Moments

Question Paper

Course	CIE IGCSE Physics
Section	1. Motion, Forces & Energy
Topic	Moments
Difficulty	Medium

Time Allowed 50

Score /38

Percentage /100

Question 1a

A 50 cm rule is balanced at its mid-point. A force of 8.0 N acts at a distance of 10 cm from one end of the rule.

Fig. 2.1 shows the arrangement.

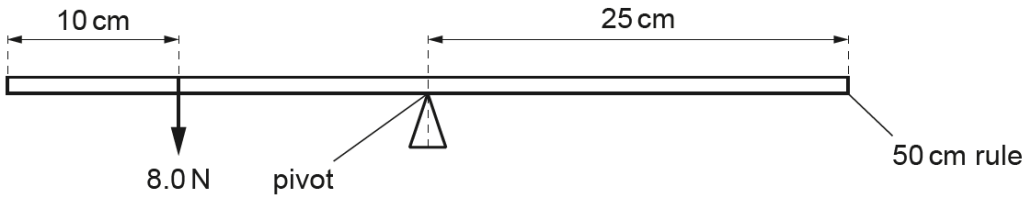

Fig. 2.1

Calculate the moment of the 8.0 N force about the pivot. Give the unit.

moment = ...
unit = ...
[5 marks]

Question 1b

Another force acts at a point 10 cm from the pivot. It makes the rule balance.

On Fig. 2.1, draw an arrow to show the position and direction of this force.

[2 marks]

Question 2a

A metre rule is balanced on a pivot by three vertical forces, as shown in Fig. 5.1.

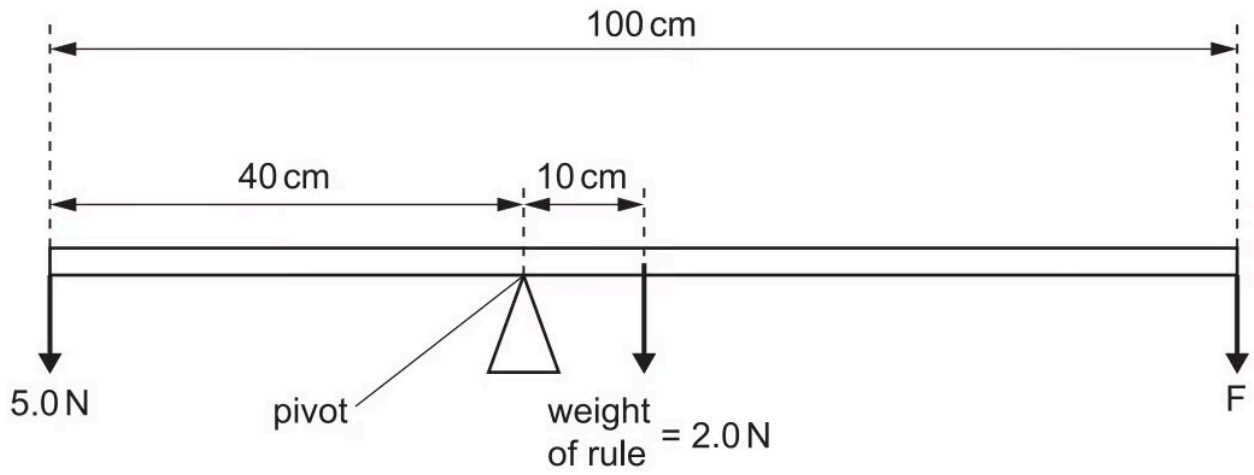

Fig. 5.1 (not to scale)

Show that the moment of the 5.0 N force about the pivot is 200 N cm.

[2 marks]

Question 2b

Extended tier only

Calculate the size of force F.

F = ... N

[4 marks]

Question 3a

Complete the statement by writing in the blank spaces.

The moment of a force about a pivot is equal to ..... multiplied by .....

[1 mark]

Question 3b

Fig. 3.1 shows a horizontal rod of length 2.4 m and weight 160 N. The weight of the rod acts at its centre. The rod is suspended by two vertical ropes X and Y. The tension in each rope is 80 N.

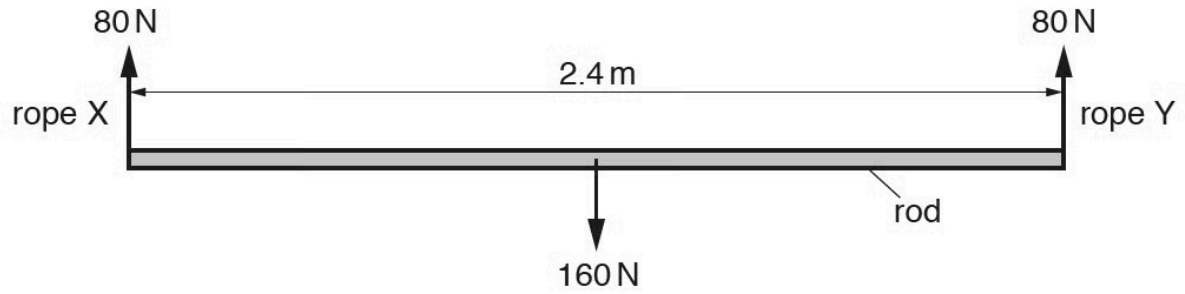

Fig. 3.1

(i) State the name given to the point at which the weight of the rod acts.

