



**ST. CLARE COLLEGE**  
**GIRLS' JUNIOR LYCEUM - PEMBROKE**  
**HALF-YEARLY EXAMINATION FEBRUARY 2011**



**FORM 3**

**PHYSICS**

**TIME: 1 h 30 min**

Name: \_\_\_\_\_

Class: \_\_\_\_\_

Total Mark:

**ANSWERS MUST BE WRITTEN IN INK. EXCEPT WHERE THEY ARE EXPRESSLY REQUIRED, PENCILS MAY BE USED ONLY FOR DRAWING, SKETCHING, OR GRAPHICAL WORK.**

*Answer all questions in the spaces provided on the Examination Paper. All working must be shown. The use of a calculator is allowed. The following formulae may be useful:*

**Work = force x distance**

**Moment = force x perpendicular distance from pivot**

**Power =  $\frac{\text{work done}}{\text{time taken}}$**

**Pressure =  $\frac{\text{force}}{\text{area}}$**

**K.E. =  $\frac{1}{2}mv^2$**

**Pressure =  $hdg$**

**P.E. =  $mgh$**

**W =  $mg$**

**Section A. Answer ALL QUESTIONS. This Section carries 55 marks.**

1 This question is about Measurements.

a State the unit of and the instrument needed to measure the following quantities : 8

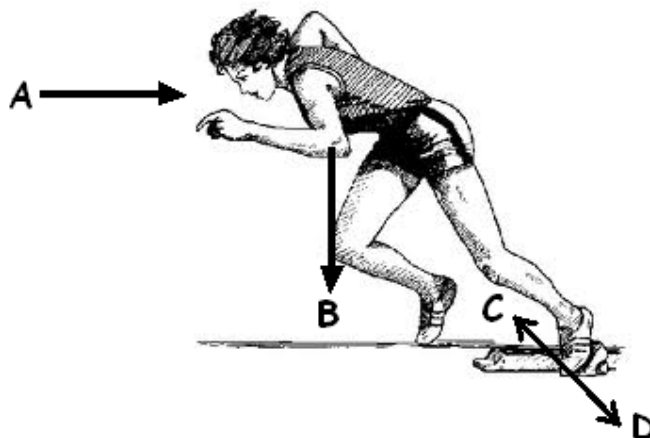
Quantity	SI Unit	Instrument
Mass of a mug		
Length of a desk		
Time taken by a pencil to fall from a table to the floor		
Volume of a cup of coffee		

b Put the following in order starting with the largest : 1

seconds, days, hours, minutes

\_\_\_\_\_

2 This question is about Forces



a Look at the above diagram and name the forces A, B, C and D. 4

A \_\_\_\_\_ B \_\_\_\_\_

C \_\_\_\_\_ D \_\_\_\_\_

b Explain what is a **Scalar** quantity. 1

\_\_\_\_\_

c Underline the Vector quantities in the list below. 4  
length, tension, upthrust, mass, velocity, speed, volume, displacement.

3 This question is about Energy. 4

a Anna drives an **electric car** to go to work. She recharges the battery-pack of her car every 80 km by connecting the battery pack to the mains supply.

Complete the following sentences by filling in the missing words from the list below.

kinetic      electrical      fossil      chemical

When the battery of the car is connected to the mains supply, \_\_\_\_\_ energy is changed to \_\_\_\_\_ energy. When the car is driven on the road, this energy is changed to \_\_\_\_\_ energy. The car does not use \_\_\_\_\_ fuel from a pumping station.

b i State one difference between renewable and non-renewable sources. 1

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- b ii State one advantage and one disadvantage (which you have not listed above) of each of the following types of energy.

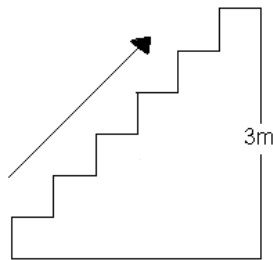
Type of Energy	Advantage	Disadvantage
Solar Energy		
Wind Energy		

2

2

4. This question is about Power

a.



A man is going upstairs. He wants to find the power he develops when he reaches the top. The mass of the man is 70kg. Calculate his weight.

\_\_\_\_\_

- b. Calculate the work done by this man to go upstairs.

3

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

- c. What instrument does he need to measure the time taken to go upstairs?

1

\_\_\_\_\_

- d. The first time he does this experiment he takes 5 seconds to go all the way up. Find the power he develops.

2

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

- e. The next time round he climbs the stairs in 3 seconds. How does the power change?

2

\_\_\_\_\_

- 5 This question is about Kinetic and Potential energy  
 A ball of 1.5kg rests on top of a cliff 6m high.

- a Find the Potential energy of the ball.

2

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

- b How much is the ball's Kinetic energy just before it hits the ground if it was to fall off the cliff? 1  
\_\_\_\_\_
- c What is the principle you used to answer question 5b. 2  
\_\_\_\_\_  
\_\_\_\_\_
- d Calculate the velocity with which the ball hits the ground. 3  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- e What happens to the Kinetic energy when the ball hits the ground? 1  
\_\_\_\_\_

6. This question is about Pressure

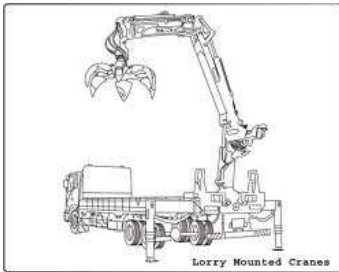
A horse of mass 500kg stands up on its hind limbs. The area of the limbs in contact with the ground is  $0.01\text{m}^2$ .



