



ST. NICHOLAS COLLEGE
HALF YEARLY SECONDARY EXAMINATIONS
February 2013



FORM 3

PHYSICS Track 2

TIME: 1 h 30 min

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:

Weight	$W = mg$
Density	$\rho = \frac{m}{V}$
Moments	Moment = force x perpendicular distance
Pressure	$P = \frac{F}{A}$

For office use only:

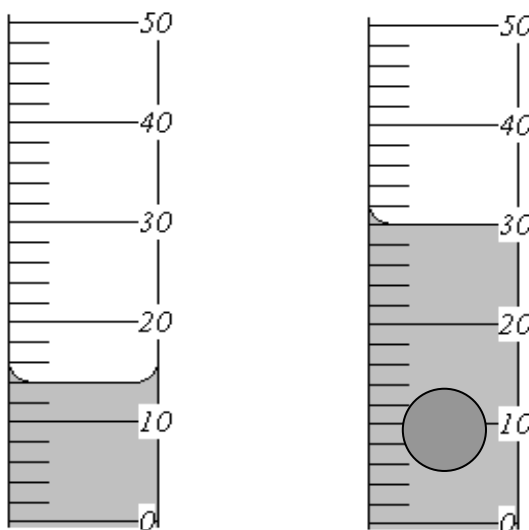
Question No.	1	2	3	4	5	6	7	8	Total Mark	Practical Mark	Final Mark
Maximum Score	8	8	8	8	8	15	15	15	85	15	100
Actual Score											

SECTION A : This section carries a total of 40 marks.

1. Naomi and Jack were in the laboratory to find out the density of a stone .

a. i. What measuring instrument did they use to measure the volume of water?

_____ (1)



ii. What is the volume of water? _____ (1)

iii. What is the volume of water and the stone? _____ (1)

iv. What is the volume of the stone? _____ (1)

b. What measuring instrument did they use to measure the mass of the stone?

_____ (1)

c. Help Naomi and Jack calculate the **density** of another stone of mass 300g and volume 50 cm³.

_____ (2)

d. Explain using the word **DENSITY** why the stone sinks in water.

_____ (1)

2. This question is about Heat Energy and Temperature

a. Write down **True** or **False** next to each sentence.

i	Temperature is measured in Joules.	
ii	The higher the temperature the hotter the object.	
iii	Degree Celcius (°C) is a unit of temperature.	
iv	Energy and Temperature are the same.	
v	Heat is a type of energy	
vi	Heat energy flows from a cold place to a hot place.	

(3 marks)

b. Continue the following sentences

i. When an object is heated it e _____ . (1)

ii. When an object cools it c _____ . (1)

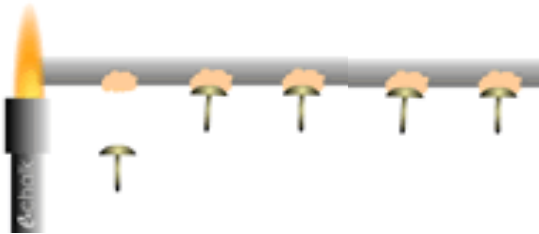
iii . When things are heated, they get bigger because the
m _____ start moving more and take up more space. (1)

c. Explain why a bottle of lemonade always has space between
the top of the liquid and the cap.



(2)

3. Carrie and David were investigating which rod is the best conductor of heat. They set up the experiment as shown in the diagram. The table shows their results.



Metal	Time for all pins to fall
Copper	10 minutes
Steel	12 minutes
Nickel	16 minutes

- a. Which material did they use to stick the pins to the rod? Explain why this material is chosen.

_____ (2)

- b. Which metal is the best conductor of heat? Explain your answer.

_____ (2)

- c. Which statement about conductors is correct . Underline the correct answer.

- Metals are good conductors because of free moving electrons.
 - Atoms in metals are widely spaced so heat energy is easily transferred.
 - In cold weather metal conductors are warm to touch.
- (1)

- d. What must Carrie and David do to ensure a **FAIR** comparison?

