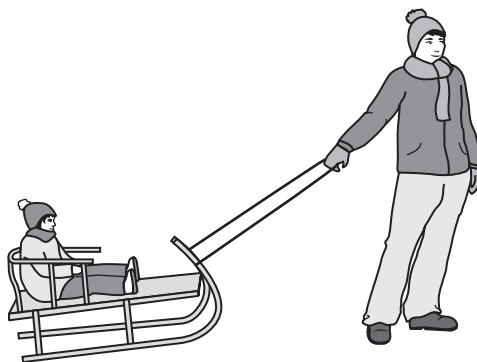**8** (a) The diagram shows a man pulling a child on a sledge.

The mass of the child and sledge is 45 kg.

The unbalanced force acting on the sledge is 49 N.

(i) State the equation linking unbalanced force, mass and acceleration.

(1)

(ii) Calculate the acceleration of the child and sledge.

(2)

acceleration = ... m/s²

(iii) Suggest a reason why the man must pull the sledge with a force that is greater than 49 N.

(1)

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(b) The sledge is then placed at the top of a hill.

When it slides down the hill, it accelerates at 1.3 m/s².

The sledge accelerates from rest for 2.4 s.

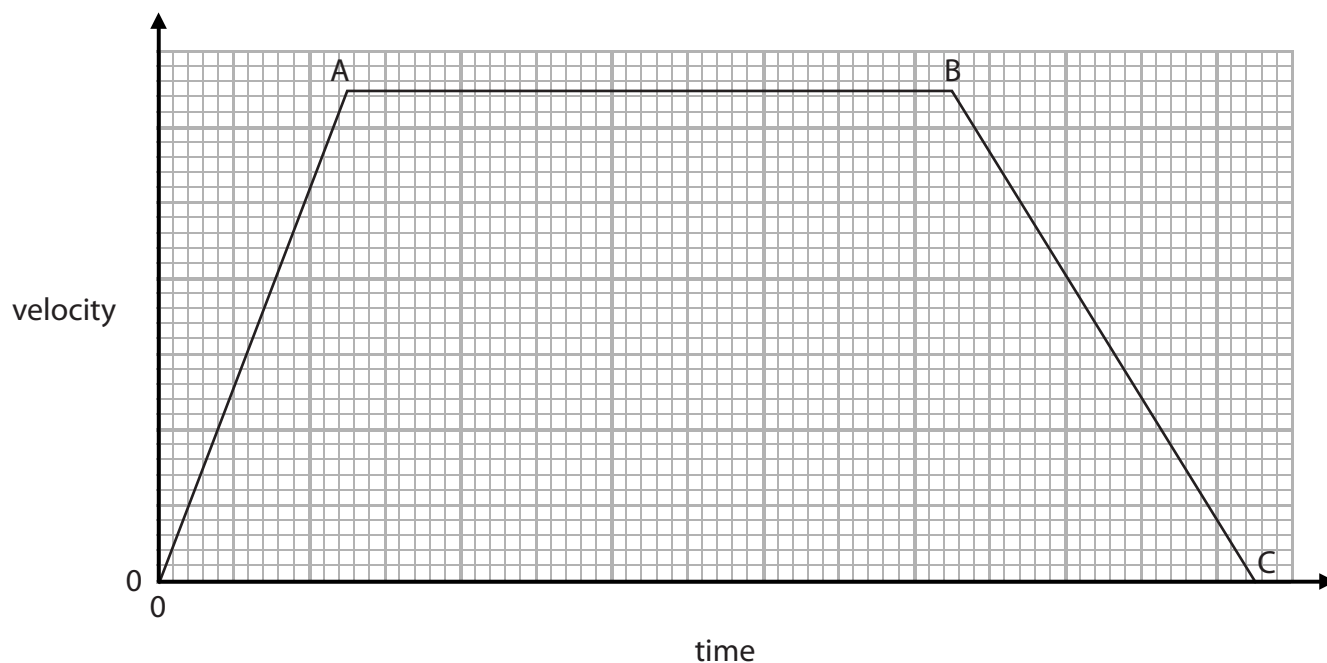(i) State the equation linking acceleration, velocity and time.

(1)

(ii) Show that the sledge reaches a speed of approximately 3 m/s after it has accelerated for 2.4 s.

(2)

(c) This velocity-time graph shows the motion of another sledge.

(i) Which feature of the velocity-time graph shows the distance travelled by the sledge?

(1)

....

(ii) Describe the motion of the sledge during the journey shown by the velocity-time graph.

(3)

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(Total for Question 8 = 11 marks)