MOTION OF COMETS

1 A comet, travelling in space, enters the atmosphere of a planet.

Fig. 1.1 is the speed-time graph for the comet from time $t = 0$ s.

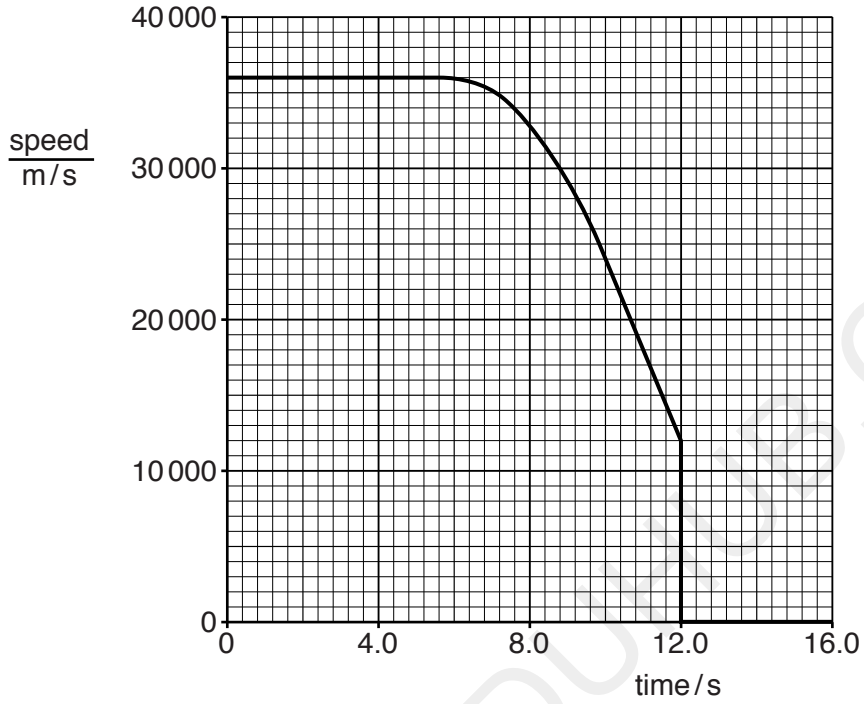

Fig. 1.1

(a) (i) During the period $t = 0$ s to $t = 6.0$ s, both the speed of the comet and the velocity of the comet remain constant.

State what this suggests about the motion of the comet.

.....

.....[1]

(ii) Determine the distance travelled during the period $t = 0$ s to $t = 6.0$ s.

distance = ...[2]

(b) Explain what the graph shows about the motion of the comet during the period $t = 6.0$ s to $t = 10.0$ s.

.....

.....

.....[2]

(c) Determine the acceleration of the comet at $t = 11.0\,s$.

acceleration = ...[2]

(d) Suggest what happens to the comet at $t = 12.0\,s$.

.....

.....[1]

[Total: 8]

(a) **(i)** (it / comet) travels in a straight line B1

(ii) area (under graph) OR s = vt in any form OR vt C1
220 000 m OR 220 km A1

(b) negative acceleration OR deceleration OR (it / the comet) is slowing down B1
acceleration / deceleration (only accept **it** if acc / decel already mentioned)
not constant allow either increasing or decreasing B1

(c) attempt at gradient OR (a =) $\Delta v / \Delta t$ OR (0–)12 000 / 2.0 OR other correct values for $\Delta v / \Delta t$ C1
(–)6000 m / s^2 tolerance 5000 – 7000 m / s^2 A1

(d) (it / comet) hits surface (of planet)
OR stops o.w.t.t.e. B1

[Total: 8]