4 A lorry carries a load of hot asphalt – a runny mixture of small stones and tar.

(a) The mass of the lorry and its load is 17 000 kg.

The velocity is 13 m/s.

(i) State the equation linking momentum, mass and velocity.

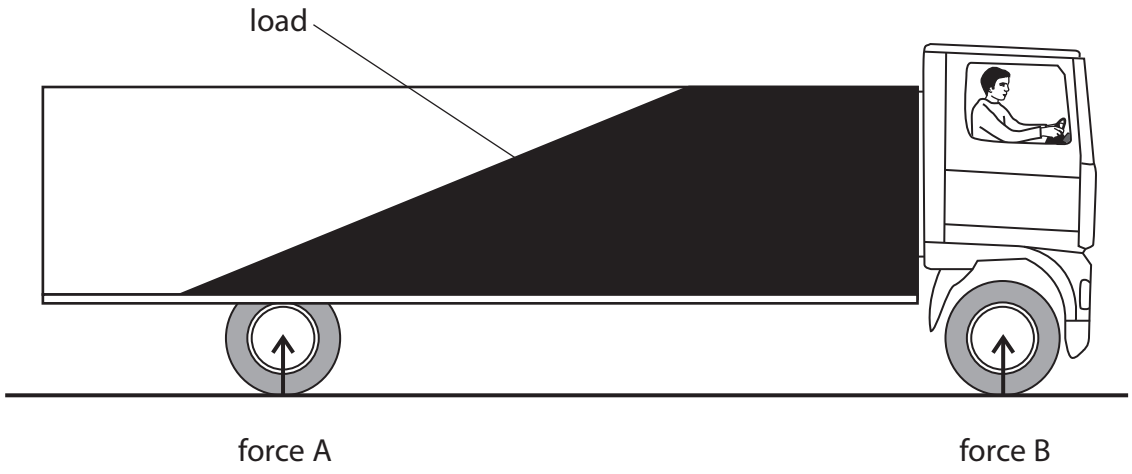
(1)

(ii) Calculate the total momentum of the lorry and its load.

(2)

momentum = ... kg m/s

(b) The lorry stops suddenly and the load slides to the front, as shown below.



Force A and force B are upward forces from the road on the lorry.

(i) Use ideas about momentum to explain why the load slides to the front when the lorry stops suddenly.

(2)

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(ii) Use ideas about moments to explain why force B increases when the load slides to the front.

(3)

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(c) The force on the road from one of the tyres is 53 000 N.

The pressure of the air in this tyre is 390 kPa.

(i) State the equation linking pressure, force and area.

(1)

(ii) Calculate the area of this tyre in contact with the road.

(2)

Area = ... m^2

(Total for Question 4 = 11 marks)