

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

- (b) Fig. 21.1 shows a ball at **rest** on a horizontal table. [1]

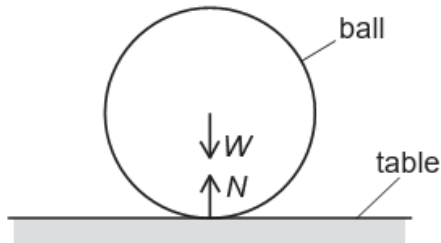


Fig. 21.1

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 .

- (ii) According to a student, $W = N$ is a consequence of Newton's third law of motion. [1]
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**.

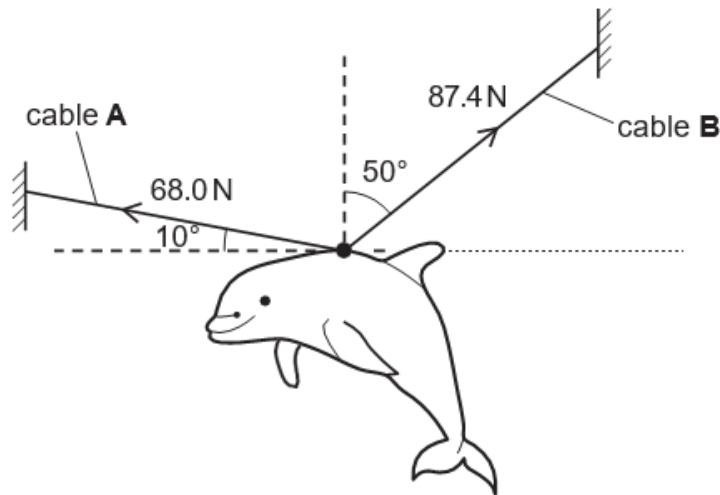


Fig. 21.2

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**.

$$F = \quad \quad \quad \text{N}$$

[2]

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

$$m = \quad \quad \quad \text{kg}$$

[2]

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

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

$$\text{ratio} =$$

[2]

Total Marks for Question Set 18: 9

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