



# GOZO COLLEGE



Track 2

## Half Yearly Examinations for Secondary Schools 2012

**FORM 3**

**PHYSICS**

**TIME: 1h 30min**

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

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

**Answer all questions.**

**All working must be shown. The use of a calculator is allowed.**

**Where necessary take acceleration due to gravity  $g = 10\text{m/s}^2$ .**

*You may find some of these equations useful:*

Energy and Work	$W = Fs$ $PE = mgh$	$E \text{ (or } W) = Pt$ $KE = \frac{1}{2} mv^2$ Efficiency = $\frac{\text{power output}}{\text{power input}} \times 100$
Weight	$W = mg$	
Moments	$M = Fs$	
Density	$\rho = m/V$	

Number	1	2	3	4	5	6	7	8	Total
Maximum mark	8	8	8	8	8	15	15	15	<u>85</u>
Actual mark									

	Total Theory	Total Practical	Final Mark
Actual Mark			
Maximum Mark	<b>85</b>	<b>15</b>	<b>100</b>

**SECTION A**

**This section carries 40 marks.**

1. a) Fill in the following table. [6]

No	Physical Quantity	Symbol used	Value	Change to these Units
i.	distance	s	3.5 Km	m
ii.	time		2.5 minutes	s
iii.	energy	E	4 KJ	J
iv.	mass		1500 g	Kg

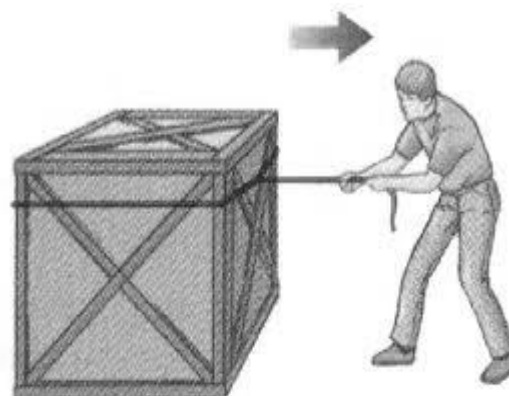
b) Some students were asked to write statements about mass and weight. Their statements are printed below. Mark true ( **T** ) or false ( **F** ) in the box alongside each statement.

[2]

i.	Mass and weight are the same thing	
ii.	Mass is measured in kilograms.	
iii.	Weight is a type of force.	
iv.	Weight is the acceleration caused by gravity.	

2. The diagram shows a man pulling a box by means of a rope.

a) Write down the names of four forces acting on the box and mark them on the diagram. [4]




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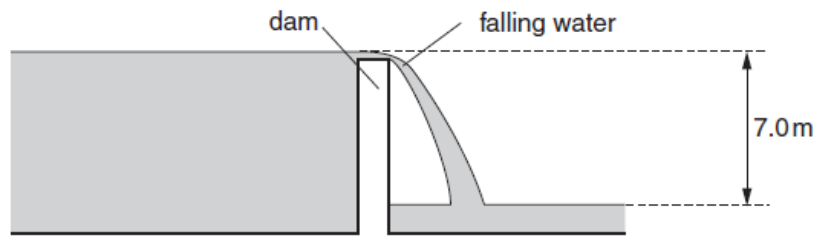
b) If the book has a mass of 250 g calculate its weight. [2]

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c) If the man is pushing with a force of 12 N and the frictional forces are 2 N calculate the resultant force on the book. [2]

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3. The diagram below shows water falling over a dam. The vertical height that the water falls is 7.0 m.



a) Calculate the potential energy lost by 1.0 kg of water during the fall. [2]

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b) Assuming all this potential energy loss is changed to kinetic energy of the water; calculate the speed of the water, at the end of the fall. [3]

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c) The law of conservation of energy states that ..... [1]

