Work, Energy & Power: Exam Revision Tracker

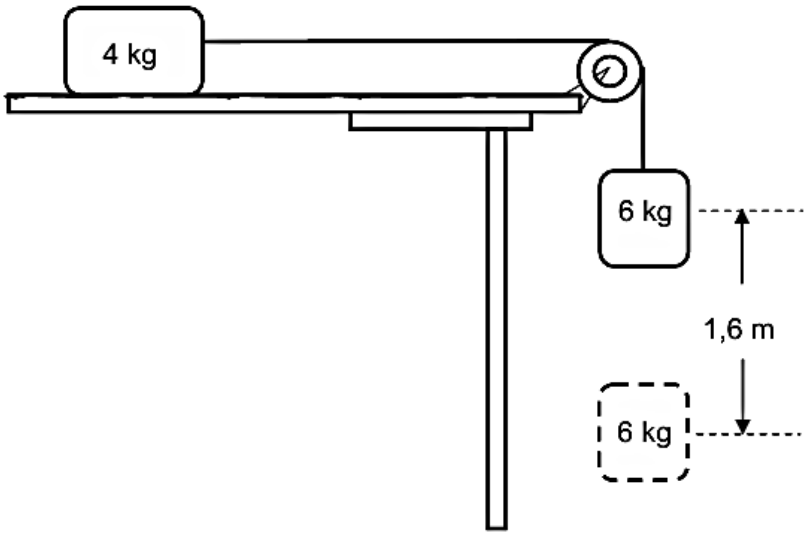
Attempt #1		Attempt #2		Attempt #3		Attempt #4		Attempt #5	
Total	Score	Total	Score	Total	Score	Total	Score	Total	Score
12		7		15		13		14	
Percentage =		Percentage =		Percentage =		Percentage =		Percentage =	

Work, Energy & Power: Attempt #1

Total = 12 Marks

In the diagram below, a 4 kg block lying on a rough horizontal surface is connected to a 6 kg block by a light inextensible string passing over a light frictionless pulley.

Initially the blocks are HELD AT REST.



1. State the work-energy theorem in words. (2)

When the blocks are released, the 6 kg block falls through a vertical distance of 1,6 m.

2. Draw a labelled free-body diagram for the 6 kg block. (2)

3. Calculate the work done by the gravitational force on the 6 kg block. (3)

The coefficient of kinetic friction between the 4 kg block and the horizontal surface is 0,4. Ignore the effects of air resistance.

4. Use **energy principles** to calculate the speed of the 6 kg block when it falls through 1,6 m while still attached to the 4 kg block. (5)

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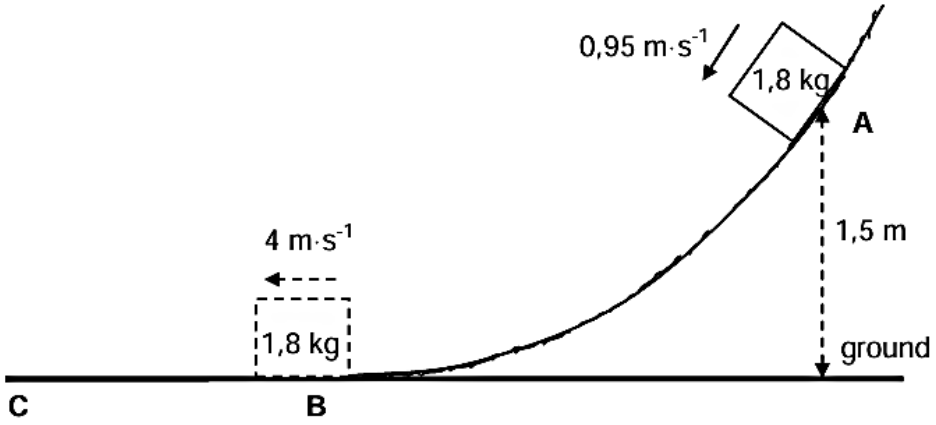
Work, Energy & Power: Attempt #2 ⚡

Total = 13 Marks

An object of mass 1,8 kg slides down a rough curved track and passes point **A**, which is 1,5 m above the ground, at a speed of 0,95 $m \cdot s^{-1}$.

The object reaches point **B** at the bottom of the track at a speed of 4 $m \cdot s^{-1}$.



1. Define the term *conservative force*. (2)

2. Name the conservative force acting on the object. (1)

3. Is mechanical energy conserved as the object slides from point **A** to point **B**? Choose from YES or NO. Give a reason for the answer. (2)

4. Calculate the gravitational potential energy of the object when it was at point **A**. (3)

5. Using energy principles, calculate the work done by friction on the object as it slides from point **A** to point **B**. (4)

Surface **BC** in the diagram above is frictionless.

6. What is the value of the net work done on the object as it slides from point **B** to point **C**? (1)

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Work, Energy & Power: Attempt #3 ⚡

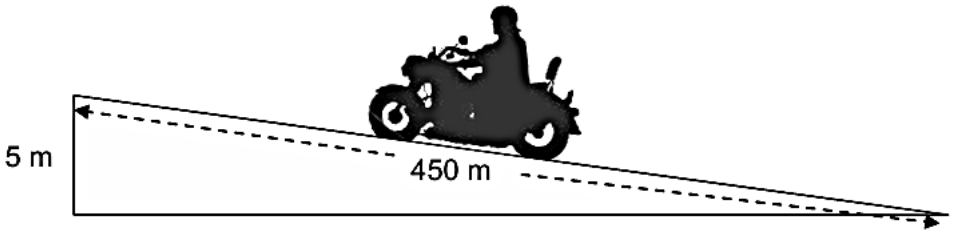
Total = 15 Marks

The track for a motorbike race consists of a straight, horizontal section that is 800 m long.

