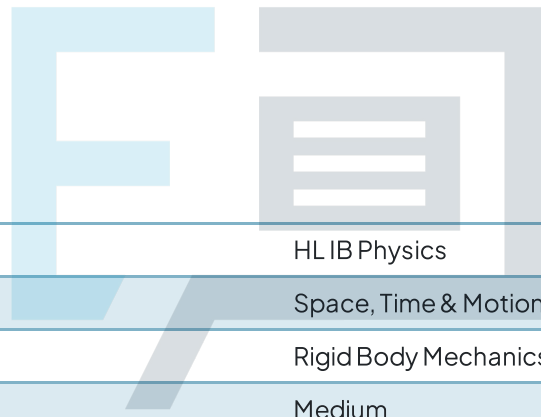




Exam Papers Practice

Rigid Body Mechanics

Question Paper



Course	HL IB Physics
Section	Space, Time & Motion
Topic	Rigid Body Mechanics
Difficulty	Medium

Exam Papers Practice

To be used by all students preparing for HL IB Physics
Students of other boards may also find this useful

Question 1

A student holds a pencil horizontally by the tip and lets it swing down to a vertical position. The pencil is 8 cm long and there is a 2 g mass of blu-tac stuck on the end that swings.

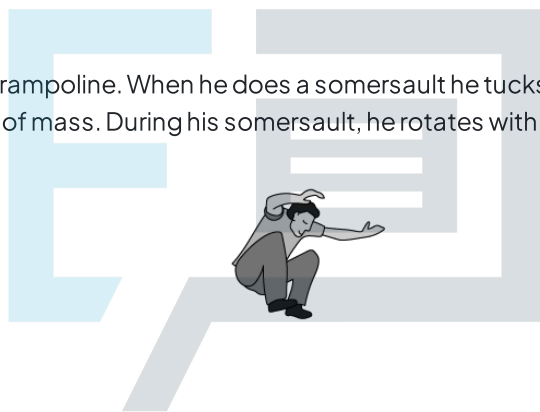
What is the moment of inertia acting on the blu-tac during this motion?

- A. $1.28 \times 10^{-5} \text{ kg m}^2$
- B. $1.6 \times 10^{-4} \text{ kg m}^2$
- C. 123 kg m^2
- D. 128 kg m^2

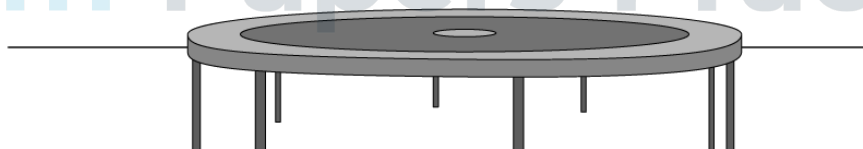
[1 mark]

Question 2

A boy of mass 55 kg is bouncing on a trampoline. When he does a somersault he tucks up into a ball so his whole body is no more than 67 cm away from his centre of mass. During his somersault, he rotates with a linear velocity of 7.1 m s^{-1} .



Exam Papers Practice



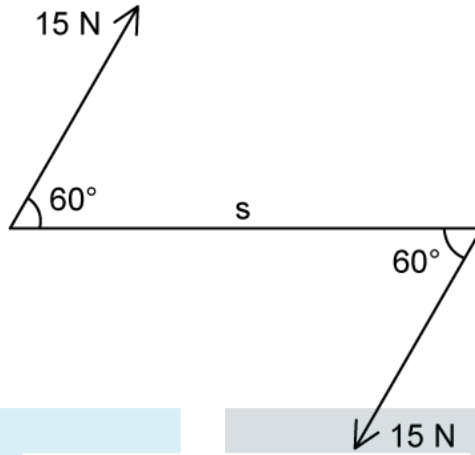
What is the boy's angular momentum during the somersault?

- A. $175 \text{ kg m}^2 \text{ rad s}^{-1}$
- B. $262 \text{ kg m}^2 \text{ rad s}^{-1}$
- C. $391 \text{ kg m}^2 \text{ rad s}^{-1}$
- D. $2.62 \times 10^6 \text{ kg m}^2 \text{ rad s}^{-1}$

[1 mark]

Question 3

A ceremonial pole of length S is being held by two performers. One performer is holding each end. Both performers are applying a force of 15 N at an angle of 60° to the pole. The total torque applied by the couple on the pole is 45 N m .



What is the length of the ceremonial pole S ?

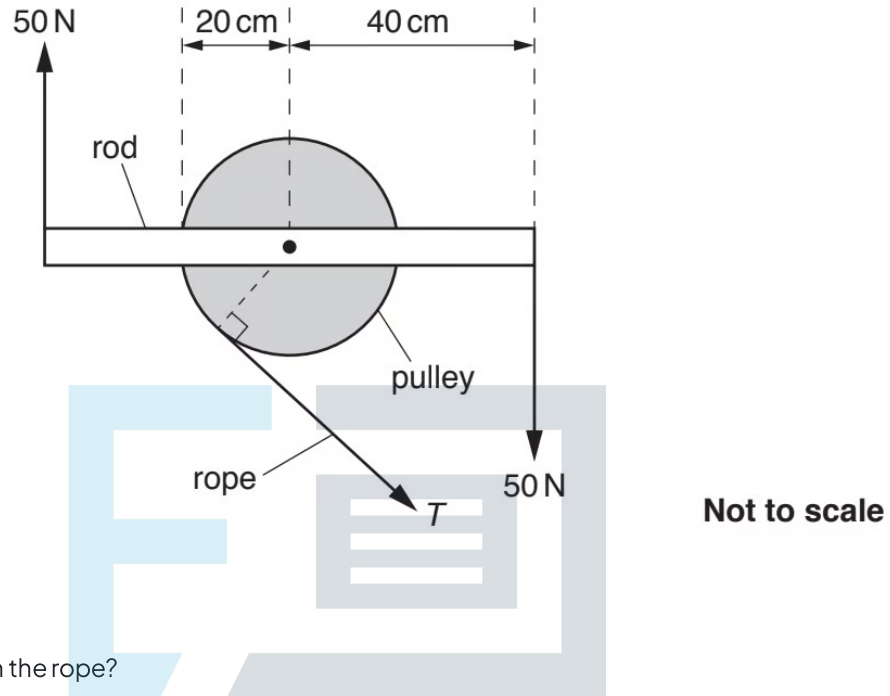
- A. $\sqrt{3}\text{ Nm}$
- B. 3 Nm
- C. $2\sqrt{3}\text{ Nm}$
- D. $4\sqrt{3}\text{ Nm}$

[1 mark]

Exam Papers Practice

Question 4

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.



What is the value of the tension in the rope?

- A. 40 N m
- B. 100 N
- C. 150 N
- D. 200 N

[1 mark]

Question 5

A CD of radius 60 mm rotates at a rate of 500 revolutions per minute.

What is the linear acceleration of the CD when it rotates for 3 minutes?

- A. 0.0174 m s^{-2}
- B. 0.167 m s^{-2}
- C. 0.29 rad s^{-2}
- D. 62.8 m s^{-2}