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GIRLS SECONDARY
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HALF-YEARLY EXAMINATIONS – FEBRUARY 2012



Index Number []

Form: 3 Physics Time: 1hr 30mins

Name: Class:

Answer ALL questions in the spaces provided on the Examination Paper. All working must be shown. The use of a calculator is allowed.

Table with 2 rows and 2 columns: Equations, Density (m = rho V), Heat (Heat energy = m c Delta theta)

Marks Grid: For the Examiners' use ONLY

Marks Grid table with columns: Question, 1-7, Th., Prac, Total, Final Mark %

Section A: This section has 4 questions. Each question carries 10 marks (total 40marks)

1. Table of Measurements

a) For the following situations identify the instrument to be used, the S.I. unit, the symbol for the quantity to be found and finally circle a reasonable answer for the following measurements:

Table with 5 columns: Situation, Instrument to be used, Symbol, S.I Unit, Reasonable answer in the S.I units (circle one value)

[6]

1b) Underline the correct answer:

Sara needs to find the density of an irregular object. She must use a **test-tube/measuring cylinder** to find the volume and a **balance/ hourglass** to find the **density/mass**. The standard international system of units used for density is **the J/kg⁰C or the kg/m³**. [4]

2. Charlene was asked to measure the volume of a small irregular object. She was provided with *water* and a *measuring cylinder*.

a) Briefly describe how Charlene should use the water and the measuring cylinder to find the volume of the small irregular object that sinks.

[4]

b) List two precautions that Charlene should do during her experiment: [2]

- i. _____
- ii. _____

c) Charlene wanted to find the density of the irregular object. What is the additional instrument that she will need? _____ [1]

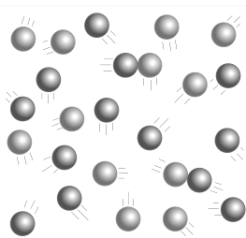
d) Calculate the density of the irregular object if it has a mass of 60g and a volume of 20cm³:

[3]

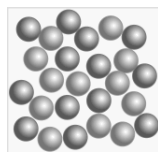
3a) For each statement below state whether it refers to a solid, liquid or gas. [3]

- (i) The material has a fixed volume and shape. _____
- (ii) The material has a fixed volume but not a fixed shape. _____
- (iii) The material does not have a fixed volume or shape. _____

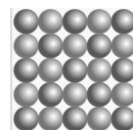
b) Diagrams A, B and C below show particles in the solid, liquid and gaseous state. Complete the following with words or phrases: [6]



A



B



C

(i) Diagram _____ shows particles with the least kinetic energy. A change of state from B to A is called _____. The particles move because they have _____.

(ii) When a material is heated, the particles vibrate more and the space between them _____ . When this happens, the material _____ .

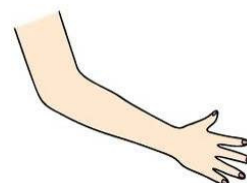
(iii) Since the particles in material A are far apart, this material has the lowest _____ .

(c) If you place alcohol on your skin you feel cool. Underline **ONE** statement from below which best explains what is happening.

(i) Alcohol molecules are always cold.

(ii) The molecules of alcohol take heat energy from your arm to evaporate.

(iii) The alcohol only feels cool because your skin is warm.



[1]

4a. **Match** each method of heat transfer with its definition.

Term	Definition
Conduction	Infrared heat waves.
Convection	Heat transfer from a heat source through a solid.
Radiation	The flow of heat through a liquid or gas.

[3]

b. Label each example with the appropriate type of heat transfer: radiation, convection, or conduction. [5]

i) Heat we feel from the sun. _____

ii) My spoon is hot after leaving it in a cup full of hot water. _____

iii) This is responsible for making pasta rise and fall in a pot on the stove. _____

iv) Insulation is used to prevent this type of heat transfer. _____

v) A type of decorative lamp contains coloured liquids. These liquids form globs that break off and rise to the top of the liquid. The globs rise due to _____.



c. Give one example of an insulator: _____ [1]

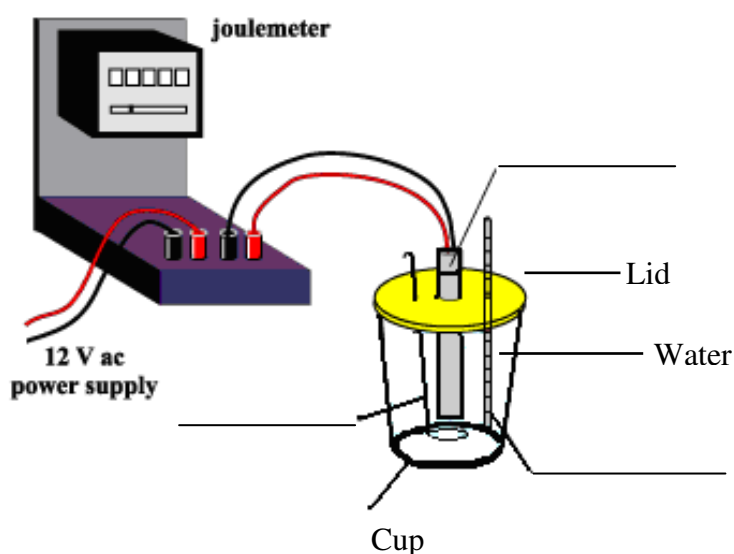
d. Give one example of a conductor: _____ [1]

Section B: Answer all questions in this section. This section carries 45 marks.

