

Lagan College Mathematics Department



GCSE FURTHER MATHS

Moments

PP Questions

- 3 A seesaw is made of a uniform plank of wood AB of mass 15 kg and length 6 m.

Jane, whose mass is 26 kg, sits at the end A of the seesaw and her brother Jack, whose mass is 34 kg, sits at the other end B.

The seesaw is supported in a horizontal position by a smooth pivot at a point P as shown in **Fig. 2**.

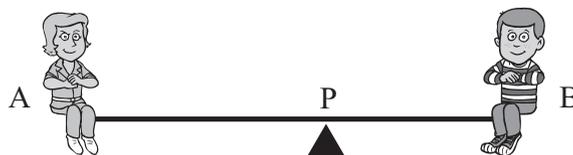


Fig. 2

The seesaw rests in equilibrium in a horizontal position.

- (i) Copy **Fig. 2** and mark clearly on your diagram the forces acting on the seesaw. [2]

Calculate

- (ii) the reaction at the pivot, [1]
- (iii) the distance of the pivot from the end A. [3]

- 4 The histogram in **Fig. 3** in your Supplementary Answer Booklet shows the distribution of the number of months, to the nearest month, it had taken employees in a taxi firm to pass their driving tests.

- (i) Use the information from the histogram to complete **Table 1** in your Supplementary Answer Booklet. [3]

Two new employees join the firm. Both of them took between 13 and 16 months, to the nearest month, to pass their driving tests.

- (ii) Use this information to complete the histogram in **Fig. 3** in your Supplementary Answer Booklet. [3]

- 5 Jordan recorded the number of points scored in each match by Jumpers basketball team throughout the season.

The mean number of points scored for all 30 games was 36 and the standard deviation was 8.2

The mean number of points scored for the 14 home games was 40 and the standard deviation was 7.8

Calculate

- (i) the mean number of points scored for the 16 away games, [3]
- (ii) the standard deviation for these 16 away games. [4]
- 6 A **uniform** plank AB of mass 40 kg and length 8 m rests horizontally on two supports, one at C and the other at D, where $AC = 2$ m and $CD = 3.5$ m, as shown in **Fig. 3**.

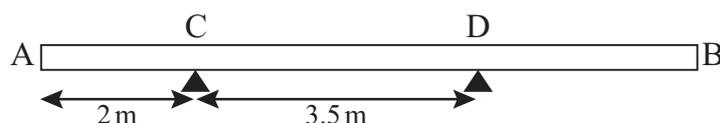


Fig. 3

A child of mass 30 kg stands at the centre of the plank.

- (i) Copy **Fig. 3** and show on your diagram all the forces acting on the plank. [1]
- (ii) Find in Newtons the reactions at C and D. [3]

The child now moves towards the end B until the plank is on the point of tilting about the support D.

When the plank is on the point of tilting,

- (iii) state the value of the reaction at C, [1]
- (iv) calculate the distance of the child from the end B. [3]

- 8 A uniform rod AB, of mass 0.81 kg and length 4 m, rests horizontally in equilibrium on two supports. One support is at the end A and the other support is at C, where $AC = 3.6$ m, as shown in **Fig. 5**.

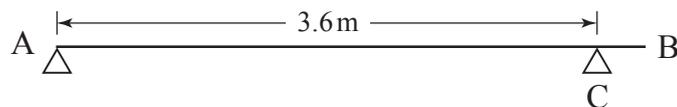


Fig. 5

- (i) Copy the diagram and mark clearly **all** the forces acting on the rod, showing clearly the points at which they act on the rod. [2]

- (ii) Calculate the reactions at the supports. [3]

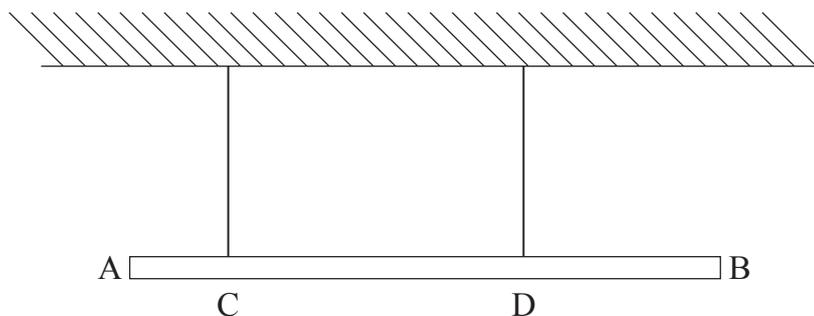
A mass of 0.75 kg is placed at a point X on the rod such that the reaction at A is now twice the reaction at C.

- (iii) Find the reaction at C. [2]

- (iv) **Hence** find the distance AX. [2]

- 3 A uniform plank AB, of length 6 m and mass 12 kg, is held horizontally by two vertical strings attached to a ceiling. The strings are connected to the plank at the points C and D, as shown in the diagram below, where $AC = 1$ m and $AD = 4$ m.

- (i) On the diagram mark all the forces acting on the plank.



[1]

- (ii) Calculate the tension in each of the two strings.

Answer _____ N and _____ N [3]

Examiner Only	
Marks	Remark

A mass M kg is attached to the end B so that the plank is on the point of turning about D.

(iii) Write down the tension in the string at C.

Answer _____ N [1]

(iv) Calculate the value of M .

Answer _____ [3]

Examiner Only

Marks Remark

[Turn over

- 5 A uniform plank AB, of length 6 m and mass 15 kg, rests horizontally in equilibrium on two supports C and D, where $AC = 2$ m and $BD = 1.5$ m, as shown in the diagram below.



Calculate

- (i) the magnitude of the reaction at D,

Answer _____ N [2]

- (ii) the magnitude of the reaction at C.

Answer _____ N [1]

Examiner Only	
Marks	Remark

A block of mass M kg is placed at a point E on the plank, 0.5 m from B. The plank remains horizontal but is on the point of tilting about D.

(iii) State the reaction at C when the plank is on the point of tilting.

Answer _____ N [1]

(iv) Calculate the value of M

Answer _____ [2]

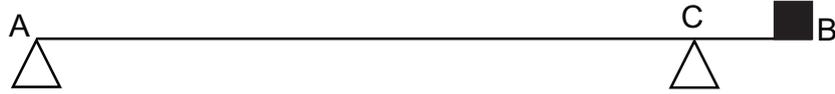
Examiner Only	
Marks	Remark

[Turn over

- 7 A uniform rod AB of length 10 m and mass 5 kg rests horizontally on two supports. One support is at A and the other is at C where $AC = 8$ m. A mass of 2 kg is placed at B.

(i) Show all forces acting on the rod in the diagram below.

[2]



(ii) Find the reactions at each support given that the rod remains in equilibrium.

[4]