DIOCESE OF KABGAYI
COLLEGE SAINTE MARIE REINE KABGAYI
END OF TERM I EXAMINATIONS, 2025-2026
DURATION: 3 HOURS
SUBJECT: PHYSICS
CLASS: SENIOR 6 PCB/ PCM
DATE:.../12/2025

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INSTRUCTIONS:

This exam has two sections: A &B

SECTION A: This section is compulsory (**70 marks)**

SECTION B: choose any three questions **(30 marks)**

NB: Write the answers in the provided space.

SECTION A: ATTEMPT ALL QUESTIONS (70 MARKS)

1. Select the option that best completes the statement or answers the question.

The characteristic of the final image formed by a simple microscope is **(2 marks)**

a) virtual, erect, and magnified

b) real, erect, and magnified

c) real, inverted, and magnified

d) virtual, inverted and magnified

2. What eye defect can be corrected using a concave lens? **(2 marks)**

a) Astigmatism

b) Hypermetropia/Farsightedness

c) Myopia/Nearsightedness

d) Presbyopia

3.Which one of the following instruments would you use to see a plant cell?**(2 marks)**

a) Periscope

b) Compound microscope

c) Simple microscope

d) Telescope

4.The astronomical telescope consists of objective and eyepiece. **(2 marks)**

The focal length of the objective is

a) equal to that of the eyepiece.

b) greater than that of the eyepiece.

c) shorter than that of the eyepiece.

d) five times shorter than that of the eyepiece.

5.Two men talk on the moon. Assuming that the thin layer of gases on the moon is negligible, which of the following is the right answer: **(2 marks)**

a) They hear each other with lower frequency

b) They hear each other with higher frequency

c) They can hear each other at such frequency

d) They cannot hear each other at all

6.a)If the statement is true, write true. If it is false, change the underlined word or words to make the statement true. **(2 marks)**

i. Loudness is how the ear perceives frequency

ii. Timber is a set of notes that are pleasing

b)A boy whistles a sound with the power of 0.5×10^{-4} W. What will be his sound intensity at a distance of 5m? (Where $I_o=10^{-12}W/m^2$) **(2 marks)**

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7. A fire truck travels north on a road at a speed of 40 m/s, emitting a siren sound at a frequency of 450 Hz. A person in a car is moving south at 20 m/s. Assume the speed of sound in air is 343 m/s.
(i) What frequency is heard by the person in the car as they approach the fire truck? **(3 marks)**

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(ii) What frequency is heard by the person as they move away from the fire truck? **(3 marks)**

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8.a) State two differences between sound and light waves **(2 marks)**
b)A particular organ pipe has a length of 72 cm, and it is open at both ends. Assume that the speed of sound in air is 340m/s.

i) Find the wavelength at the fundamental stationary waves in this pipe. **(2 marks)**

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ii) What is the corresponding fundamental frequency? **(2 marks)**

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9.a)A 2.5L container holds 0.45 moles of N_2 gas at 315K.What is the pressure inside the container $(R = 8.314 \frac{J}{mol}.K)$ **(3marks)**

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b) Why are application of physics very important to agriculture? **(3marks)**

[Give 3 reasons]

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10.a) Describe energy degradation/dilapidation which occurs when a 60w electric light bulb is in use. **(2 marks)**

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b) How does a hydroelectric power work? **(3 marks)**

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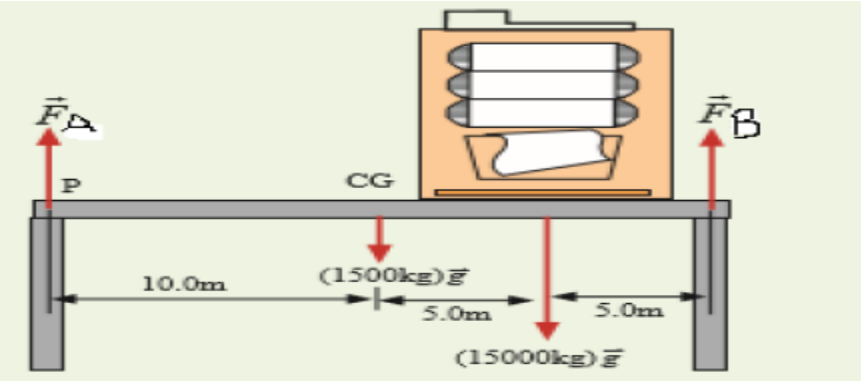
11.A uniform 1500kg beam, 20m long, supports a 15,000kg printing press 5 from the right support column, see the figure. Calculate the force on each of the vertical support columns. **(6 marks)**



