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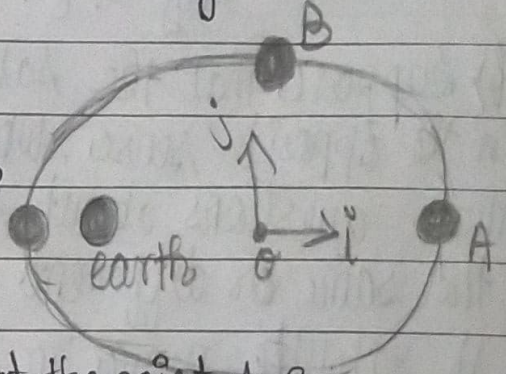
1) An artificial satellite orbits around the earth on an elliptical orbit of the kind illustrated in fig. The only appreciable force acting on the satellite is then the attractive gravitational force exerted on it by the earth, a force which decrease with increasing distance b/w the satellite & the earth.



a) Is the magnitude of the satellite's acceleration at the point C larger than, smaller than or the same as the magnitude of its acceleration at the point A ?

$(a)_C$ [>] a_A

b) Is the satellite's speed at the point C larger than, smaller than, or the same as its speed at the point A ?

$(V)_C$ [>] V_A.

c) Consider the components a_i & a_j of the satellite's acceleration along the indicated $\hat{i}$ & $\hat{j}$ directions. Is the acceleration components a_j at the point A positive, negative or zero ?

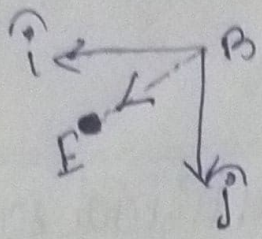
a_i = -ve

a_j = 0

d) Answer the same questions about the satellite's acceleration components at the point B.

From the central force for EB we can conclude that a_i = −ve

a_j = −ve.



e) Answer the same questions about the satellite's acceleration components at the point C.

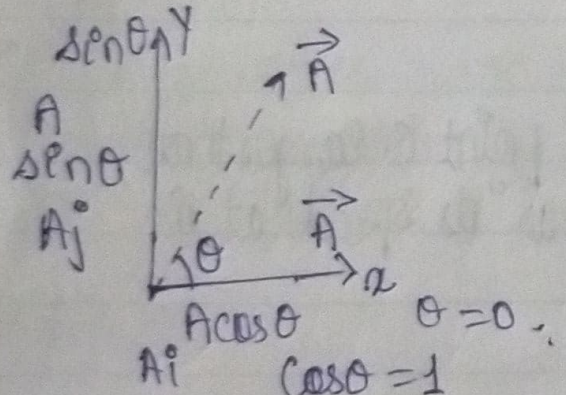
At C EC coincides OA i

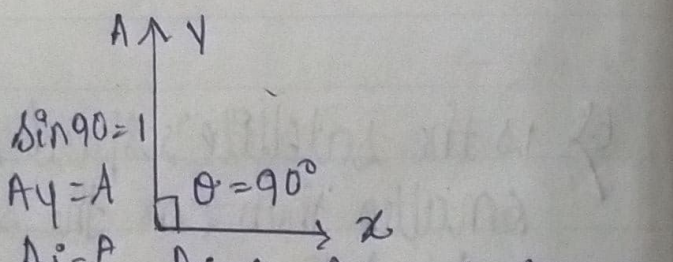
∴ a_i = +ve

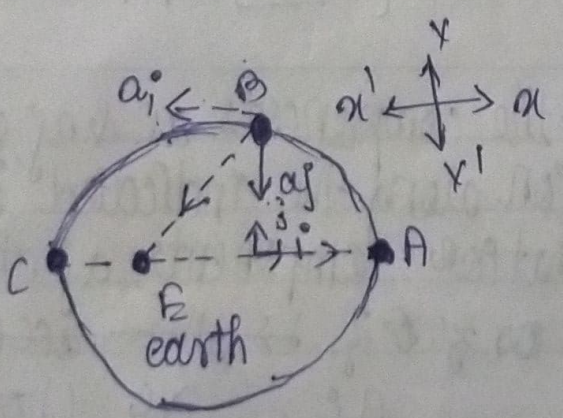
a_j = 0.

f) Suppose that the sattelite were moving around its orbit in the opposite sense. Would the answers to the preceeding three questions about the acceleration components then be the same or different?

If satellite moves in anticlockwise then still the acceleration component remain the same.







MCQs

1) How much is the gravitational force that keeps an artificial satellite of mass 3500 kg in orbit around the earth at an altitude of 4200 km —

ii) 12500 N

2) The value of g is maximum.

i) at poles of earth.

3) A stone is thrown vertically upwards & caught at the point of projection after 10 seconds. The time taken by the stone to reach the highest point is —

i) 5 sec.

4) The period of a satellite in a circular orbit of radius R is T, the period of another satellite in a circular orbit of radius 4R is —

iii) 8t.