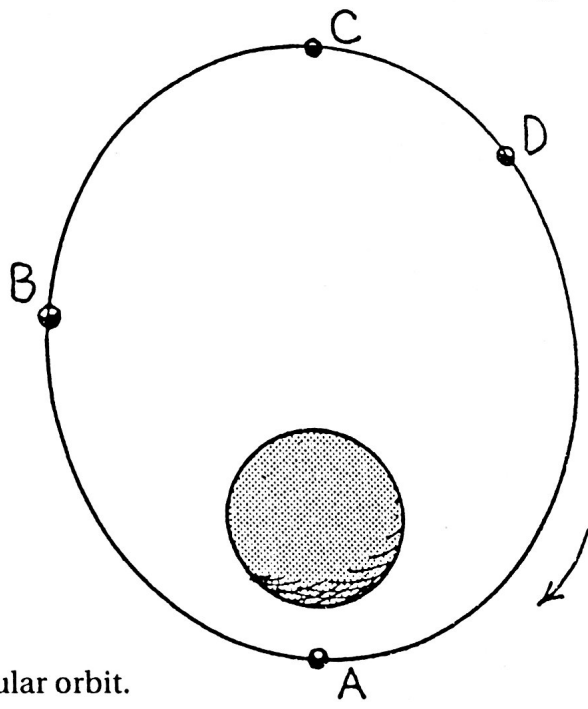


**Mechanics Overview**

1. The sketch shows the elliptical path described by a satellite about the earth. In which of the marked positions, A - D, (put S for "same everywhere") does the satellite experience the maximum

- a. gravitational force?   A
- b. speed?   A
- c. momentum?   A
- d. kinetic energy?   A
- e. gravitational potential energy?   C
- f. total energy (KE + PE)?   S
- g. acceleration?   A
- h. angular momentum?   S



2. Answer the above questions for a satellite in circular orbit.

- a.   S      b.   S      c.   S      d.   S      e.   S      f.   S      g.   S      h.   S

3. In which position(s) is there momentarily no work being done on the satellite by the force of gravity? Why?

  A and C because no force component in direction of motion.  

4. Work changes energy. Let the equation for work,  $W = Fd$ , guide your thinking on these: Defend your answers in terms of  $W = Fd$ .

a. In which position will a several-minutes thrust of rocket engines pushing the satellite forward do the most work on the satellite and give it the greatest change in kinetic energy? (Hint: think about where the most distance will be traveled during the application of a several-minutes thrust?)

  A, where force acts over longest distance.  

b. In which position will a several-minutes thrust of rocket engines pushing the satellite forward do the least work on the satellite and give it the least boost in kinetic energy?

  C, where force acts over shortest distance.  

c. In which position will a several-minutes thrust of a retro-rocket (pushing opposite to the satellite's direction of motion) do the most work on the satellite and change its kinetic energy the most?

  A, most "negative work" and most KE occurs where force acts over the longest distance.