2

(a)

Explain what is meant by *the linear momentum of a body*.

……

……

……...……

[1]

(b)

Deep space probes often carry modules which may be ejected from them by an explosion. A space probe of total mass 800 kg is travelling in a straight line through free space at 165 m s^{-1} when it ejects a capsule of mass 170 kg explosively, releasing energy. Immediately after the explosion, the empty probe continues to travel in the original direction but at 235 m s^{-1}, as shown in Fig. 2.1.

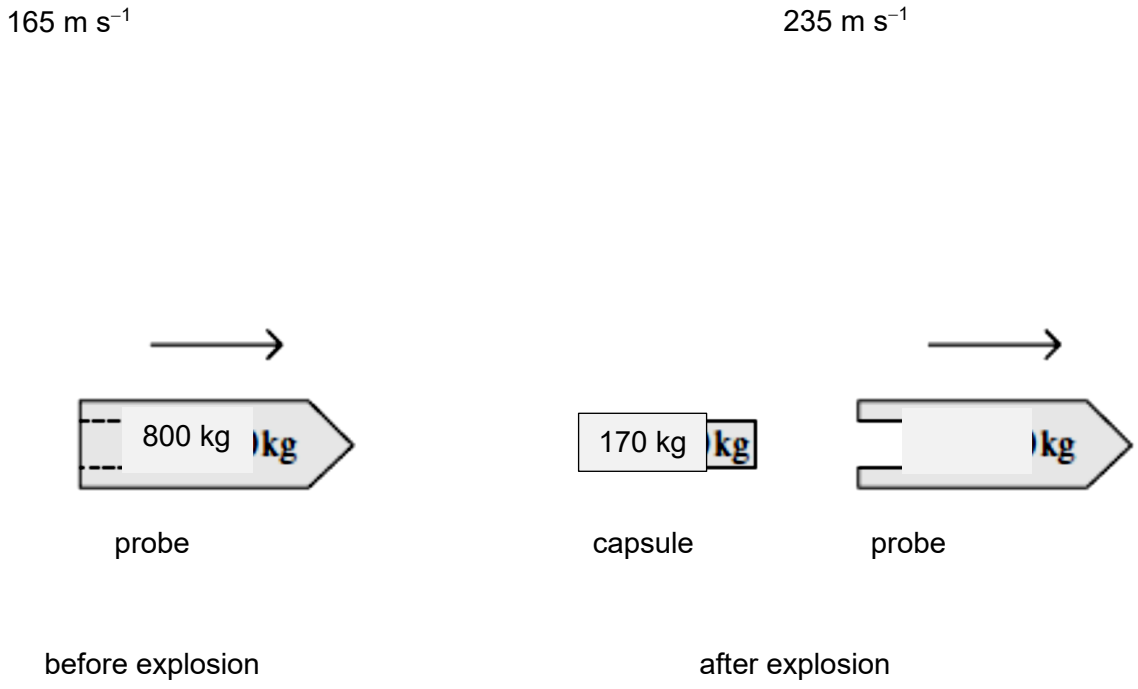

Fig. 2.1

(i)

Calculate the magnitude and direction of the velocity of the capsule immediately after the explosion.

magnitude = …… m s^{-1}

direction = ……..

[3]

(ii)

Determine the total amount of energy given to the probe and capsule by the explosion.

total energy = …… J

[3]