1   Fig. 1.1 shows Trolleys A and B of masses m_A = 1.21 kg and m_B = 2.41 kg move towards each other on a frictionless surface. A light spring is attached to Trolley B.

m_A = 1.21 kg m_B = 2.41 kg

Fig. 1.1

The trolleys collide head-on at time t = 0.10 s.

The momentum-time graphs for trolley A and trolley B are shown in Fig. 1.2.

Fig. 1.2
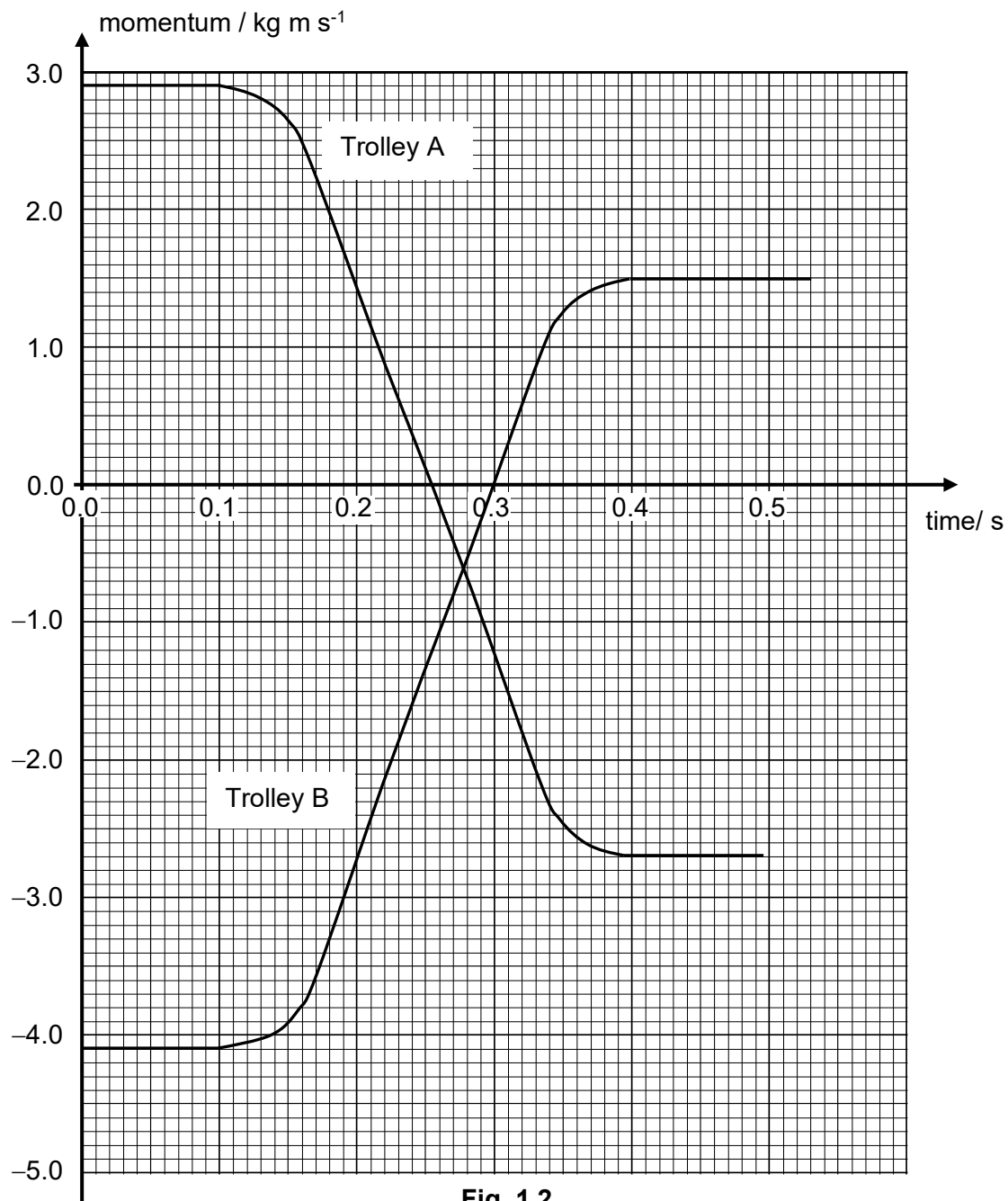
(a) State the *Principle of Conservation of Momentum*.

....

.... [2]

(b) **(i)** Read from Fig. 1.2 the momentum of trolley B when trolley A is momentarily at rest.

momentum = ... kg m s^{-1}

[1]

(ii) Explain the significance of your answer in **(b)(i)**.

....

.... [1]

(c) Explain quantitatively, but without using calculations of kinetic energy, whether the collision is elastic.

.... [3]

(d) Calculate the magnitude of the average force exerted on trolley **A** during the collision.

average force on trolley **A** = ………………… N [2]

(e) Explain whether the spring will be most compressed before, at or after the intersection of the two momentum-time graphs.

………

………

………
[2]

[Total: 11]