2 **(a)** A student suggests that Newton's third law implies that the weight of a book resting on a table is equal to the support force that the table exerts on the book.

Explain why

(i) the student is wrong,

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……

……

…… [2]

(ii) the two forces are equal and opposite.

……

……

…… [1]

(b) Use Newton's laws to deduce the principle of conservation of momentum.

[3]

(c) In space, an object of mass 28 kg travelling with velocity 88 m s^{-1} collides with a second object of mass 17 kg travelling in the same direction with a velocity of 53 m s^{-1}. The collision is inelastic.

After the collision, the 28 kg object continues to move in the original direction but with a velocity of 67 m s^{-1}.

Calculate the loss in kinetic energy in the collision.

loss in kinetic energy = ……J [3]

(d) In **(c)**, the force exerted by the 28 kg object on the 17 kg object will not have a constant value during the time they are in contact with one another.

Sketch two graphs on the axes shown in Fig. 2.1 to show how the force varies with time if the collision in **(c)** is between

(i) two steel objects (label this line S),

(ii) two rubber objects (label this line R).

Fig. 2.1

[2]

[Total: 11]