5. *This question is about specific heat capacity.*

Rob wanted to find out how much heat energy need to be absorbed by water to raise the temperature by 1°C. He set up the following apparatus.

a. **Identify** the apparatus in the following set-up.



Electronic Balance

[3]

b. What is missing from the above set-up? Why is it needed?

_____ [2]

c. The specific heat capacity of water is 4200J/kg°C. What does this mean?

_____ [2]

d. Before Rob stated the experiment he noted the initial temperature of water to be 12°C. He then found the mass of the water in the cup to be 500g. After performing the experiment with the above apparatus he noticed the water's final temperature to be 43°C.

i. Convert the mass in kg.

_____ [1]

ii. Taking the specific heat capacity of water to be 4200J/kg°C, what reading should the Joulemeter give?

_____ [3]

iii. The reading on the Joulemeter is slightly higher than the actual value found in (dii). Why?

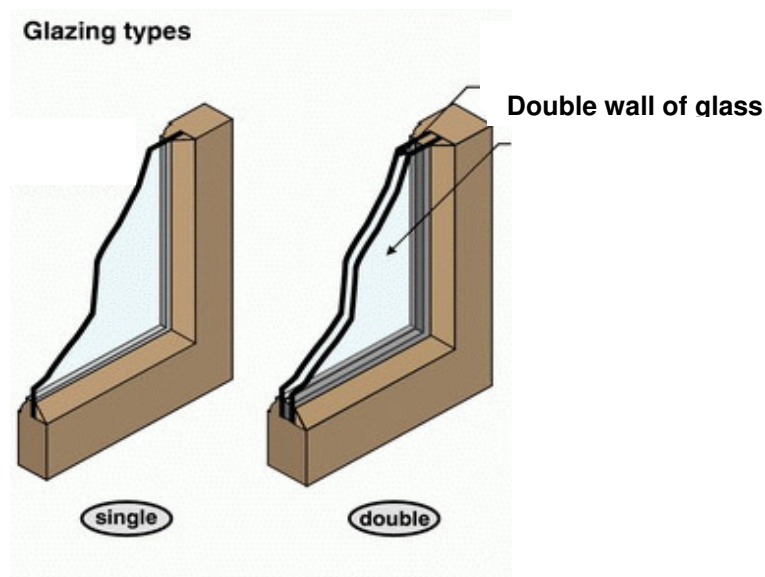
_____ [2]

e. Mention two precautions which Rob should carry out whilst doing this experiment.

_____ [2]

6. This question is about uses of conduction, convection and radiation

If one explores his/her own house, it is amazing how many examples of conduction, convection and radiation can be found.



a. A considerable amount of heat is lost from our windows especially during cold days when we use heaters to heat our homes.

i. With single glazed windows the efficiency of our home is very low. Explain why this is so, by mentioning the main process of heat transfer involved?

_____ [2]

ii. Nowadays the majority of households have double glazed windows. How do these types of windows reduce the amount heat loss? Explain in terms of heat processes.

_____ [2]

b. Heating our rooms is another example of the heat transfer. There are different ways in which we can heat our house.

i. Fill in the following table: First one is already given.

Heating Method	Main Process
<i>Radiator heater</i>	<i>Radiation</i>
Fan Heater	
Gas Heater	
Fireplace	

[3]



Fan Heater



Radiator Heater

ii. Mention one advantage of the fan heater on the radiator heater. Explain in terms of heat transfer.

[2]

iii. Where are the majority of the heaters normally placed, on the floor or fixed to the ceiling? Explain why?

[3]

c. When you step out of bed in the morning and place one bare foot on the carpet and the other foot on the tiled floor, the tiles feel much colder than the carpet although they are both at room temperature. Explain this observation.

[3]



7. *This question is about heat radiation.*

a) Fill in:

Radiation is the only type of energy that can travel through a _____. [1]

b) Joanne noticed that when she wears a black T-shirt and stays in the sun, she feels hotter than when she wears a white t-shirt. Sarah doesn't agree with her so they decided to conduct an experiment to investigate more about heat radiation.

They filled two cans, one white and one black, with tap water and put them next to a heat source. They recorded the temperature in the table below.

Time (mins)	0	2	4	6	8	10	12
Temp. black (°C)	15	24	31	36.5	41	45	47.5
Temp. white (°C)	15	20.5	25	29	33	36	38

i) On the graph paper provided, plot a graph of temperature on the y-axis against time on the x-axis for both containers on the same axis. [5]

ii) From your graph, find:

- the initial temperature of both containers. _____ [1]

- the time taken for the white container to reach 23°C. _____ [1]

- the temperature of the black container after 5mins. _____ [1]

- the difference in temperature between the two containers after 7mins.
_____ [1]

iii) Who was right between Joanne and Sarah? Give a reason for your choice.

_____ [2]

iv) Using the results obtained, which colour is the best absorber of heat?

_____ [1]

v) On the other hand, if they had to leave both containers to cool down, which one would cool down first? Explain your answer.

_____ [2]

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