

Name of the Student: _____

Max. Marks : 18 Marks

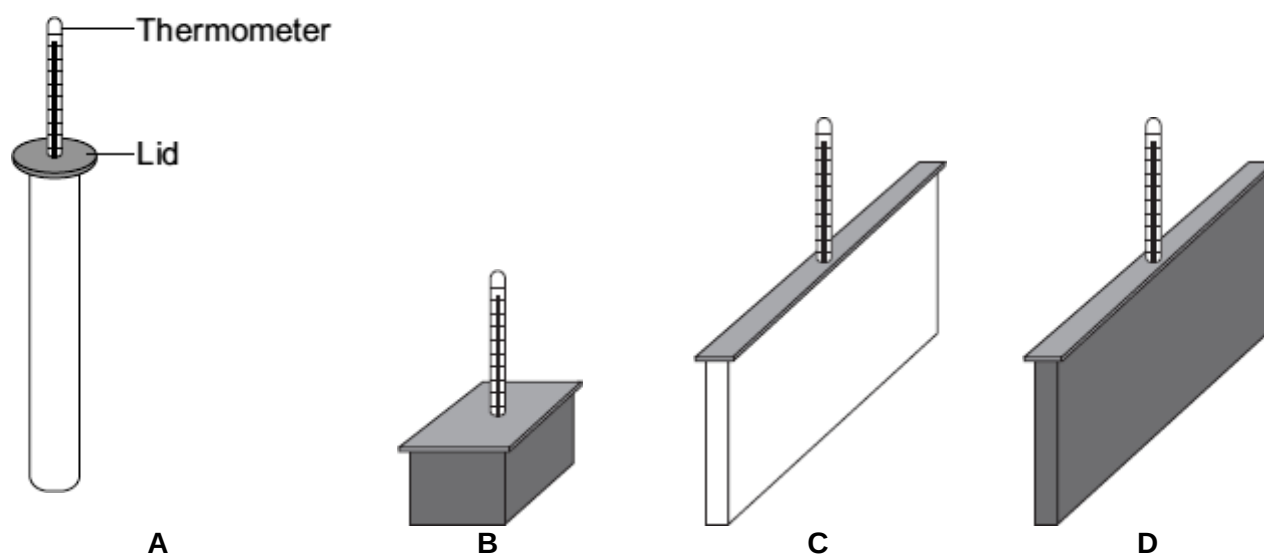
Time : 18 Minutes

Q1.

A student investigated the effect of shape and colour on heat transfer.

The student used metal containers with the same volume but with different shapes and outside colour. The containers were each filled with water at 100 °C.

After 20 minutes the temperature of the water inside each container was measured.



The results from the investigation are given in the table.

Container	Colour	Temperature after 20 minutes in °C	Temperature fall in °C
A	White	86	14
B	Black	86	14
C	White	73	27
D	Black	60	40

- (i) The student uses the results in the table to see if shape has affected heat transfer.

Which containers should the student compare to do this?

Give a reason for your answer.

(1)

- (ii) Explain why the temperature of the water in both containers **A** and **B** fell by the same amount.

(2)

- (iii) A central heating system has several radiators joined together. The hot water goes from the boiler, through each radiator in turn and then back to the boiler for reheating.

Give **one** reason, other than appearance, why it might **not** be a good idea to paint radiators black.

(1)