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12.a) with the help of the diagram, explain the term couple of forces **(3marks)**

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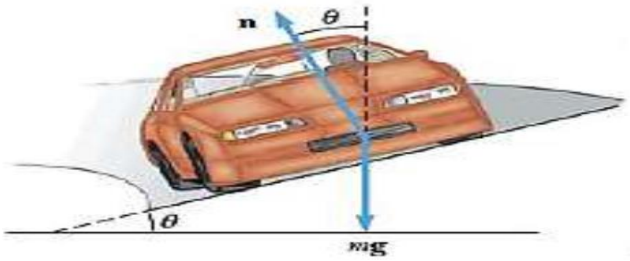
b)A car is coming around a corner at a fast speed of 40m/s. the turn has radius of curvature of 250m. At what angle would he hope the curve be banked. Use g=9.8m/s^2 **(5marks)**



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13.i) State Kirchhoff's laws **(2 marks)**

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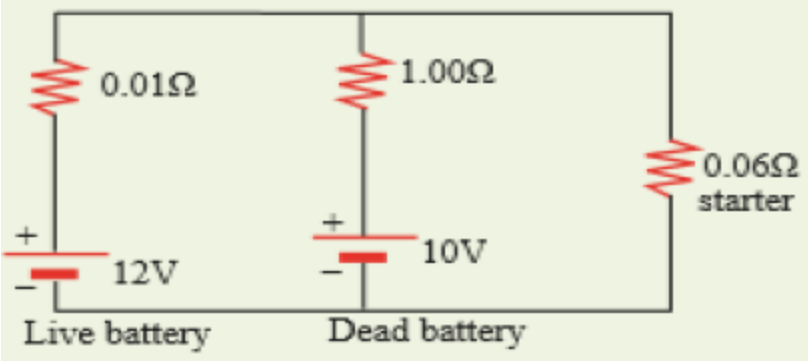
ii) A dead battery is charged by connecting it to the live battery of another car with jumper cables as shown in the figure. Determine the current in the starter and in the dead battery. **(4 marks)**



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14.A soccer ball is kicked off the ground at an angle of 40^o at the speed of 47m/s.[use g=9.81m/s^2]

a) Find the maximum height that the ball will reach(H_{max}) (**2marks)**

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b) Find the time it will take to hit the ground? (**2marks)**

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c) Find the horizontal distance travelled by the ball? (**2marks)**

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15.a) Define the electric potential and state its SI unit **(3 marks)**

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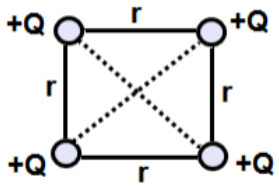
b) Four positive Q charges are arranged in the corner of a square as shown on the diagram. What is the net electric potential at the center of the square? **(4 marks)**



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SECTION B: Choose only three questions (30 MARKS)

16. Considering that the earth has always warmed and cooled naturally, people believe that human actions are mainly responsible for the present day accelerated global warming. Evaluate the validity of this statement. **(10 marks)**