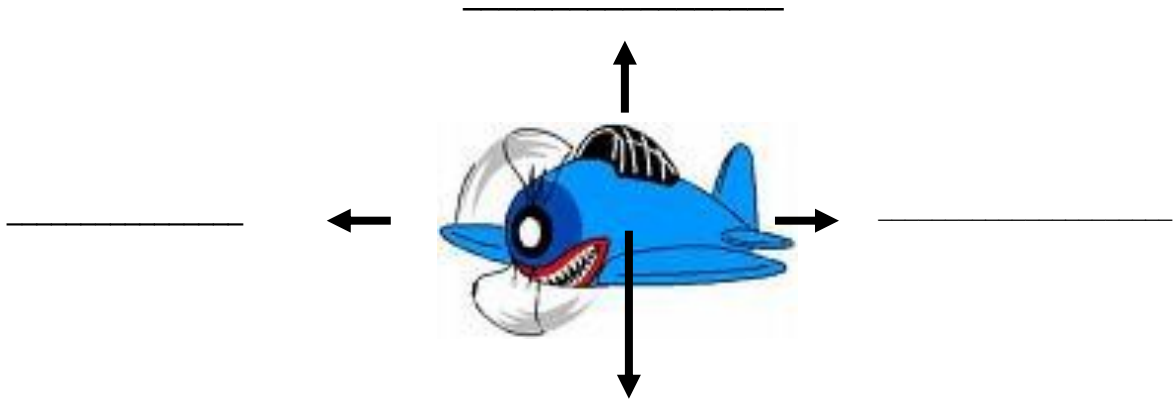
_____ (1)

- e. What are handles of pots and pans made of ? Explain why they are made of this material.

_____ (2)



4. This question is about Forces.
 a. This picture shows four forces on a plane. Name these forces .



(4 marks)

- b. A car has a thrust of 4000N and a frictional force of 2500N.



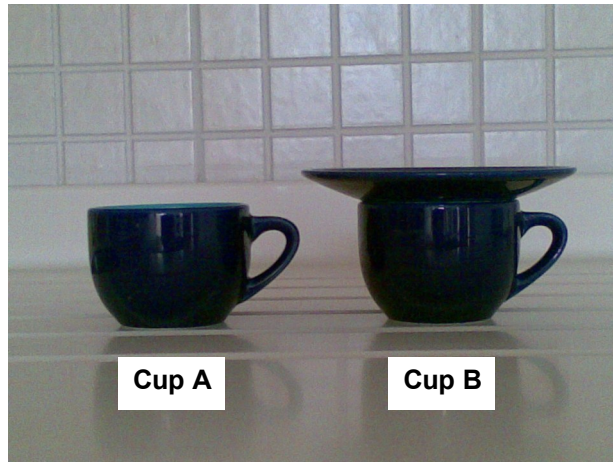
Calculate the resultant force on the car.

_____ (2 mark)

- c. A wooden block has a **mass** of 4kg. Calculate its **weight**.

_____ (2 marks)

5. The diagram below shows two cups containing hot tea . Cup A is uncovered and Cup B is covered.



- a. Which cup will cool more quickly? Explain your answer.

_____ (2)

- b. Warm air rises because it is _____ dense than cold air. (1)

- c. Why do the sides of the cup become warm after a while ?

_____ (1)

- d. Heat travels through the sides of the cup by C _____. (1)

- e. A kitchen cloth was used to cover cup B. Cup B stayed warmer for a longer time.

Explain how this cloth kept the cup warm for a longer time.

_____ (3)

SECTION B : This section carries a total of 45 marks

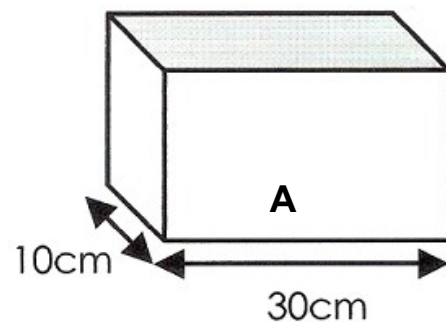
6. This question is about Pressure in solids.

A wooden block of dimensions 10cm x 10cm x 30cm, is placed on a flat surface as shown in position A. The mass of the block is 2.4kg.

a. Find :

i. The weight of the block in N.

