5.1 Force & the Turning Effect

Question Paper

Course	CIE A Level Physics (9702) 2019-2021
Section	5. Forces, density and pressure
Topic	5.1 Force & the Turning Effect
Difficulty	Medium

Time allowed: **10**

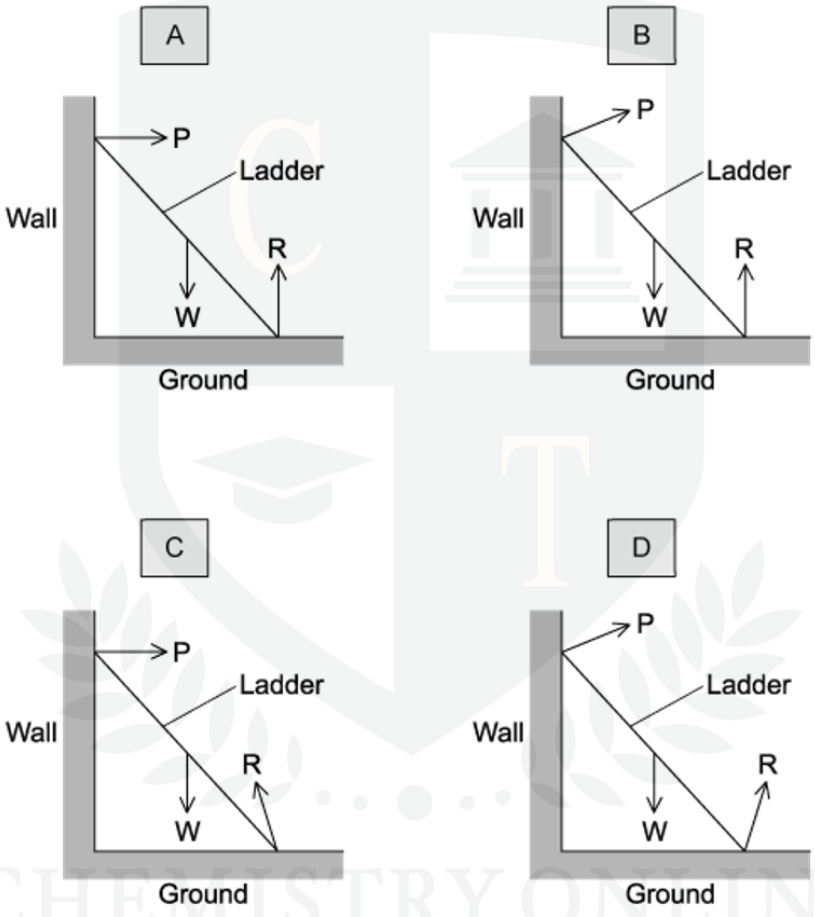
Score: **/10**

Percentage: **/100**

Question 1

A ladder is positioned on icy ground and is leant against a rough wall. At the instant of release, it begins to slide.

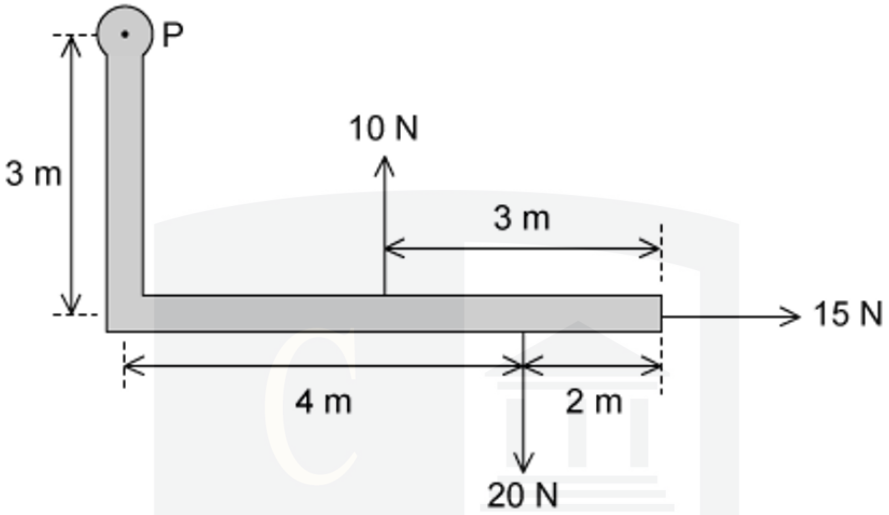
Which diagram correctly shows the directions of the forces *P*, *W* and *R* acting on the ladder as it slides?



