

**SAN FRANÇISK T'ASSISI BOYS' SECONDARY SCHOOL – ST. VENERA**

HALF YEARLY EXAMINATIONS 2007/2008

|         |                |              |
|---------|----------------|--------------|
| FORM: 4 | <b>Physics</b> | Time: 1.5hrs |
|---------|----------------|--------------|

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

**These are some useful formulas:**

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

$$\text{Weight} = \text{mass} \times \text{gravity}$$

$$\text{take } g = 10\text{m/s}^2$$

$$\text{Pressure} = \text{height} \times \text{density} \times \text{gravity}$$

**Section A. This section carries 40marks**

1. Complete the following table.

| Quantity | Unit            | Quantity    | Unit |
|----------|-----------------|-------------|------|
| Density  | $\text{Kg/m}^3$ | Gravity     |      |
| Area     |                 | Height      |      |
| Volume   |                 | Force       |      |
| Mass     |                 | Weight      |      |
| Pressure |                 | Temperature |      |

2. Complete the following statements.

- a) A force acting over a small area gives a large \_\_\_\_\_.
- b) The pressure caused by the air surrounding us is known as the \_\_\_\_\_ pressure.
- c) Convection currents form when liquids or \_\_\_\_\_ are heated.
- d) A \_\_\_\_\_ is used to measure temperature.
- e) Heat energy travels through the bottom of a pan by \_\_\_\_\_.
- f) Radiation is the heat transfer of heat by \_\_\_\_\_ radiation.
- g) Pressure in water \_\_\_\_\_ with depth.
- h) A \_\_\_\_\_ is an instrument used to measure atmospheric pressure.

3. ***This question is about radiation.***

- a) The figures below represent two blocks of copper **A** and **B** painted in different colours.



- i) Surface \_\_\_\_\_ is the best absorber of heat energy.  
ii) Surface \_\_\_\_\_ is a very good emitter of thermal radiation.  
iii) Surface \_\_\_\_\_ is the best reflector of heat energy.

- b) On a **cold winter day**, would you wear a white shirt or a black shirt to feel warmer? Explain.

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4. ***This question is about pressure in liquids.***

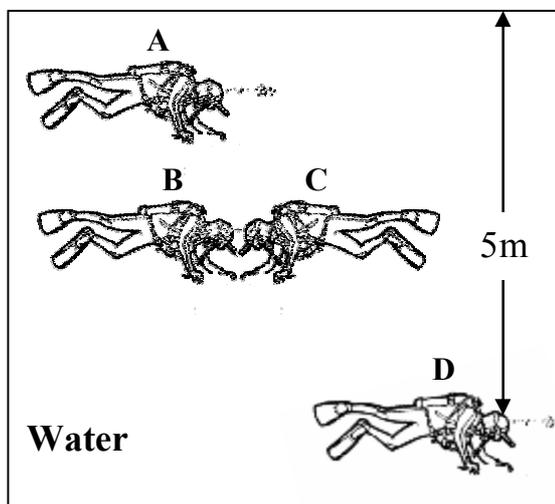
The figure shows an underwater picture of four divers: A, B, C and D.

- a) i) Which two divers are under the same pressure?

\_\_\_\_\_

- ii) Give a reason for your answer.

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



- b) i) Which diver has the greatest pressure due to the water?

\_\_\_\_\_

- ii) Explain your answer.

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- c) Calculate the pressure due to the water on diver D, given that the density of water is  $1000\text{Kg/m}^3$ .

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- d) How would you design the walls of a deep water reservoir such that it withstands the pressure of the water without collapsing?

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5. ***This question is about pressure in solids.***

To be allowed to enter St. John's Co-cathedral one must be wearing a shoes of a large surface area. The maximum pressure that must be applied on the floor is  $100,000,000\text{Pa}$ . Claire's shoes have a very thin heel. The total surface area of **one** shoe is  $5\text{cm}^2$ .

- a) Express the total area of one shoe in  $\text{m}^2$ .

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- b) Calculate the weight of Claire if she has a mass of  $65\text{kg}$ .

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- c) Calculate the pressure exerted on the ground by Claire when she wears these pair of shoes.

