GAMBITOR

METIOX

Details

Name _____

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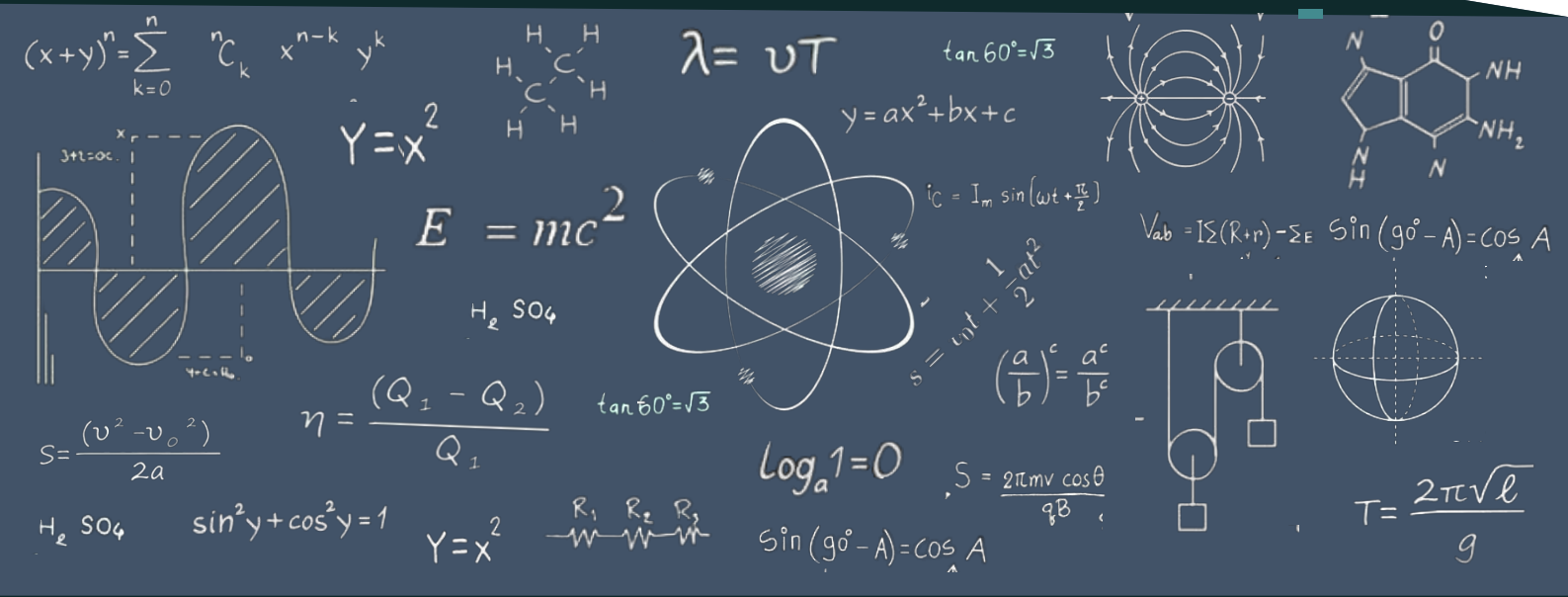


Q1.An ellipse is the locus of all those points in a plane such that the sum of their distance from two fixed points in the plane is constant. Can you find a way to construct an ellipse using a circle ? (Just pen down how you will do it.)

Now, we know that any planet revolves around the sun in an elliptical path. It is also given to you that the acceleration of the planet is inversely proportional to the square of distance between the planet and the sun. Derive Kepler's law of equal areas.
(Note : You can't use calculus even if you know what it is)

20 Marks

Q2.A sample of compound containing 4.87×10^{24} *molecules. The compound is composed of three elements. The molar mass of compound is 78 gm/mol, with atomicity and suppose there is prototype of Rutherford model in which the no. of particle that deviate is directly proportional to no. of electrons in the element at ground state- If in this model 1 billion particles are passed from each element and no. of particles that deviate are 1832090,152670,2137398 respectively.*

Find the molecular formula of the compound. This compound is burned in air to produce 72 grams of water, find oxygen required (in grams)
[Hint: On burner it produces H_2O, CO_2 , N_2 *only].*

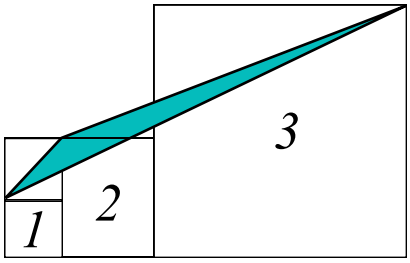
15 Marks

Q3.Calculate the shaded area (triangle) , and have 3 methods to do so:

15 Marks

Method1:- Using dimensions of Square 1= 10 cm
Method2:- Using dimensions of Square 2= 20 cm
Method3:- Using dimensions of Square 3= 39 cm

You can choose only one method and cannot revert otherwise zero marks will be allotted.



Q4.In ABC, let H denote its orthocenter. Let P be the reflection of A with respect to BC. The circumcircle of ABP intersects the line BH again at Q, and the circumcircle of ACP intersects the line CH again at R. Prove that H is the incentre of ΔPQR.

Definitions:

1. *Incenter is the point where angle bisectors of the triangle meet.*
2. *Orthocenter is the point where altitudes of the triangle meet.*
3. *Circumcircle is the circle which passes through the points of the triangle.*

10 Marks