3 A helicopter has a cable hanging from it towards the sea below, as shown in Fig. 3.1.

For Examiner's Use

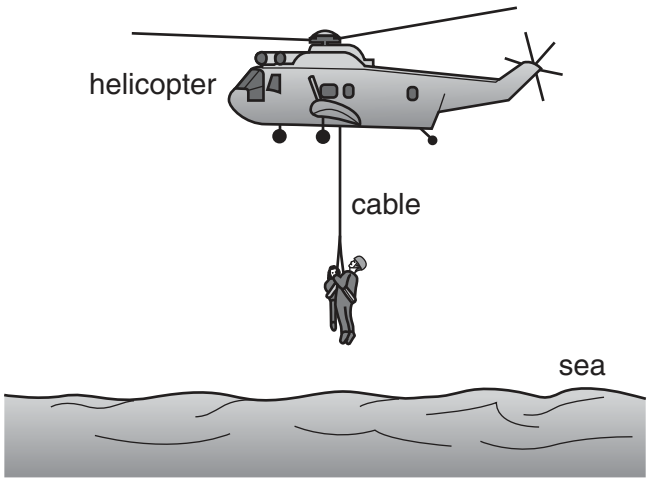

Fig. 3.1

A man of mass 80 kg rescues a child of mass 50.5 kg. The two are attached to the cable and are lifted from the sea to the helicopter. The lifting process consists of an initial uniform acceleration followed by a period of constant velocity and then completed by a final uniform deceleration.

(a) Calculate the combined weight of the man and child.

weight = ... N [1]

(b) Calculate the tension in the cable during

(i) the initial acceleration of $0.570\,m\,s^{-2}$,

tension = ... N [2]

(ii) the period of constant velocity of $2.00\,m\,s^{-1}$.

tension = ... N [1]

(c) During the final deceleration the tension in the cable is 1240 N. Calculate this deceleration.

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

(d) **(i)** Calculate the time over which the man and child are

1. moving with uniform acceleration,

time = ... s [1]

2. moving with uniform deceleration.

time = ... s [1]

(ii) The time over which the man and child are moving with constant velocity is 20 s. On Fig. 3.2, sketch a graph to show the variation with time of the velocity of the man and child for the complete lifting process.

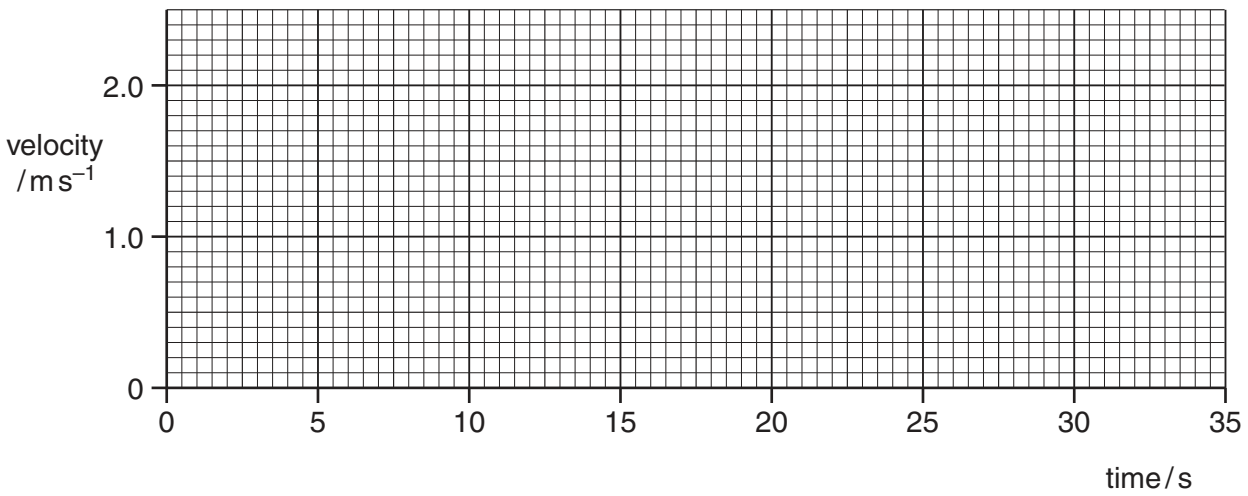

Fig. 3.2

[2]