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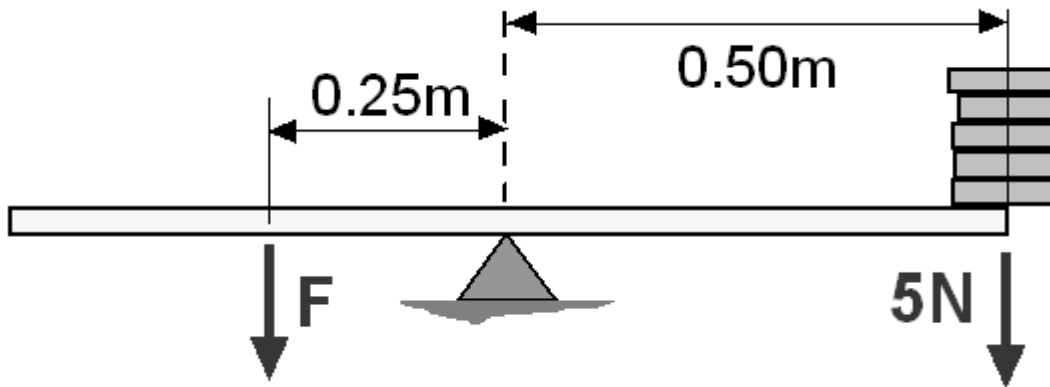
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d) Water falling over a dam could be used to generate electrical energy. List **one** advantage and **one** disadvantage of using this type of renewable energy. [2]

i. **Advantage :** \_\_\_\_\_  
\_\_\_\_\_

ii. **Disadvantage:** \_\_\_\_\_  
\_\_\_\_\_

4. The following diagram shows some weights on a balanced metre ruler.



a) Mark the pivot with the letter **P** [1]

b) Calculate the clockwise moment produced by the 5 N mass? [2]

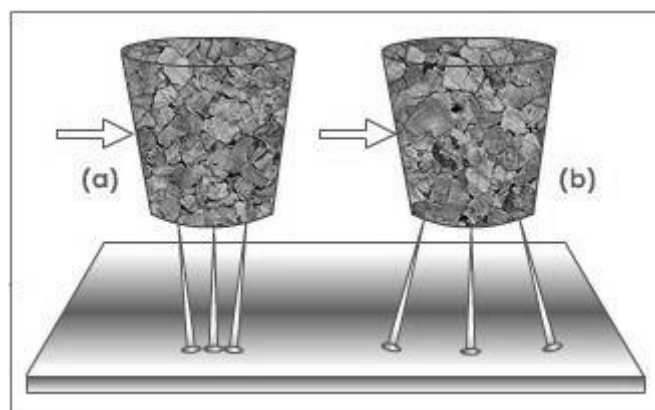
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c) If the ruler is at equilibrium what is the anticlockwise moment? [1]

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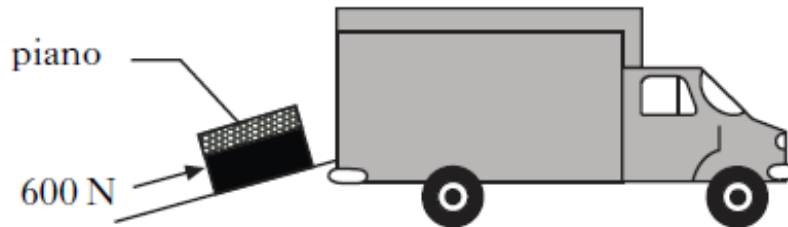
d) Calculate the value of the force labelled F. [2]

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e) The above diagram shows a cork. Three pins were inserted into the cork at its base. Which cork is the most stable? Why? [2]

5. A piano of mass 250 kilograms is pushed up a ramp into a van by applying a constant force of 600 Newton's as shown. The ramp is 3.2 metres long and the van floor is 0.75 metres above the ground.



- a) Calculate the weight of the piano. [1]
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- b) Calculate the work done to lift the piano vertically from the floor into the van? [2]
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- c) Calculate the work done pushing the piano up the ramp. [2]
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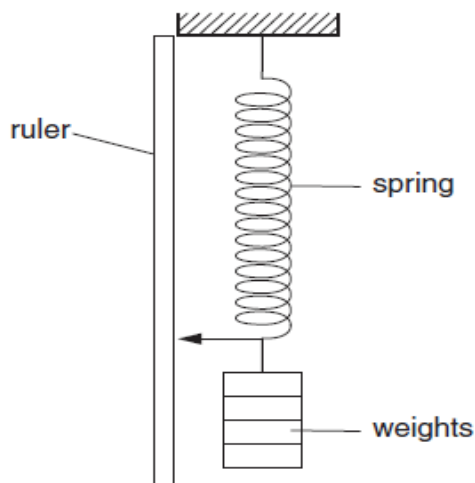
- d) Which answer in (b) and (c) above is greater? Give a reason for your answer. [2]
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- e) How can the force required to push the piano up the ramp be reduced? [1]
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**SECTION B**

