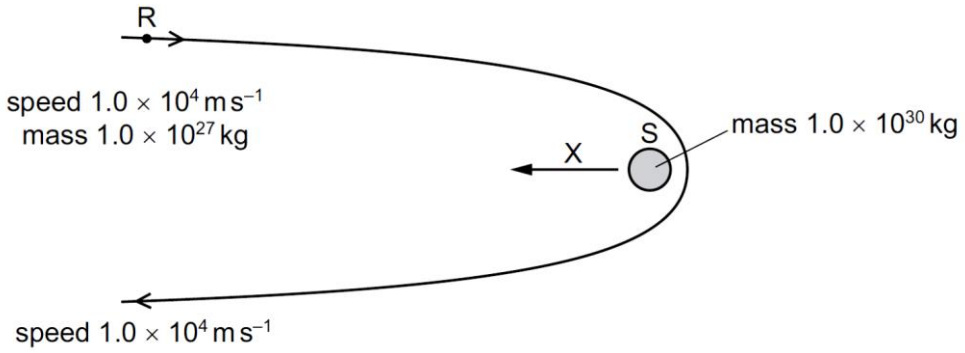
9 A rock R of mass 1.0×10^{27} kg is at a large distance from a star S and is travelling at a speed of 1.0×10^{4} m s^{-1}. The star has mass 1.0×10^{30} kg. The rock travels around the star on the path shown so that it reverses its direction of motion and, when finally at a large distance from the star again, has the same speed as initially.



Which statement is correct?

A The change in the momentum of S is in the direction of arrow X.

B The change in the velocity of S is approximately 20 m s^{-1}.

C The magnitude of the change of momentum of R is 10^{3} times greater than the magnitude of the change of momentum of S.

D The momentum of R does not change.