of too much heat in the car.

ITEM 3

A student putting on a blue shirt and a yellow trouser stand behind a tall wall taking some water from a glass, on putting his pencil in a glass of water, he thought his pencil had got broken and he made a loud sound seeking for help. Three members of the rescue team arrived to help but they needed to climb the wall first to see the student which was tiresome, each of the rescue team members had a torch producing red, green and white light. The colours of the student's shirt and trouser changed when different light was shone on them at a time which brought confusion among the rescue team.

If a ray from the bottom of the pencil in the glass with water of refractive index 1.33 is incident at an angle Q and angle of refraction was 44.0^0, what was the angle of incidence θ_w as shown below.



Hint:

The rescue team has access to two plane mirrors, boxes, masking tape and glue

Task:

As a learner of physics,

a) Help the rescue know the device they can design to help them see the student without climbing and draw the design model
b) Help the rescue team understand the colour changes that happened and why
c) Help the learner understand why his pencil appeared bent and determine angle θ_w

END