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- d) Can Claire enter the cathedral when wearing these shoes? Suggest one way how Claire can solve her problem.

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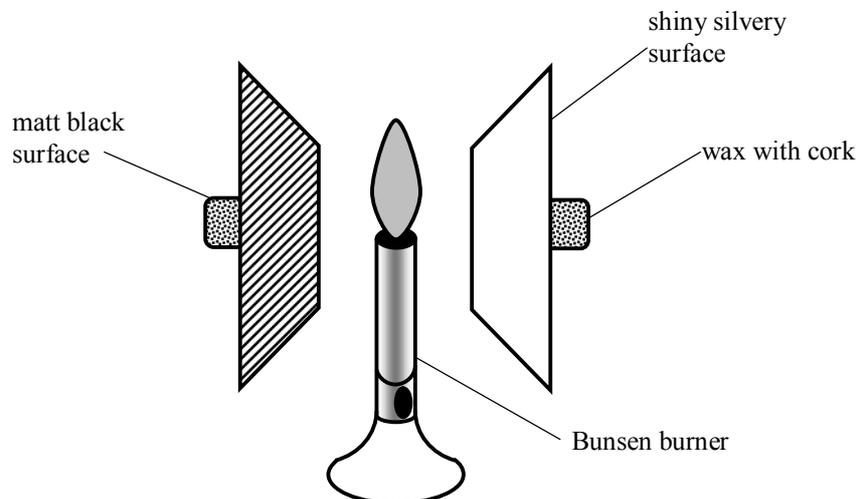
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## Section B. This section carries 45marks

6. *This question is about the design of an experiment.*

John carries out an experiment to see which surface is the best absorber of radiation. The diagram shows the setup of the apparatus used by John.



a) Describe briefly how John could have conducted his experiment.

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b) i) The cork attached to the \_\_\_\_\_ surface fell off first. This means that this surface is a \_\_\_\_\_ absorber of radiation.

ii) The cork attached to the \_\_\_\_\_ surface took a very long time to fall. This means this surface is a \_\_\_\_\_ conductor of radiation or in other words a \_\_\_\_\_ insulator of radiation.

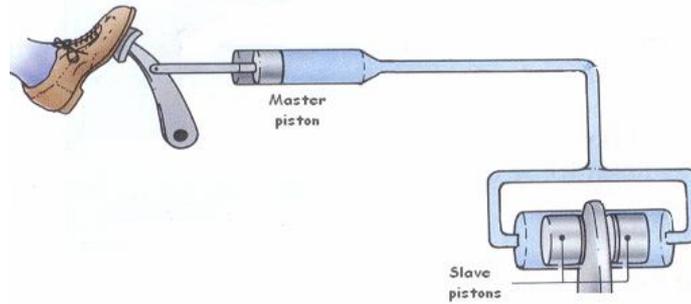
c) Mention at least two precautions that John had to take in order to conduct his experiment properly.

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7. This question is about hydraulic machines.



A driver in a car pushed the break pedal with a force of 50N, the area of the master piston is  $2\text{cm}^2$ .

- a) Calculate the pressure produced by the master piston.

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- b) State the pressure near the output force. Explain.

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- c) Using the value of the pressure found in question a, calculate the force applied on the break pads if the area of the slave pistons is  $120\text{cm}^2$ .

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- d) Mention at least 2 applications where hydraulic systems are used.

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8. *This question is about heat.*

Elaine noted the temperature of the water in her kettle just after switching it on. Her results were as follows:

|                         |    |    |    |    |    |    |    |    |
|-------------------------|----|----|----|----|----|----|----|----|
| <b>Temperature (°C)</b> | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
| <b>Time (s)</b>         | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  |

a) Use the graph paper provided to plot a graph of **temperature on the y-axis** against **time on the x-axis**.

b) From your graph :

i) What was the temperature of the water after 3.5 minutes?

\_\_\_\_\_

ii) After how many minutes was the temperature of the tea at 75°C?

\_\_\_\_\_

c) How would the results change if she kept the lid of her kettle open? Explain.

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**END OF EXAM PAPER**

| <b>Exam Total</b> | <b>Practical Work</b> | <b>Total Mark</b> |
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