A Level · OCR · Physics

10 mins 10 questions

Multiple Choice Questions

Moments

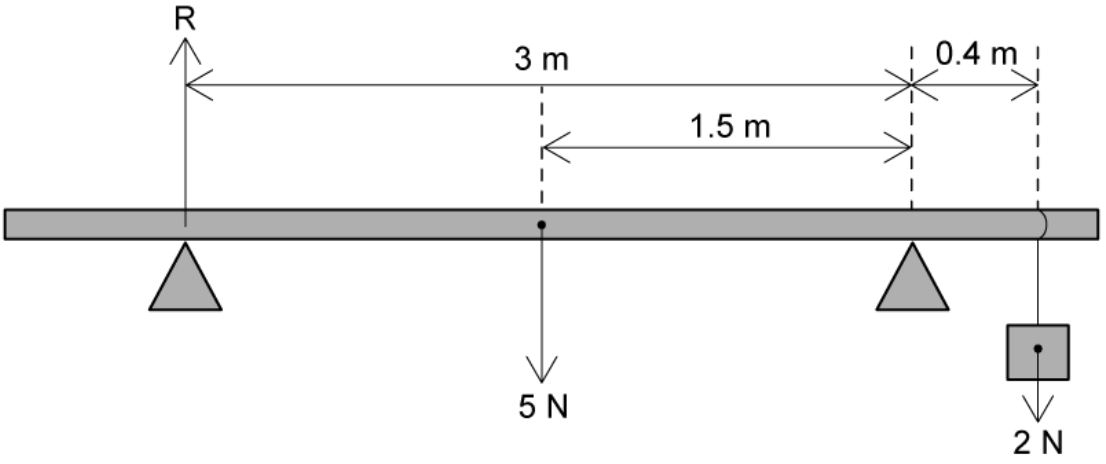
Moments / Couples & Torque / Centre of Mass / Equilibrium

Medium (5 questions)	/5
Hard (5 questions)	/5
Total Marks	**/10**

Scan here to return to the course
or visit savemyexams.com

Medium Questions

1 A uniform wooden rod of weight 5 N is balanced symmetrically between two supports which are 3 m apart. A weight of 2 N is hung at a distance of 0.4 m from the right-hand support.



What is the reaction force *R* exerted on the rod from the left hand support?

A. 2.2 N

B. 2.8 N

C. 4.8 N

D. 6.7 N

(1 mark)

2 A guitar tuning peg is turned about its axis of rotation by applying two equal and opposite forces, *F*, at either end of the peg as shown. The width of the tuning peg is 4 mm and the length is 20 mm.

A minimum torque of 10×10^{-3} N is required by this couple to start turning the peg.

What is the minimum value of force *F* required?

A. 0.5 N

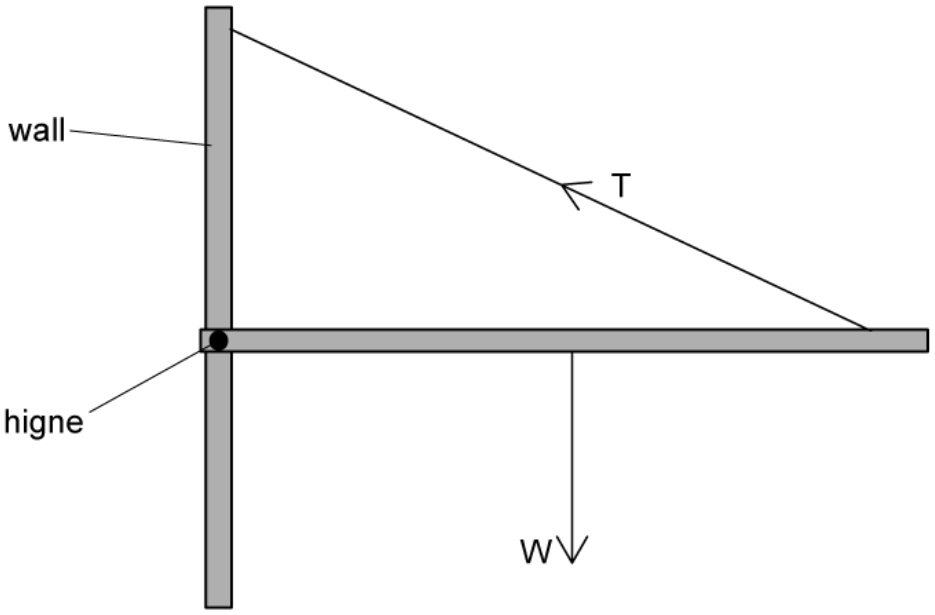
B. 1.0 N

C. 2.0 N

D. 2.5 N

(1 mark)

3 A shelf of weight *W* is hinged to a wall, and held up by a cable with tension *T* as shown:



Which of the following arrows represents the correct direction of the force exerted on the shelf by the hinge, given that the shelf is in equilibrium?

