BAMENDA ARCHDIOCESAN EXAMINATION BOARD (BAEBOC)
MOCK G.C.E. EXAMINATION

MARCH 2026 **ADVANCED LEVEL**

Subject Title	**PURE MATHS WITH MECHANICS**
Paper Number	**PAPER 3**
Subject Code	**0765**

Duration: THREE HOURS

Full marks may be obtained for answers to ALL questions. All questions carry equal marks.

Mathematical formulae booklets published by the Board are allowed.

In calculations, you are advised to show all the steps in your working, giving the answer at each stage.

Calculators are allowed.

Start each question on a fresh page.

1) (i) A force F, where F= (18i +18 t j -36t k) N, acts at time t seconds on a particle of mass 3kg. Initially the particle is at the origin moving with velocity $(2i + j - 3k)\ ms^{-1}$. Find,

a) the acceleration of the particle at time t.
b) the velocity of the particles at time t.
c) when t=2, the kinetic energy of the particle. **(2, 3,3 marks)**

ii) A particle start from rest and moves with an acceleration of $(2v^2+1)\ ms^{-1}$ where v is the speed of the particle. Find the distance taken by the particle to attain a speed of 3mls. **(5 marks)**

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2)(i) A particles p, of mass 40kg placed on a rough horizontal plane, is connected to another particle Q, of mass 50kg hanging freely, by the means of a light inextensible string which passes over a smooth pulley at the top edge of the plane. Given that the plane is inclined at 30^0 to the horizontal and that the coefficient of friction between the plane and particle is $\frac{\sqrt{3}}{4}$. Find,

a) the acceleration of the particle and the tension in the string.
b) the magnitude and direction of the force exerted on the string by the pulley.

The particle Q hits the ground after travelling for 2 seconds and does not rebound.

c) Find the further distance which P covers before momentarily coming to rest. (take g as $10mls^2$) **(6,3, 4 marks)**

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3) A particle is projected with initial velocity $(20\sqrt{3}i + 20j)$ mls. Find
a) The speed and direction of the particle after 1 second.
b) The time of flight of the particle.
C) The range of the particle.
d) The maximum height attained by the particle.
e) The Cartesian equation of the path of the particle. **(4, 2, 2, 2, 3 marks)**

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4)i) A force F_1=(2i+3i-k) N, acts through a point with position vector r_1=(3i+6j+k)m. Another force F_2 = (i-2j+k)N acts through a point with position vector r_2 =(3i-j+4k)m,
a) Show that these forces are concurrent starting the position vector of their point of intersection.
b) Find also the line of action of the resultant of these forces. **(4, 3 marks)**

ii) A uniform leader rest with one end against a rough vertical wall and the other end on rough horizontal ground. When the ladder is inclined at θ° to the horizontal, it is at the point of slipping. Given that the coefficient of friction between the ladder and the ground and between the ladder and the wall is $\frac{1}{2}$, show that $\tan\theta = \frac{3}{4}$ **(6 marks)**

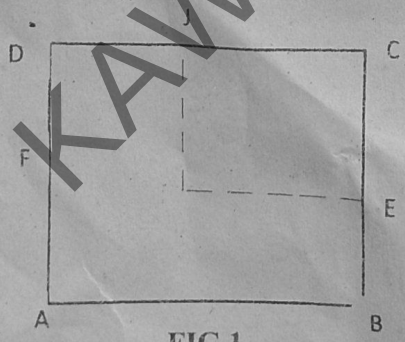

FIG 1

5) i) A uniform lamina is in the form of a square ABCD where AB=4a and BC= 4a. E and F are mid-point of BC and AD respectively while H and J are the mid points of EF and CD. A cut is made through the lamina along the line EH and the square section HECJ is folded along HJ so as to lie on top of FHJD. Find the center of gravity of the resulting lamina from AB and AD. **(7 marks)**

ii) A particle of mass 5kg moves in a horizontal circle on the smooth inner surface of a fixed spherical bowl of radius $\sqrt{3}$ m. The depth of the circle below the center of the bowl is 1m. Find in $rads^{-1}$, the angular speed of the particle and in N, the normal reaction of the bowl . **(6 marks)**

6) Two spheres A and B of equal masses lie on a smooth horizontal table. Sphere A is given a speed of μ ms^{-1} so that it strikes A at a distance of 12m from a vertical wall. Given that the coefficient of fraction between A and B and between B and the wall is $\frac{1}{4}$.

(a) Find the speeds of A and B after this collision.

B subsequently collides with A again after rebounding from the wall.

(b) Show that the second collision between A and B will take place at a distance of $\frac{24}{17}$ m from the wall.

(c) Find the time taken between the two collision **(6, 5. 2 marks)**

7) The constant non-gravitational resistance to the motion of a car of mass 1500kg is 500N. The engine of the car works at a constant rate of 20kw. Find the speed of the car when it is accelerating at the rate of $2ms^{-2}$

a) on a level road

b) up a smooth plane inclined at $\sin^{-1}\left(\frac{1}{10}\right)$ to the horizontal. **(4, 4 marks)**

ii) To a ship A, moving due north with a speed of $5ms^{-1}$, another ship, B, appears to be moving to A with speed $40ms^{-1}$ in the direction E 30^0S. Find to one decimal place the magnitude and direction of the true velocity of B. **(5 marks)**

8) (i) Two events A and B are such that $p(A) = \frac{1}{3}$, $P(B) = \frac{2}{3}$ and $P(A\backslash B) = \frac{1}{12}$, Find

a) $P(A \cap B)$

b) $P(B\backslash A)$

c) $P(A\backslash B^c)$ **(2,2,3 marks)**

(ii) In a certain village, one –quarter of the population has a particular disease. If a person has the disease the probability that a laboratory test will show positive result is $\frac{19}{20}$. If a person does not have the disease, the probability that a laboratory test will show negative result is $\frac{9}{20}$. A person is selected at random from the village and tested. Find the probability that

d) the test result is positive.

e) the person has the disease or the test result is positive **(3,3 marks)**

END