[1 mark]

Question 2

A rigid L-shaped lever arm is pivoted at point P.



Three forces act on the lever arm, as shown in the diagram.

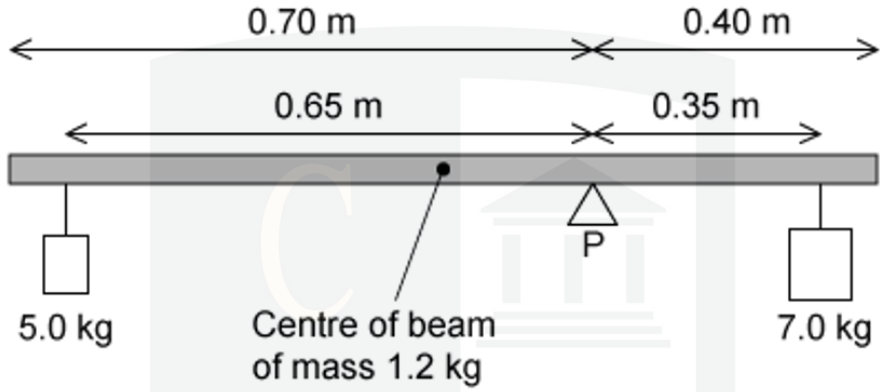
What is the magnitude of the resultant moment of these forces about point P?

A 5 N m **B** 65 N m **C** 95 N m **D** 155 N m

[1 mark]

Question 3

A uniform beam of mass 1.2 kg is pivoted at P as shown. The beam has a length of 0.70m and P is 0.40m from one end. Loads of 5.0 kg and 7.0 kg are suspended 0.65m and 0.35m from the pivot as shown.



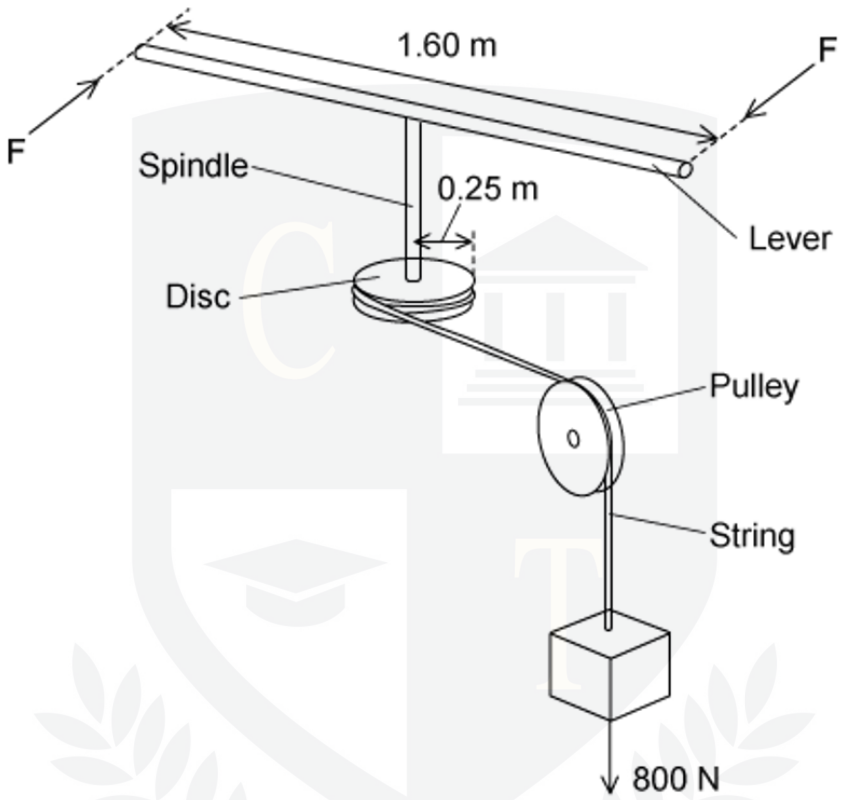
What torque must be applied to the beam in order to maintain it in equilibrium?