A.

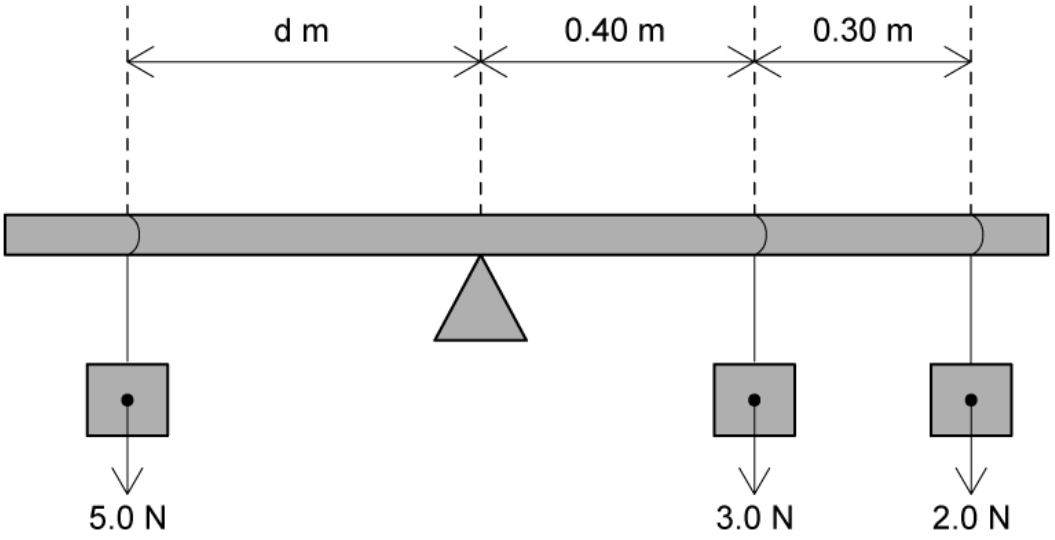
B. 

C. 

D. 

(1 mark)

4 A uniform metal rod is balanced on a pivot. The centre of mass of the rod is positioned directly over the pivot. Three masses of weight 5 N, 4 N and 2 N are added to the rod at the positions shown:



What is the value of *d* given that the rod is in equilibrium?

A. 0.36

B. 0.52

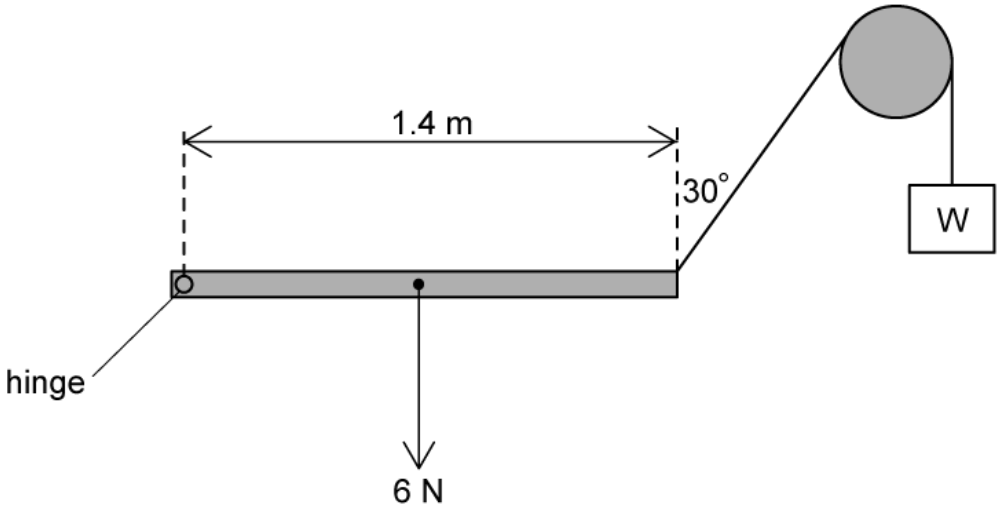
C. 0.70

D. Cannot be determined without knowing the weight of the rod.

(1 mark)

5 A uniform wooden plank of length 1.4 m and weight 6 N is hinged at one end and attached to a rope angled at 30^{o} to the vertical at the other end. The rope is passed over

a smooth pulley and a weight, *W*, is hung from the end of it. The plank is stationary.



