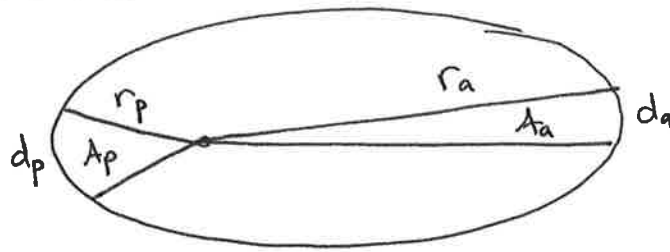


ASGV1 EX 17.3 (Kepler's 2nd law)



a) Mercury's perihelion distance is $r_p = 46 \times 10^6$ km

Its aphelion distance is $r_a = 70 \times 10^6$ km

Looking up Mercury's perihelion speed, I find that in one minute Mercury moves $d_p = 3540$ km

b) Using Kepler's law, we find that

$$d_a = d_p \cdot \frac{r_p}{r_a} = 2330 \text{ km in one minute}$$

c) Looking up the aphelion speed, Mercury moves in one minute a distance of 2339 km, which is very close

d) The area swept out during one minute can be found by approximating the areas as triangles:

$$A_p = \frac{1}{2} d_p r_p = 81e9 \text{ km}^2$$

$$A_a = \frac{1}{2} d_a r_a = 82e9 \text{ km}^2$$

which is very close

Kepler's 2nd law says that equal areas are swept out in equal times.