2 A motor drags a log of mass 452 kg up a slope by means of a cable, as shown in Fig. 2.1.

For Examiner's Use

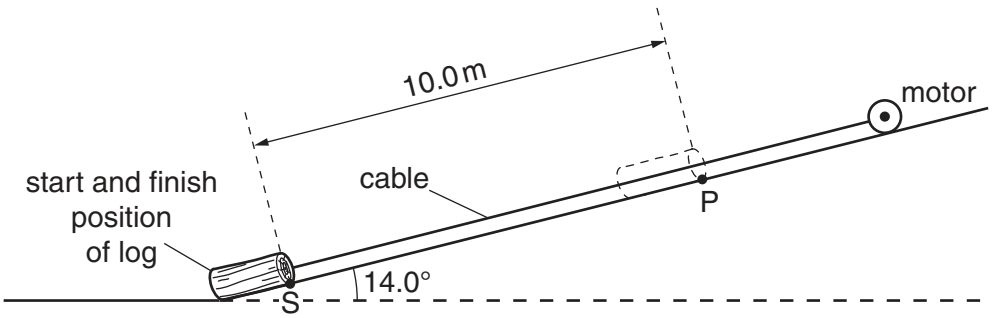

Fig. 2.1

The slope is inclined at 14.0° to the horizontal.

(a) Show that the component of the weight of the log acting down the slope is 1070 N.

[1]

(b) The log starts from rest. A constant frictional force of 525 N acts on the log. The log accelerates up the slope at 0.130 m s^{-2}.

(i) Calculate the tension in the cable.

tension = ... N [3]

(ii) The log is initially at rest at point S. It is pulled through a distance of 10.0 m to point P.

Calculate, for the log,

1. the time taken to move from S to P,

time = ... s [2]

2. the magnitude of the velocity at P.

velocity = ... $m\,s^{-1}$ [1]

(c) The cable breaks when the log reaches point P. On Fig. 2.2, sketch the variation with time t of the velocity v of the log. The graph should show v from the start at S until the log returns to S. [4]

Fig. 2.2

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