| Question Number | Answer | Mark |
|---|---|---|
| **16(a)** | Use of $p = m\,v$ **(1)**<br>Use of momentum conservation **(1)**<br>$v = 0.04$ m s$^{-1}$ **(1)**<br>Towards O , away from S, to left (dependent on MP3) **(1)**<br><br>Example of Calculation<br>1350 kg × 0.82 m s$^{-1}$ + 2950 $v$ – 2100 kg × 0.58 m s$^{-1}$ = 0<br>$v$ = (1218 – 1107) kg m s$^{-1}$ ÷ 2950 kg = 0.0376 m s$^{-1}$ | **4** |
| **16(b)(i)** | The rocket motor exerts a force on the gases, so the gases exert a force on the rocket motor **(1)**<br><br>The forces are equal and opposite according to Newton's third law (dependent on MP1) **(1)**<br><br>So there is a resultant/net/unbalanced force on the descent module, which accelerates according to Newton's second law (accept Newton's first law)(independent mark) **(1)** | **3** |
| **16(b)(ii)** | Use of $v = u + at$ to find $a$ **(1)**<br>Use of $\Sigma F = m\,a$ **(1)**<br>$\Sigma F = 3.4 \times 10^2$ N **(1)**<br><br>Example of Calculation<br>$a$ = 0.58 m s$^{-1}$ ÷ 5 s = 0.116 m s$^{-2}$<br>$\Sigma F = m\,a$ = 2950 kg × 0.116 m s$^{-2}$ = 342.2 N | **3** |
| | **Total for question 16** | **10** |