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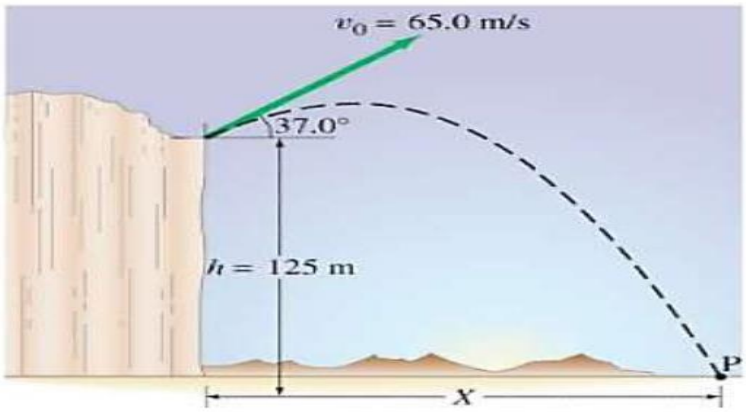
17.A projectile is shot from the edge of a cliff 125m above ground level with an initial speed of 65.0m/s at an angle of 37.0^0 with the horizontal, as shown in figure below.



a)Determine the time taken by the projectile to hit point P at ground level **(3 marks)**

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b)Determine the range X of the projectile as measured from the base of the cliff **(2 marks)**

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c)At the instant just before the projectile hits points P, find the horizontal and the vertical components of its velocity **(2 marks)**

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d)Find the magnitude of the velocity **(1 marks)**

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e)Find The angle made by the velocity vector with the horizontal. **(1 mark)**

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f)Find the maximum height above the cliff top reached by the projectile. **(1 marks)**

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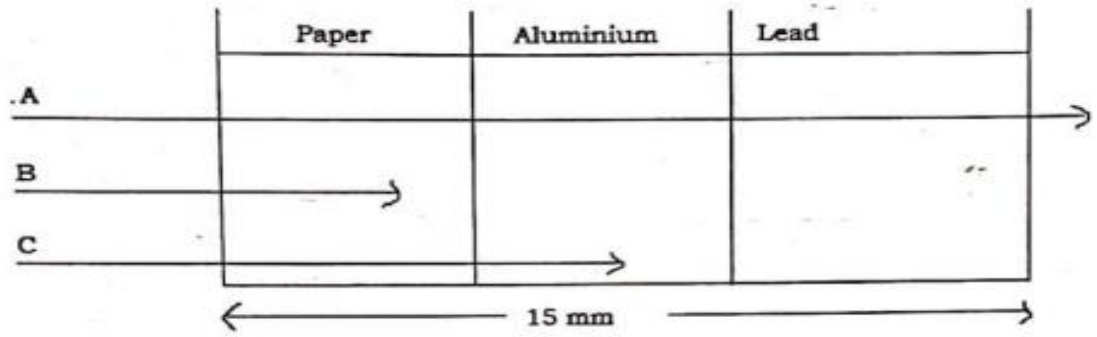
18. a)The following arrows in the figure below shows how different types of nuclear radiations penetrate different materials.



Identify the radiation A, B and C **(3marks)**

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b) The table below describes the nuclei of four atoms

uranium-234	radon-220	plutonium -238	americium-238
$^{234}_{92}U$	$^{220}_{86}Rn$	$^{238}_{94}Pu$	$^{238}_{95}Am$