A 0.62 N m **B** 0.98 N m **C** 6.1 N m **D** 9.6 N m

[1 mark]

Question 4

A spindle is attached at one end to the centre of a lever of length 1.60 m and at its other end to the centre of a disc of radius 0.25 m. A string is wrapped round the disc, passes over a pulley and is attached to an 800 N weight.



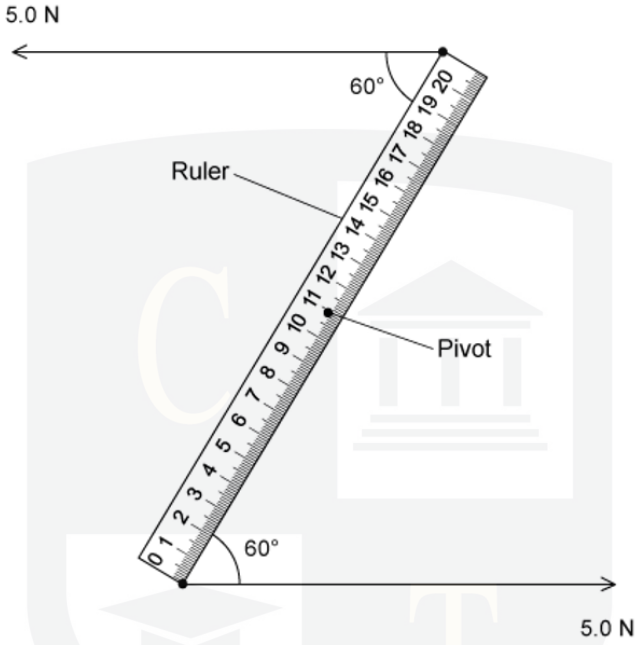
What is the minimum force *F*, applied to each end of the lever, that could lift the weight?

A 62.5 N **B** 125 N **C** 250 N **D** 750 N

[1 mark]

Question 5

A 20 cm ruler is pivoted at its centre. Equal and opposite forces of magnitude 5.0 N are applied to the ends of the ruler, creating a couple as shown



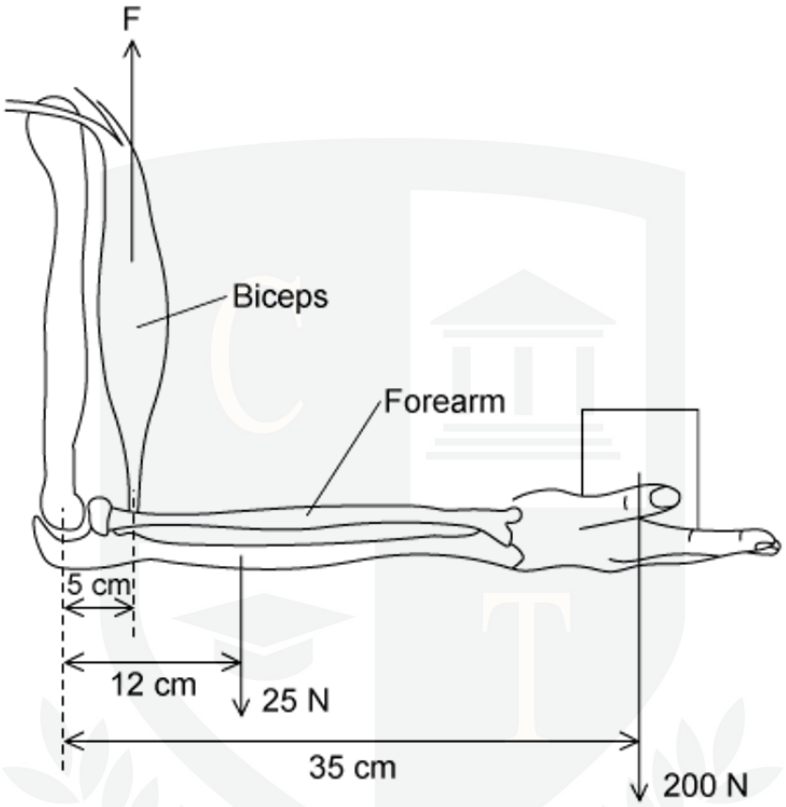
What is the magnitude of the torque of the couple on the ruler when it is in the position shown?