What is the value of *W*?

A. 3.0 N

B. 3.5 N

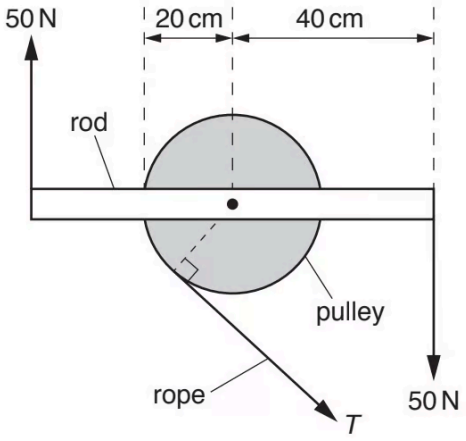
C. 4.8 N

D. 6.0 N

(1 mark)

Hard Questions

1 A rod is fixed to a pulley. Two 50 N forces are applied to the ends of the rod as shown. The tension in the rope attached to the pulley is *T*. The system is in equilibrium.



Not to scale

What is the moment of the tension *T* about the centre of the pulley?

A. 10 N m

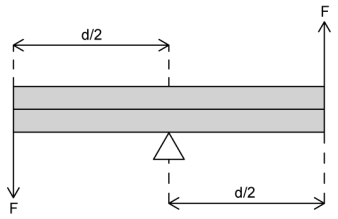
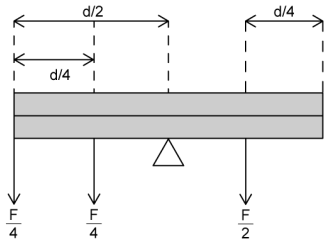
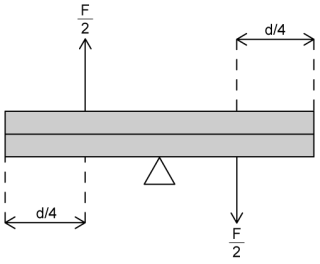
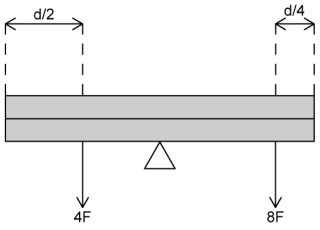
B. 20 N m

C. 30 N m

D. 40 N m

(1 mark)

2 A uniform rod of length *d*, which pivots on its midpoint, is subject to multiples of force *F* in four different scenarios below.

1	2
	
3	**4**
	

Which of the following statements is correct?

A. There is a net anticlockwise rotation in scenarios 1 and 3

B. Scenarios 2 and 4 are in equilibrium

C. There is a net clockwise rotation in scenarios 1 and 2

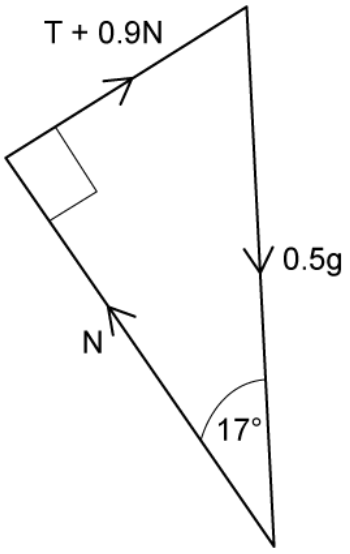
D. None of the scenarios are in equilibrium

(1 mark)

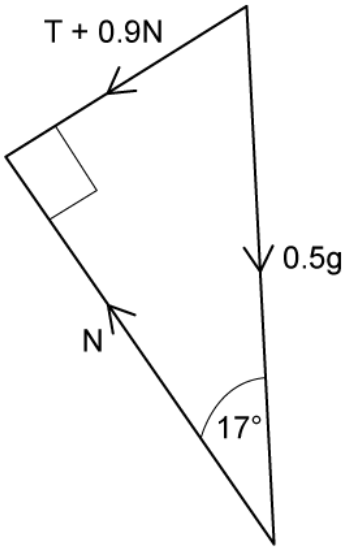
3 A 500 g object that is placed on a rough surface which makes an angle of 17° to the horizontal. It is attached to a rope with tension *T* that is parallel to the slope and experiences a frictional force of 0.9 N. The normal reaction force on the particle is *N*.

As the particle is not moving, which of the following triangle of forces is **correct**?