i)All nuclei are unstable and have different **half-life** between each other

Explain the term **half-life** **(2marks)**

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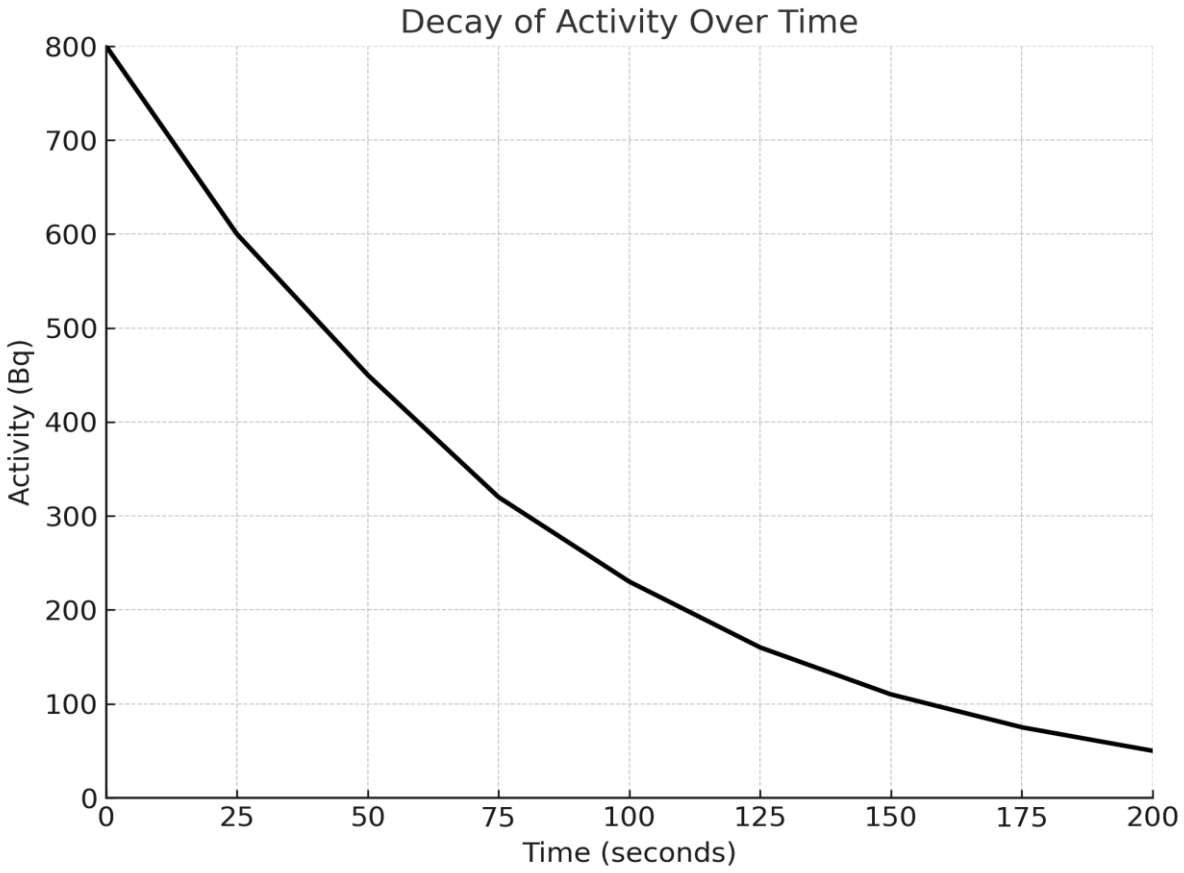
ii) The graph below shows how activity in Becquerel(Bq) of a sample of radon-220 changes with time in seconds**.**



Use the graph to find the half-life of radon-220 **(2marks)**

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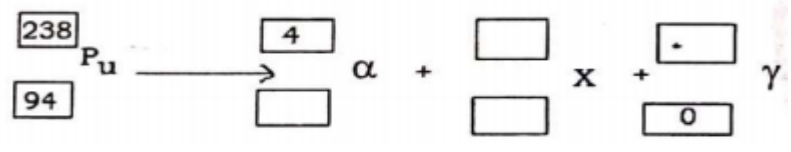
c)when plutonium-238 decays, it emits alpha particle and gamma particle

i)complete the following decay equations for plutonium-238



(2marks)

ii)identify the element X (**1mark)**

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19. a) State the conditions under which a rigid body is in equilibrium under the action of coplanar forces.**(2 marks)**

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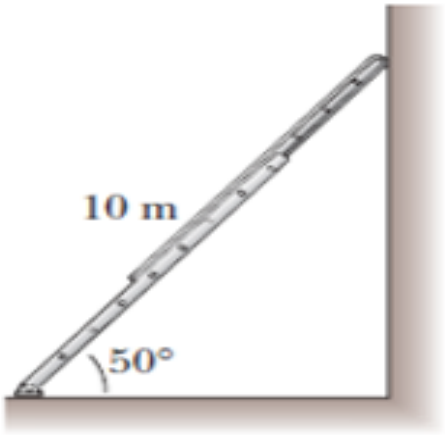
b) A uniform ladder 10.0 m long and weighing 50.0 N rests against a smooth vertical wall as in Figure below. If the ladder is just on the verge of slipping when it makes a 50^0 angle with the ground, find the coefficient of static friction between the ladder and ground. **(8marks)**



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