A 0.17 N m **B** 0.87 N m **C** 1.0 N m **D** 1.7 N m

[1 mark]

Question 6

A man holds a 200 N load stationary in his hand. The combined weight of the forearm and hand is 25 N. The forearm is held horizontal, as shown



What is the vertical force *F* needed in the biceps?

A 1340 N **B** 1400 N **C** 1460 N **D** 1520 N

[1 mark]

Question 7

An object, made from two equal masses joined by a light rod, falls with uniform speed through air. The rod remains horizontal.

Which statement about this system is correct?

A it is not in equilibrium because it is falling steadily

B it is not in equilibrium because it is in motion

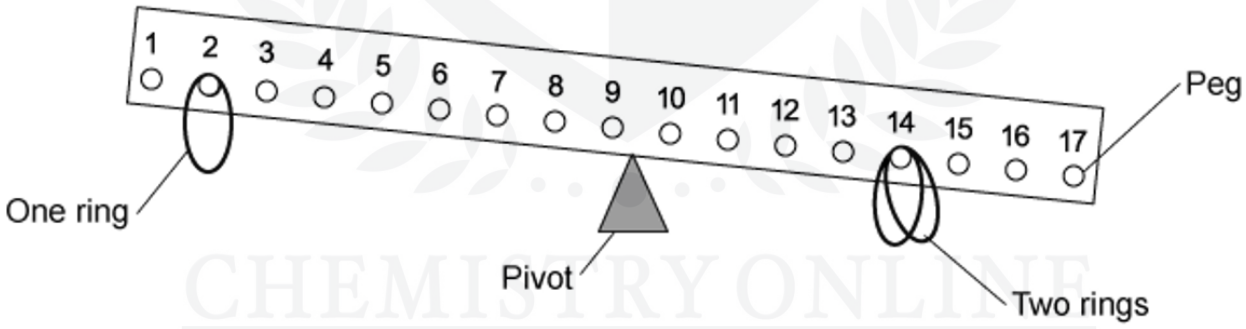
C it is not in equilibrium because there is a resultant torque

D it is in equilibrium because there is no resultant force and no resultant torque

[1 mark]

Question 8

The diagram shows a child's balancing game.



The wooden rod is uniform and all the rings are of equal mass. Two rings are hung on peg 14 and one on peg 2.

On which hook must a fourth ring be hung in order to balance the rod?

