OCR
Oxford Cambridge and RSA

AS Level Physics A

H156/01 Breadth in Physics

Question Set 18

1 **(a)** For a system to be in equilibrium, the resultant force must be zero.

State another condition that must be satisfied for the system to be in equilibrium

[1]

(b) Fig. 21.1 shows a ball at **rest** on a horizontal table.

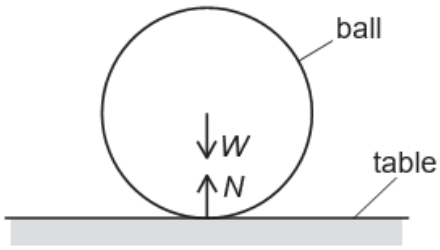

Fig. 21.1

The weight of the ball is *W* and the normal contact force on the ball is *N*.

(i) According to Newton's third law of motion, *W* is one of the forces in a pair of equal and opposite forces.

Name the object that experiences a force of magnitude *W* but in the opposite direction to *W*.

[1]

(ii) According to a student, *W* = *N* is a consequence of Newton's third law of motion.

State why this is incorrect.

[1]

(c) Fig. 21.2 shows a model dolphin in a museum. The dolphin is held in equilibrium by two cables **A** and **B**.

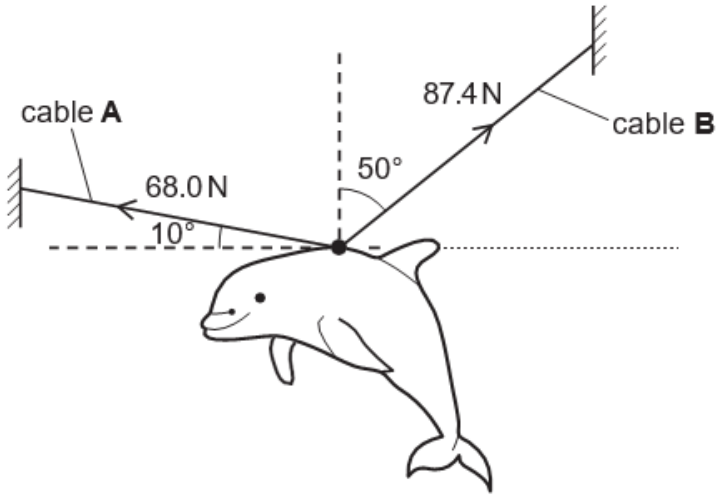

Fig. 21.2

The tension in cable **A** is 68.0 N and it makes an angle of 10° to the horizontal.
The tension in cable **B** is 87.4 N and it makes an angle of 50° to the vertical.

(i) Calculate the **total** vertical force *F* supplied by cables **A** and **B** by resolving the tensions in cables **A** and **B.**

F = N

[2]

(ii) Use your answer from **(i)** to calculate the mass *m* of the dolphin.

m = kg

[2]

(iii) The cables **A** and **B** have the same length and cross-sectional area.
The material of cable **B** has Young modulus 1.29*E*, where *E* is the Young modulus of the material of cable **A**.
Both cables obey Hooke's law.

Calculate the ratio $\frac{\text{extension of cable } \mathbf{B}}{\text{extension of cable}}$.

ratio =

[2]

Total Marks for Question Set 18: 9