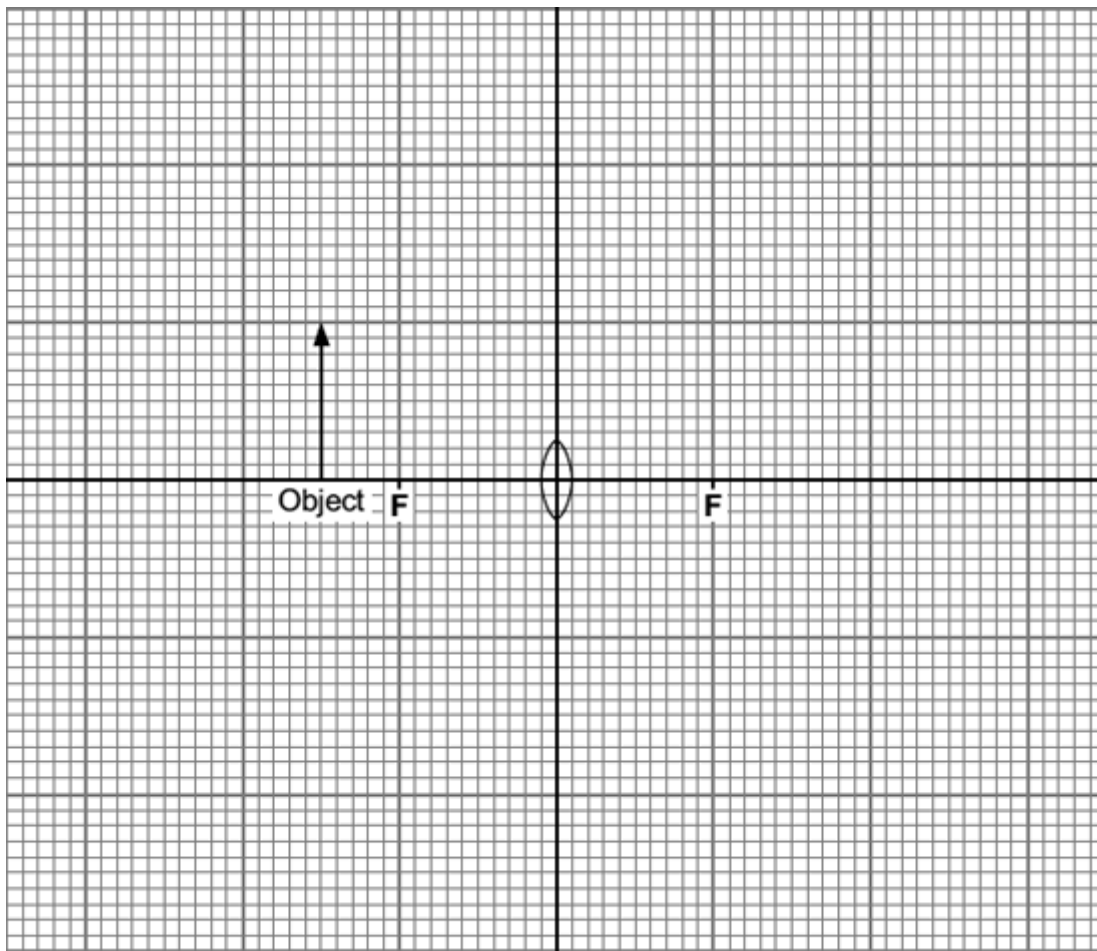
(Total 4 marks)

Q2.

A student investigated how the nature of the image depends on the position of the object in front of a large converging lens.

The diagram shows one position for the object.

- (a) Use a ruler to complete a ray diagram to show how the image of the object is formed.



Key: F = principal focus

(4)

- (b) Describe the nature of this image relative to the object.

(2)

(Total 6 marks)

Q3.

- (a) Microwaves and visible light are two types of electromagnetic wave. Both can be used for communications.

- (i) Give **two** properties that are common to both visible light and microwaves.

1.

2.

(2)

- (ii) Name **two** more types of electromagnetic wave that can be used for communications.

- (b) Wi-Fi is a system that joins computers to the internet without using wires. Microwaves, with a wavelength of 12.5 cm, are used to link a computer to a device called a router. Microwaves travel through the air at 300 000 000 m/s.

Calculate the frequency of the microwaves used to link the computer to the router.

Show clearly how you work out your answer and give the unit.

Frequency = _____

(3)

- (c) Wi-Fi is used widely in schools. However, not everyone thinks that this is a good idea.

A politician commented on the increasing use of WiFi. He said: 'I believe that these systems may be harmful to children.'

However, one group of scientists said that there is no reason why Wi-Fi should not be used in schools. These scientists also suggested that there is a need for further research.

- (i) Suggest what the politician could have done to persuade people that what he said was not just an opinion.

(1)

- (ii) Why did the group of scientists suggest that there is a need for further research?

(1)

(Total 8 marks)