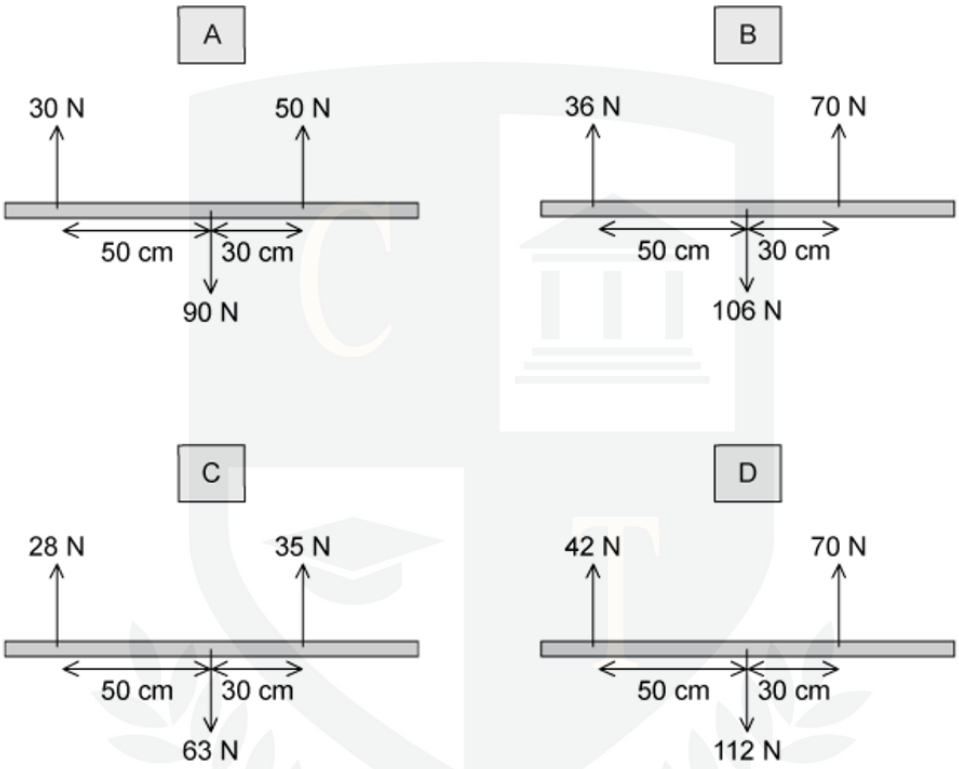
A 2 **B** 3 **C** 5 **D** 6

[1 mark]

Question 9

Four beams of the same length each have three forces acting on them.

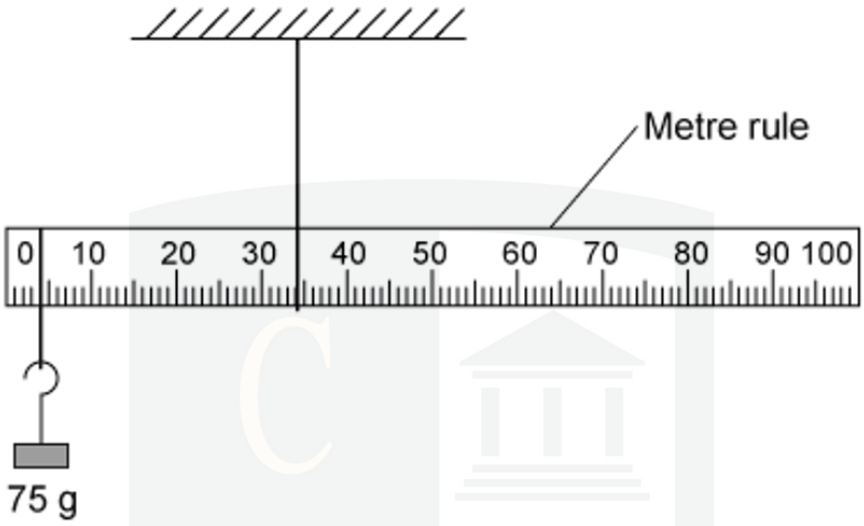
Which beam has both zero resultant force and zero resultant torque acting?



[1 mark]

Question 10

A uniform metre rule is hung from the ceiling as shown



The rule balances when a 75g mass is hung from one end of the ruler

What is the mass of the metre rule?

A 38 g **B** 51 g **C** 141 g **D** 159 g

[1 mark]