

# EB Education Revision Guide



How to work with Required Practicals: Part 8  
Combined (AQA Physics Paper 2 - 2022)

# Assessed Required Practical Activities Paper 2 Foundation & Higher

**Required practical activity 21:** investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.

# Practical 21: Radiation and absorption

## What you need to know

**To investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.**

The Leslie cube, which has different coloured surfaces, is placed on to a heat proof mat. The cube is filled with very hot water, and the lid replaced. The infra-red detector is used to measure the amount of infra-red radiated from each surface. The detector needs to be the same distance from each surface. This experiment could also be carried out using different coloured cans and measuring the temperature of the water.

You may be asked:

- To explain why lids should be placed on the cube/containers. This is to reduce any heat loss through convection.
- To explain what the control variables are – containers should be the same size, volume and thickness, and the starting temperature of the water should be the same.

Matte black surfaces **absorb** and **emit** much more radiation than shiny smooth surfaces.

# Your turn:

1. Objects all emit and absorb infrared radiation.

a) Using the correct words from the selection below, complete the sentences.

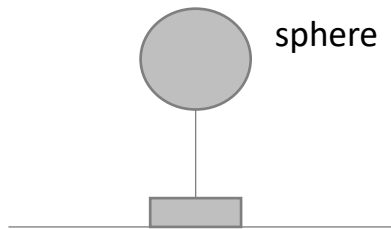
dark shiny    dark matte    light shiny    light matte

The best emitters of infrared radiation have ..... surfaces.

The worst emitters of infrared radiation have ..... surfaces.

b) The sphere shown below is at a much higher temperature than its surroundings.

Energy is transferred from the sphere to the surroundings.

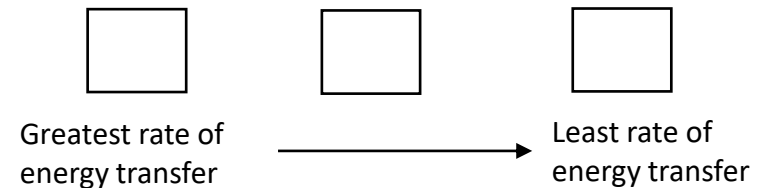


The table below shows readings for the sphere in three different conditions.

Condition	Temperature of sphere in °C	Temperature of surroundings in °C
A	75	3
B	85	0
C	95	35

The sphere transfers energy to the surroundings at a different rate in each of the conditions.

Put the conditions A, B and C in the correct order.



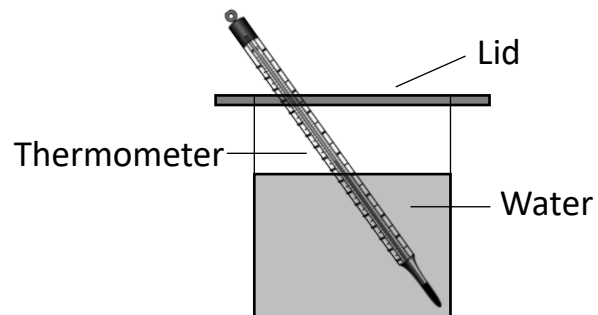
Give a reason for your answer.

.....

.....

# Your turn:

2. The diagram below shows a can containing water. Toby investigates how quickly a can of water heats up when it is cooler than the room temperature.



He has four cans, each of them is made of the same material, with the following outer surfaces.

- light matte    light shiny    dark matte    dark shiny

He measures how long it takes the water in each can to reach room temperature. The same mass of water is placed in each can, at the same starting temperature.

a) Which can of water will reach room temperature the quickest? Explain why.

.....  
 .....  
 .....

b) Suggest three control variables, other than the material of the can, mass of water and starting temperature.

1 .....  
 2 .....  
 3 .....

# Your turn:

c) The photographs below show two different foxes.



Fox A



Fox B

Which fox is better adapted to survive cold conditions?

Explain why

.....  
.....  
.....  
.....  
.....  
.....  
.....

# Your turn:

1. Objects all emit and absorb infrared radiation.

a) Using the correct words from the selection below, complete the sentences.

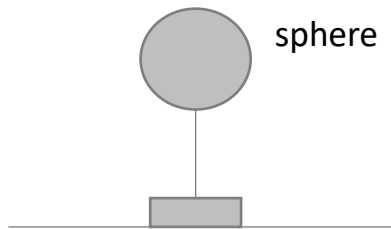
dark shiny      dark matte      light shiny      light matte

The best emitters of infrared radiation have ..... **dark matte** surfaces.

The worst emitters of infrared radiation have ..... **light shiny** surfaces.

b) The sphere shown below is at a much higher temperature than its surroundings.

Energy is transferred from the sphere to the surroundings.

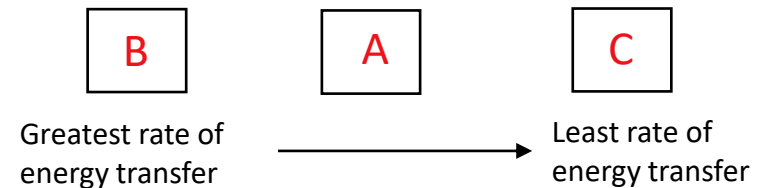


The table below shows readings for the sphere in three different conditions.

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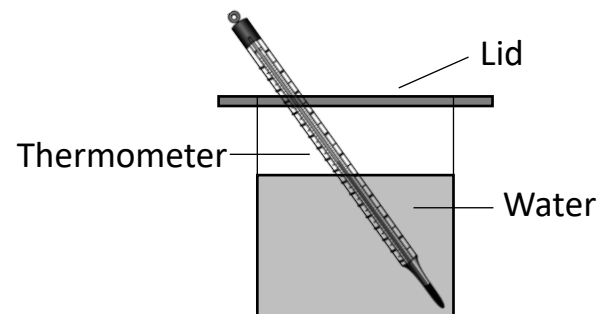


Give a reason for your answer.

..... **Biggest temperature difference in B** .....

# Answers:

2. The diagram below shows a can containing water. Toby investigates how quickly a can of water heats up when it is cooler than the room temperature.



He has four cans, each of them is made of the same material, with the following outer surfaces.

light matte      light shiny      dark matte      dark shiny

He measures how long it takes the water in each can to reach room temperature. The same mass of water is placed in each can, at the same starting temperature.

- a) Which can of water will reach room temperature the quickest? Explain why.

..... Dark matte because it is the best absorber of  
 ..... infra-red radiation  
 .....

- b) Suggest three control variables, other than the material of the can, mass of water and starting temperature.

- 1 ..... Same surface area /shape of can
  - 2 ..... Same position in the room
  - 3 ..... Same surface underneath the can
- Surrounding temperature the same for all cans



# Your turn:

c) The photographs below show two different foxes.



Fox A



Fox B

Which fox is better adapted to survive cold conditions?

Explain why

.....  
Fox A  
.....  
Smaller ears , thicker fur to minimise energy  
.....  
transfer  
.....  
.....  
.....  
.....

For more help and resources, or  
to work with us as a tutor, please  
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