- a. Calculate the weight of the horse. 2  
\_\_\_\_\_
- b. Calculate the pressure exerted on the ground when the horse is in this position. 3  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- c. The horse then stands on the ground on all four limbs. If all limbs have the same base area, calculate the pressure now exerted on the ground. 2  
\_\_\_\_\_
- d. What can you conclude from answers you obtained in (b) and (c) above? Give one reason for your answer. 2  
\_\_\_\_\_  
\_\_\_\_\_

**Section B. Answer ALL Questions. This Section carries 45 marks.**

1. This question is about work and energy



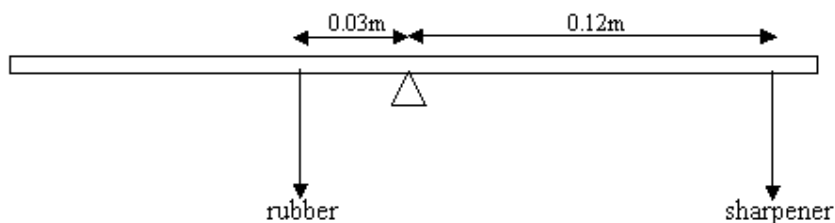
A group of students observe a lifter truck transporting a weight through different heights. The students calculated the work done by the crane as the load is lifted through various heights.

Readings	1	2	3	4	5	6	7	8
Work done(J)	0	10000	20000	30000	45000	50000	60000	70000
Height(m)	0	1	2	3	4	5	6	7

- a Plot a graph of Work done  $W$  (J) on the y-axis against Height (m) on the x-axis 5
- b One of the readings in the above table was wrongly calculated.
- i Encircle the wrong reading on the table. 1
- ii The reading should be \_\_\_\_\_ 1
- c Use your graph to find:
- i • the work done by the lifter to raise the weight through 1.5m \_\_\_\_\_J 1
- ii • the distance moved by the load when 32500J were used up. \_\_\_\_\_m 1
- d Calculate the weight of the load lifted by the truck. 2
- \_\_\_\_\_
- e The mass of this load is \_\_\_\_\_kg 1
- f Fill in the blanks:  
The students know that the amount of \_\_\_\_\_ used up by the lifter is actually \_\_\_\_\_ than those calculated in the table. This is because no machine is 100% \_\_\_\_\_. 3

2. This question is about Moments

Gillian is balancing her ruler using a triangular prism as a pivot. She places her sharpener and rubber on opposite sides of the ruler to make it balance properly as shown on the diagram.



- a i Gillian is applying the principle of moments. State this principle. 2

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- a ii Using the above diagram, say whether the rubber or the sharpener is the lightest. Explain. 1

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- b i If the mass of the sharpener is 0.01kg, calculate the : weight of the sharpener. 2

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- b ii moment of the sharpener. 2

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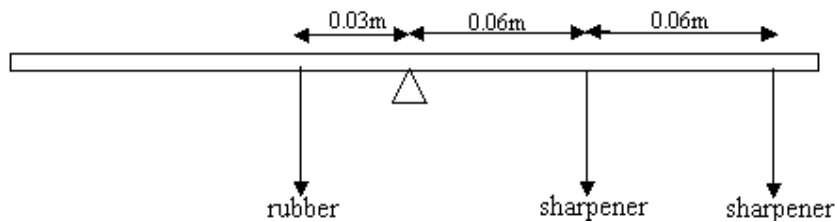
- b iii weight of the rubber. 2

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Next Gillian places a similar sharpener in front of the other identical sharpener, 6 cm away from the pivot.



- c i Will the ruler remain balanced? If not, which way will it turn? 1

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- c ii Calculate the moment of the new sharpener. 2

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- iii What is the total moment of both sharpeners? 2

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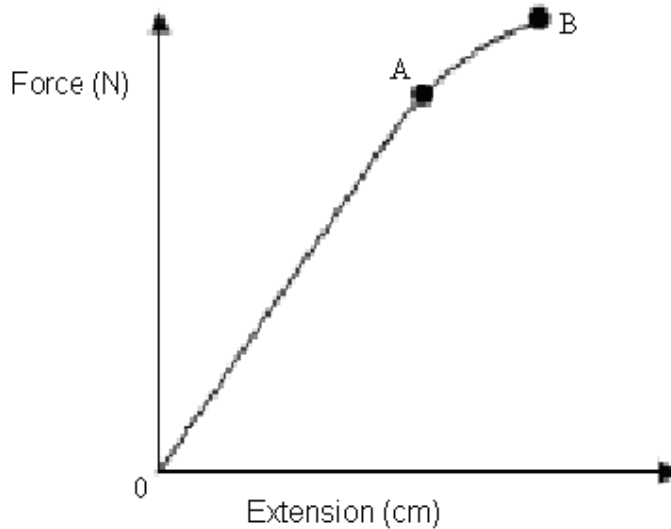
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- iv Calculate the total distance that the rubber must be moved away from the pivot to balance the ruler now. 2

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- 3 This question is about Hooke's law



- a The graph above was obtained by Jamie who was doing an experiment to investigate the relationship between force and extension for a steel spring. Give a suitable title to Jamie's graph. 1
- b Hooke's law states that the \_\_\_\_\_ is \_\_\_\_\_ proportional to extension provided that the \_\_\_\_\_ is not exceeded. 3
- c By looking at the graph explain whether Jamie's spring obeys Hooke's law in the region:  
OA \_\_\_\_\_  
AB \_\_\_\_\_ 4
- d What is the meaning of elastic limit? 2
- 
- 
- e Which letter of the alphabet best represents the elastic limit in the above graph? 1
- f What happens to the spring once it exceeds the elastic limit? 2
- 
-

- h Draw and label a suitable diagram of apparatus that Jamie used while he was doing his experiment. 3