A participant, such as the one in the picture above, rides at a certain average speed and completes the 800 m course in 75 s. To maintain this speed, a constant driving force of 240 N acts on the motorbike.

1. Calculate the average power developed by the motorbike for this motion. (3)

Another person practises on the same motorbike on a track with an incline. Starting from rest, the person rides a distance of 450 m up the incline which has a vertical height of 5 m, as shown below.



The total frictional force acting on the motorbike is 294 N. The combined mass of rider and motorbike is 300 kg. The average driving force on the motorbike as it moves up the incline is 350 N. Consider the motorbike and rider as a single system.

2. Draw a labelled free-body diagram for the motorbike-rider system on the incline. (4)

3. State the WORK-ENERGY theorem in words. (2)

4. Use energy principles to calculate the speed of the motorbike at the end of the 450 m ride. (6)

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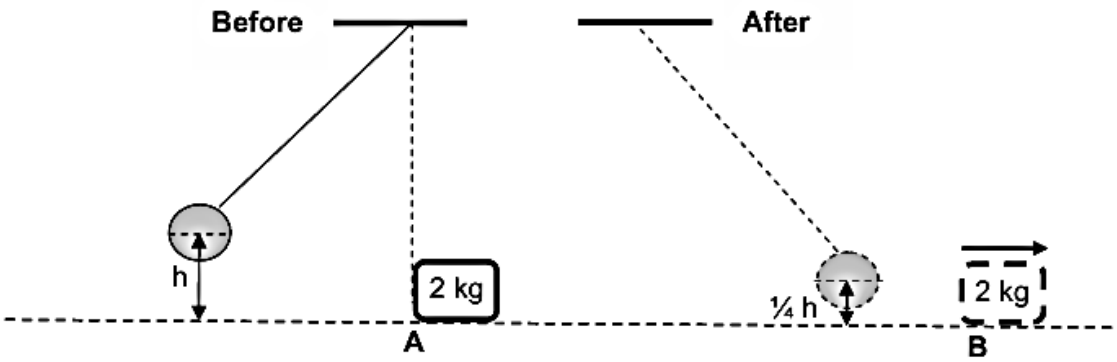
Work, Energy & Power: Attempt #4 ⚡

Total = 13 Marks

A pendulum with a bob of mass 5 kg is held stationary at a height h metres above the ground. When released, it collides with a block of mass 2 kg which is stationary at point **A**.

The bob swings past **A** and comes to rest momentarily at a position ¼ h above the ground.

The diagrams below are NOT drawn to scale.



Immediately after the collision the 2 kg block begins to move from **A** to **B** at a constant speed of 4,95 $m \cdot s^{-1}$.
Ignore frictional effects and assume that no loss of mechanical energy occurs during the collision.

1. Calculate the:

1.1 Kinetic energy of the block immediately after the collision (3)

1.2 Height h (4)

The block moves from point **B** at a velocity of 4,95 $m \cdot s^{-1}$ up a rough inclined plane to point **C**. The speed of the block at point **C** is 2 $m \cdot s^{-1}$. Point **C** is 0,5 m above the horizontal, as shown in the diagram below.
During its motion from **B** to **C** a uniform frictional force acts on the block.

2. State the work-energy theorem in words. (2)

3. Use energy principles to calculate the work done by the frictional force when the 2 kg block moves from point **B** to point **C**. (4)

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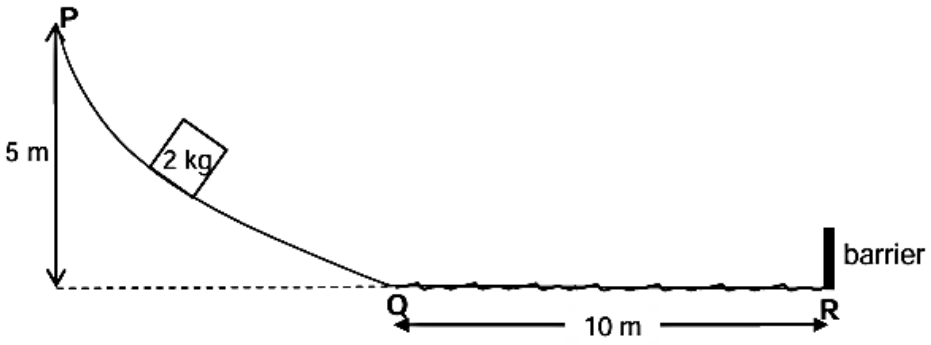
Work, Energy & Power: Attempt #5 ⚡

Total = 14 Marks

A 2 kg box is released from rest at point **P**, 5 m above the ground. It slides down a smooth frictionless curved track **PQ**. See the diagram below.



1. State the *principle of conservation of mechanical energy* in words. (2)

2. Use the PRINCIPLE OF CONSERVATION OF MECHANICAL ENERGY to calculate the speed of the box when it reaches point **Q**. (3)

The box passes point **Q** and moves 10 m on a rough horizontal surface before striking a barrier at point **R** at a speed of 4 $m \cdot s^{-1}$.

3. Use ENERGY PRINCIPLES to calculate the magnitude of the average frictional force acting on the box as it moves from **Q** to **R**. (4)

The barrier exerts an impulse of 14 N·s to the LEFT on the box when the box strikes the barrier.

4. Calculate the change in kinetic energy of the box after striking the barrier. (5)

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