[1]

(ii) Calculate the mass of the rod.

mass = ... [1]

(iii) The rod is in equilibrium.

Using data from Fig. 3.1, explain why.

[4]

[6 marks]

Question 4a

Fig. 2.1 shows a man pushing down on a lever to lift one end of a heavy log.

Fig. 2.1

State the term used to describe the turning force exerted by the man.

[1 mark]

Question 4b

(i) Fig. 2.2 shows the forces acting as the man starts to lift the heavy log.

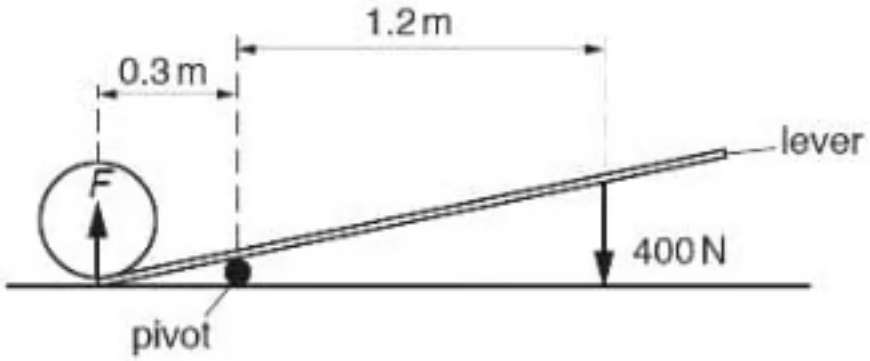

Fig. 2.2

Calculate the force F, exerted by the lever on the heavy log.

force = ... N [3]

(ii) Describe how the man can use a smaller force to lift the heavy log.

[1]

[4 marks]

Question 5a

During a routine check of security camera footage at a zoo, it is discovered that a toucan and a grass snake have been escaping from their enclosures and performing experiments on a uniform 2 m long seesaw to study the principle of moments.

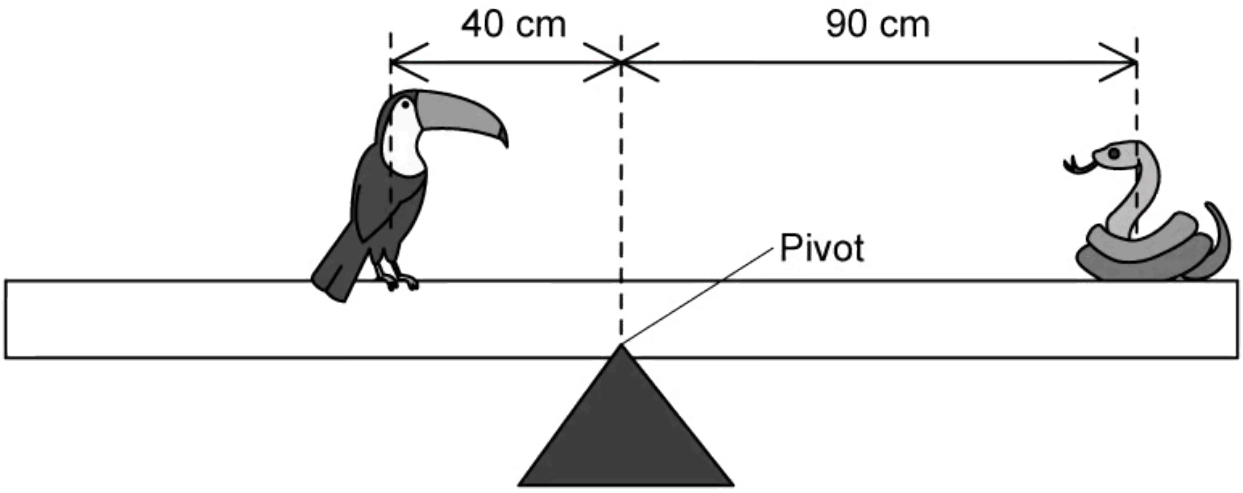

Fig. 1.1

Mass of a toucan = 600 g

Mass of a grass snake = 250 g

Calculate the weight of each animal in newtons. You may assume the acceleration of free fall is 10 m/s^2.

[4 marks]

Question 5b

For the system in Fig. 1.1, calculate the clockwise and anticlockwise moments separately.

clockwise moment = ... N m

anticlockwise moment = ... N m

[5 marks]

Question 5c

State whether the system is in equilibrium or not. Explain your reasoning.

[2 marks]

Question 5d

Extended tier only

On a different day, the toucan and the grass snake sit in new positions at different distances from the pivot. The same 2 metre long seesaw is not in equilibrium and has a resultant clockwise moment of 5.2 N m.

A bearded dragon climbs onto on the left side of the see saw. Suggest whether it is possible for the bearded dragon to bring the seesaw into equilibrium. Explain your answer using the principle of moments.

Average weight of a bearded dragon = 4.9 N

[2 marks]