1 **(a)** **(i)** Define *acceleration*.

.....

..... [1]

(ii) State Newton's first law of motion.

.....

..... [1]

(b) The variation with time t of vertical speed v of a parachutist falling from an aircraft is shown in Fig. 1.1.

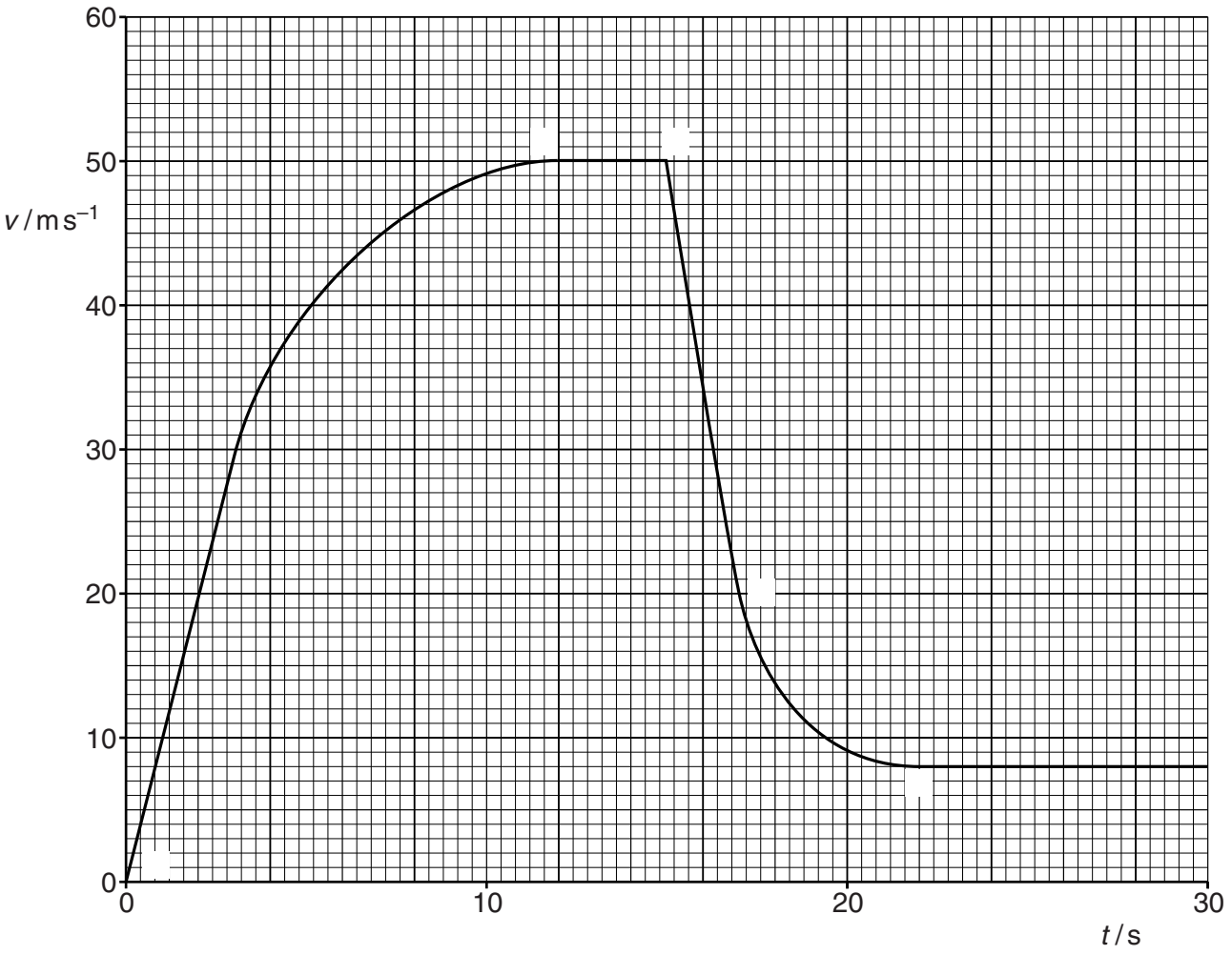

Fig. 1.1

(i) Calculate the distance travelled by the parachutist in the first 3.0 s of the motion.

distance = ... m [2]

(ii) Explain the variation of the resultant force acting on the parachutist from $t = 0$ (point A) to $t = 15$ s (point C).

.....

.....

.....

.....

..... [3]

(iii) Describe the changes to the frictional force on the parachutist

1. at $t = 15$ s (point C),

.....

.....

..... [1]

2. between $t = 15$ s (point C) and $t = 22$ s (point E).

.....

.....

..... [1]

(iv) The mass of the parachutist is 95 kg.

Calculate, for the parachutist between $t = 15$ s (point C) and $t = 17$ s (point D),

1. the average acceleration,

acceleration = ... $m\,s^{-2}$ [2]

2. the average frictional force.

frictional force = ... N [3]