1. A train is moving along a straight horizontal track between two points A and B.

In a model of the motion of the train

- at time $t = 0$ the train is moving with speed $20\,\text{m s}^{-1}$ as it passes A
- the train then moves with constant speed $20\,\text{m s}^{-1}$ for $12\,\text{s}$
- the train then decelerates at a **constant** rate $a\,\text{m s}^{-2}$ for $8\,\text{s}$, reaching a speed of $16\,\text{m s}^{-1}$
- the train then accelerates at $0.4\,\text{m s}^{-2}$ until it reaches B

Using the model,

(a) sketch a speed-time graph for the motion of the train between A and B,

(2)

(b) find the value of a.

(1)

The train travels $285\,\text{m}$ while it is **accelerating** at $0.4\,\text{m s}^{-2}$

Using the model,

(c) find the distance AB,

(3)

(d) find the total time taken for the train to move from A to B.

(3)

(e) State **one** limitation of the model of the motion of the train at time $t = 12\,\text{s}$.

(1)