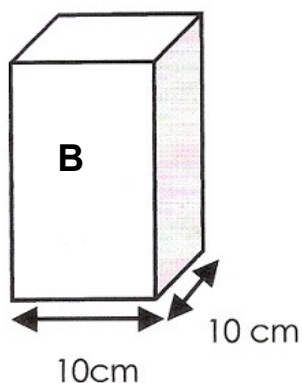
_____ (1)



ii. Using the formula $P = \frac{F}{A}$ find the pressure the block is making on the flat surface in position A .

_____ (3)

iii. The block is moved to position B. Calculate the new Pressure the block is making on the flat surface.



_____ (3)

iv. Which position A or B makes the bigger Pressure on the flat surface? Explain your answer.

_____ (3)

b. Gabriel lies on two different mattresses as shown below.



Diagram 1



Diagram 2

i. In which diagram is Gabriel making most pressure on the mattress?

_____ (2)

ii. Which mattress would be more comfortable to sleep on? Explain your answer.

 _____ (3)

7. **This question is about Hooke's Law.**

A wire was suspended vertically and 1N weights were loaded to it. Below is a table showing the results.

Load (N)	0	1	2	3	4	5	6
Extension (mm)	0	10		30	40	50	55

a. Fill in the missing value in the table above. (1)

b. Use the results shown in the table above and plot a graph of **extension** on the **y-axis** against **load** on the **x-axis**. (6)

c. On your graph mark with and E the point of the elastic limit . (2)

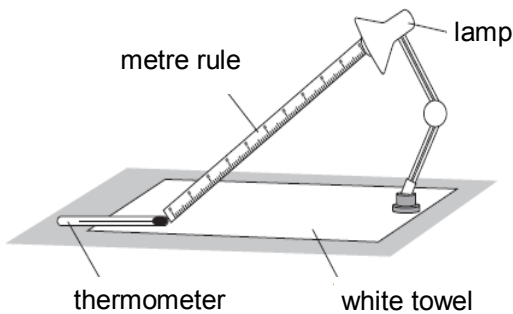
d. Use the graph to find:

i. The extension when the load is 4.5N. _____ (2)

ii. The load that would give an extension of 25mm. _____ (2)

iii. Hooke's Law states that the _____ of a spring is directly proportional to the _____ . (2)

8. a. Kevin investigates heat energy emitted from four different lamps **A, B, C** and **D**. He set up the experiment as shown below. He recorded the temperature at the start of the experiment and 5 minutes later he recorded the final temperature.



Lamp	Initial temperature (° C)	Final temperature (° C)	Temperature change (° C)
A	17	27	
B	18	26	
C	20	28	
D	22	24	

- i. In the table above record the temperature change for each lamp. (4)
- ii. Which lamp caused the largest rise in temperature?
_____ (1)
- iii. Mention **ONE** thing which was kept constant during the investigation.
_____ (2)
- iv. Heat energy is reaching the lamp by _____ (2)
- v. Name one other form of energy the lamp is producing?
_____ (2)

- b. The diagram below shows different examples of how heat can be lost from inside a badly insulated house.

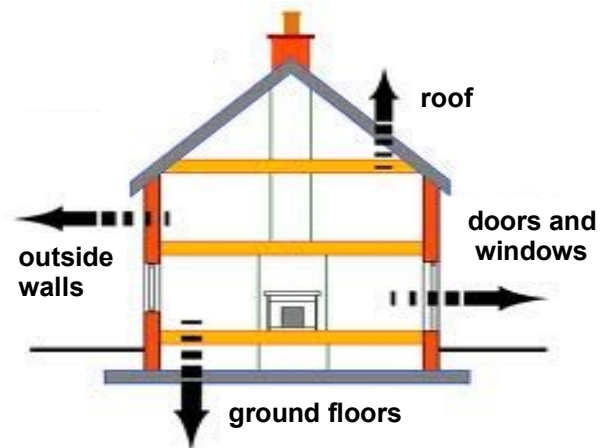
Suggest a solution for the following:

Roof _____

Outside walls _____

Doors and windows _____

Ground floor _____



(4)