**This Section carries 45 marks.**

6. This figure shows apparatus that may be used to compare the strength of a spring.



a) Name the upward force exerted by the spring on the weights. [1]

\_\_\_\_\_

b) Is this force a vector or a scalar quantity? [2]

\_\_\_\_\_

c) Table 1 was obtained when weights were added to the spring. Complete the table by filling the missing values. [2]

	<b>Table 1</b>							
Load N	0	2	4	6	8	10	12	14
Length of spring - mm	100	106	112	118	124	130	145	160
Extension - mm	0	6	12		24	30		60

(i) Draw a graph of **extension – mm** on the **Y axis** against **Load – N** on the **X-axis**. [4]

(ii) Use the graph to find the extension produced by a 5 N load. [2]

\_\_\_\_\_

(iii) Hooke’s Law states that the \_\_\_\_\_ is proportional to the \_\_\_\_\_ given provided that the elastic limit is not exceeded. [2]

(iv) On your graph mark a point P at which Hooke’s Law is not obeyed. [2]

\_\_\_\_\_

7. A farmer on digging a well finds four yellow looking stones. He wants to know if they are made of gold and so he asks his son, Jacob to find out. Jacob measures the mass and the volume of the four rocks and labels them A, B, C and D.

Rock Sample	A	B	C	D
Mass/g	<b>101</b>	<b>220</b>	<b>630</b>	<b>4899</b>
Volume /cm <sup>3</sup>		<b>44</b>	<b>80</b>	<b>978</b>
Density g/cm <sup>3</sup>	<b>5.05</b>			<b>5.00</b>

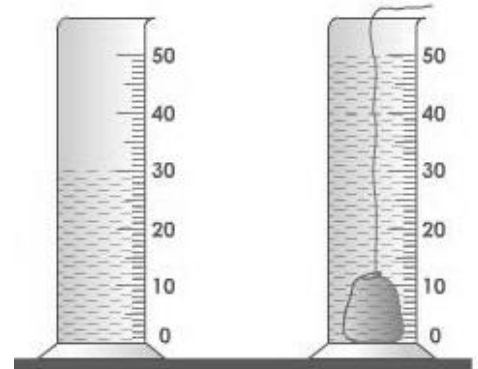
a) Jason uses a measuring cylinder to measure the volume of rock sample A.

i) What is initial volume of water in measuring cylinder. [2]

\_\_\_\_\_

ii) What is final volume of water plus rock. [2]

\_\_\_\_\_



iii) Calculate the volume of rock sample A and write it down in the table above. [2]

\_\_\_\_\_

b) Fill in above table by calculating the density of rock B and rock C. [4]

c) Name the three samples of the rocks that are made from the same material. [1]

\_\_\_\_\_

d) State and explain which of the rocks is made from a different material. [2]

\_\_\_\_\_

\_\_\_\_\_

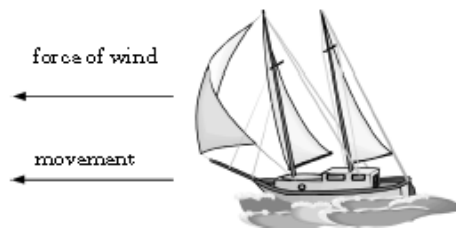
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Aluminum	2.70 g/cm <sup>3</sup>
Iron	7.87 g/cm <sup>3</sup>
Silver	10.50 g/cm <sup>3</sup>
Gold	19.3 g/cm <sup>3</sup>
Iron pyrite	5.01 g/cm <sup>3</sup>

e) Iron pyrite is also known as fool's gold as it very similar to gold in colour. Do you think that the farmer has found gold? [2]

\_\_\_\_\_

8. Wind exerts a forward force on a yacht causing it to move in the direction shown.



a) There is another force on the yacht acting in the opposite direction to the direction of movement. Name this force. [2]

b) The yacht must be lifted out of the water for repairs by means of a crane. The yacht has a weight of 15000 N. Calculate the work done in lifting the yacht out of the water onto a stand 3 m above sealevel. [3]

c) Calculate the power output of the crane if it takes 300 seconds to lift the yacht onto the stand. [3]

d) Calculate the efficiency of the machine if it uses a power input 200 Watts in lifting the yacht. [3]

$$\text{Efficiency} = \frac{\text{power output}}{\text{power input}} \times 100$$

(g) A simple circuit consists of a battery joined to a bulb. What energy change takes place in the circuit? Fill the diagram below by writing the energy type in the box. [4]

