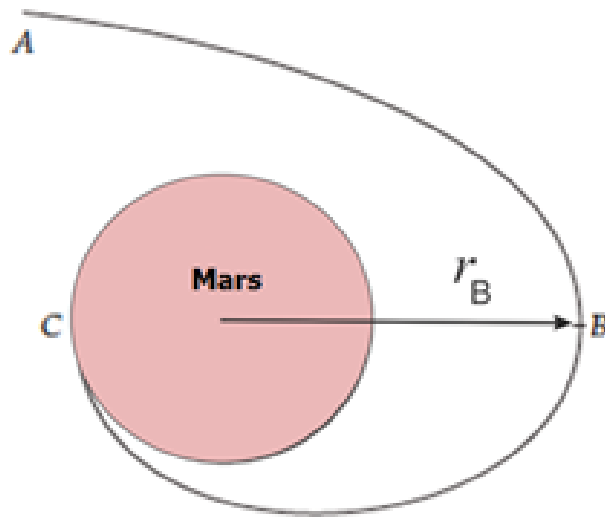


Mars (10 points).

A spacecraft of mass $m=5.0 \times 10^4 \text{ kg}$ approaches in a parabolic orbit AB , with respect to Mars. When the spacecraft reaches point B of least distance to the center of Mars, $r_B = 6.8 \times 10^6 \text{ m}$, it undergoes an instantaneous deceleration using its rockets and goes into a perfectly calculated orbit so that it will touch the Martian surface exactly at point C , diametrically opposite B , as shown in the figure.



- | | | |
|-----|---|-------|
| 3.1 | Determine the speed (km s^{-1}) of the spacecraft at point B just before the deceleration. | 3.0pt |
| 3.2 | Calculate the total energy (J) of the spacecraft as it is moving between points B and C . | 4.0pt |
| 3.3 | Calculate the speed (km s^{-1}) of the spacecraft at point C . | 3.0pt |