3 **(a)** A truck R of mass 9400 kg moves with constant acceleration in a straight line down a slope, as illustrated in Fig. 3.1.

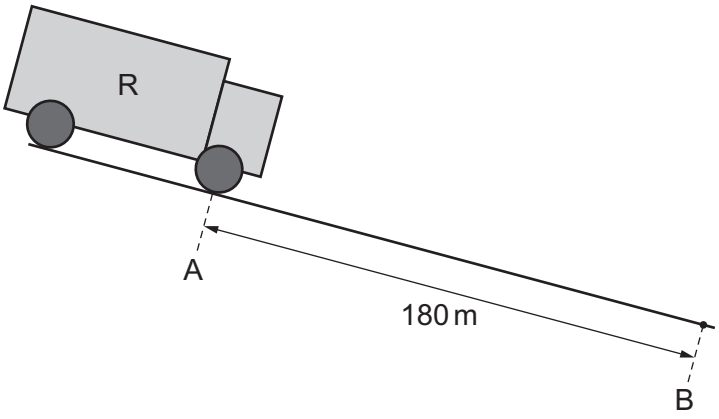

Fig. 3.1

At point A the speed of the truck is 13 m s^{-1} and at point B the speed of the truck is 22 m s^{-1}. A and B are a distance of 180 m apart.

(i) Calculate the acceleration of the truck between A and B.

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

(ii) Determine the gain in kinetic energy of the truck between A and B.

gain in kinetic energy = ... J [3]

(b) A short time after passing point B truck R moves in a straight line on horizontal ground. The driver of the truck applies the brakes. Fig. 3.2 shows the variation with time of the momentum of the truck.

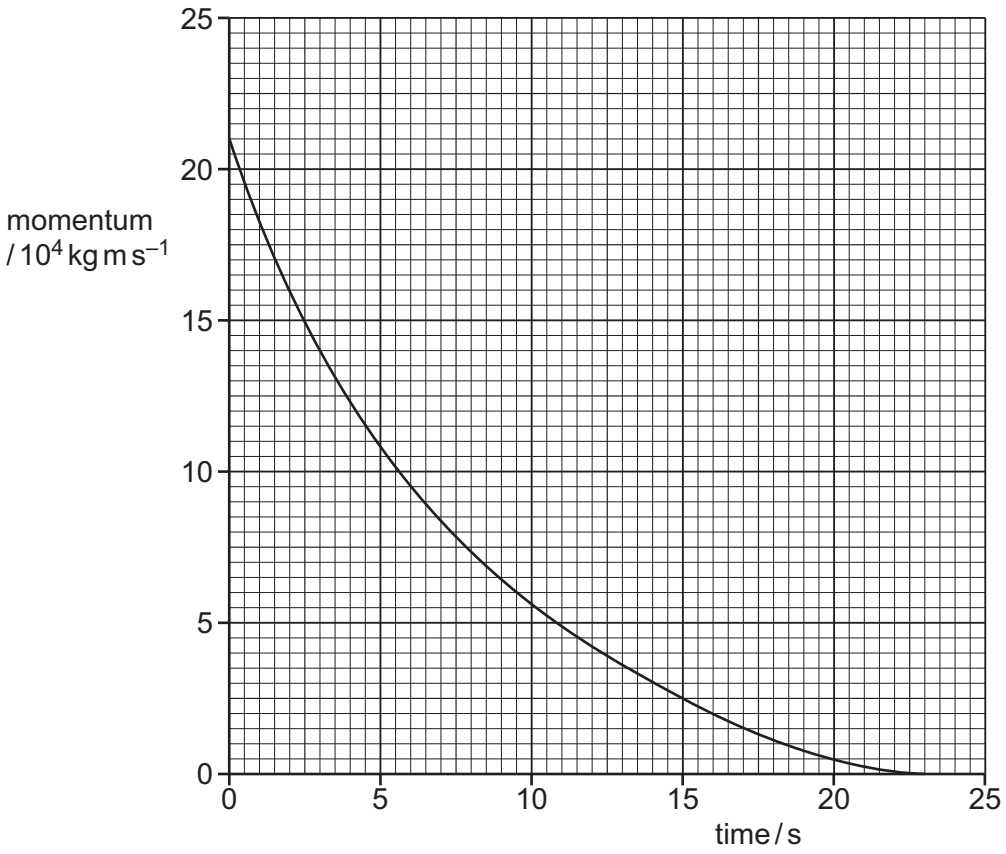

Fig. 3.2

(i) Define force.

.....

..... [1]

(ii) Show that the average resultant force F acting on truck R between time $t = 0$ and $t = 15\,s$ is $-1.2 \times 10^4\,N$.

[1]

(iii) An identical truck S has the same initial momentum as truck R. Truck S experiences a constant force equal to the force *F* in **(b)(ii)**.

State and explain whether truck S will take more, less or the same amount of time to come to rest as truck R.

.....

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.....

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.....

.....

..... [3]

[Total: 10]