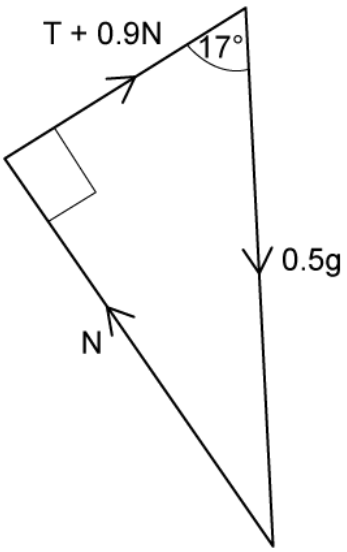
A.



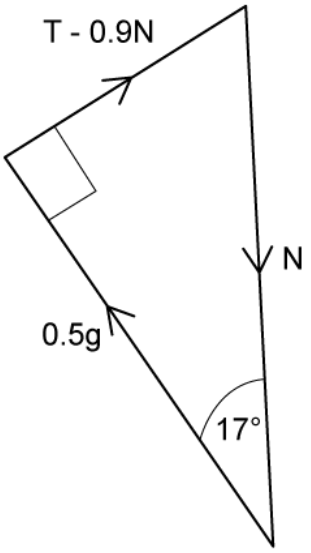
B.



C.



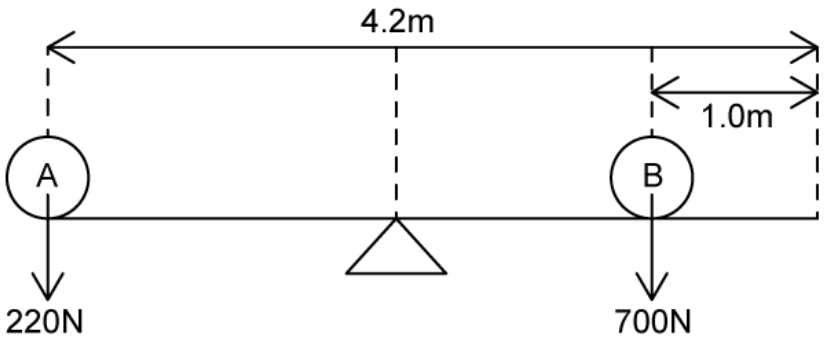
D.



(1 mark)

4 Below is a diagram of two people, **A** and **B**, who are sitting on a non-uniform seesaw of length 4.2 m. Person **A** has a weight of 220 N and is sat on one end of the seesaw. Person **B** has a weight of 700 N and is sat 1.0 m away from the other end. The seesaw

pivots around the midpoint and its weight *W* acts 1.9 m away from Person **A**. The system is in equilibrium.



What is the weight of the seesaw?

A. 162 N

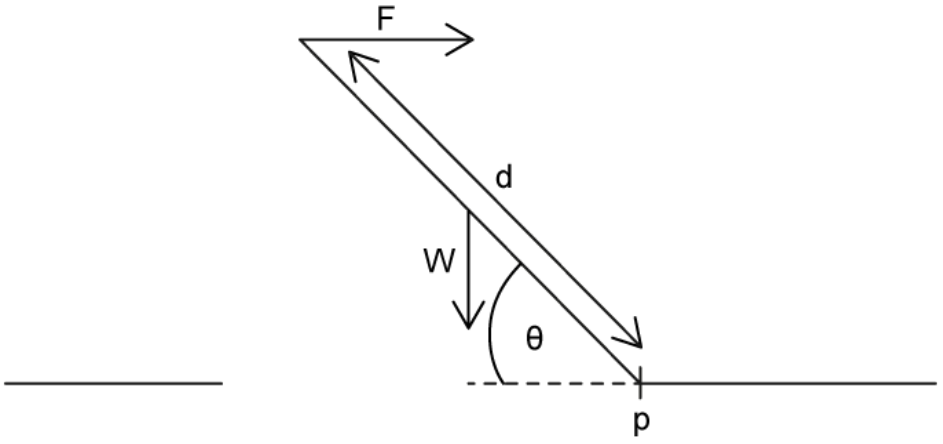
B. 1540 N

C. 5040 N

D. 530 N

(1 mark)

5 Below is a diagram of a uniform trapdoor of weight *W* and length *d*. It hinges around point *p* and is being held open with force *F,* which is *d* m away from *p*. The trapdoor makes an angle θ to the horizontal.



Which one of the following equations are **correct**?

A. $Fd = Wd$

B. $Fd\sin\theta = Wd\sin\theta$

C. $Fd\sin\theta = W\frac{d}{2}\sin\theta$

D. $Fd\sin\theta = W\frac{d}{2}\cos\theta$

(1 mark)