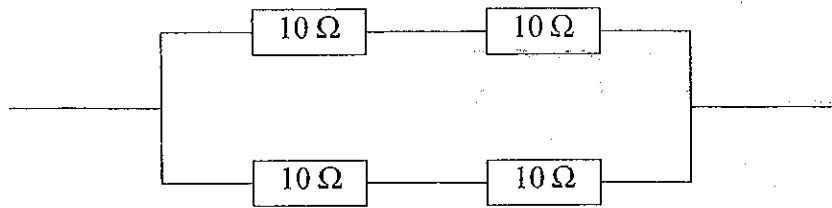


1. Four 10Ω resistors are connected as shown in the diagram.

Le
blc



Calculate the total resistance of the combination.

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

Total resistance =
(3)

Comment on your answer and suggest why such a combination of resistors might be used.

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

(2)

Q1

(Total 5 marks)

5. Define the term specific heat capacity.

Lec
bla

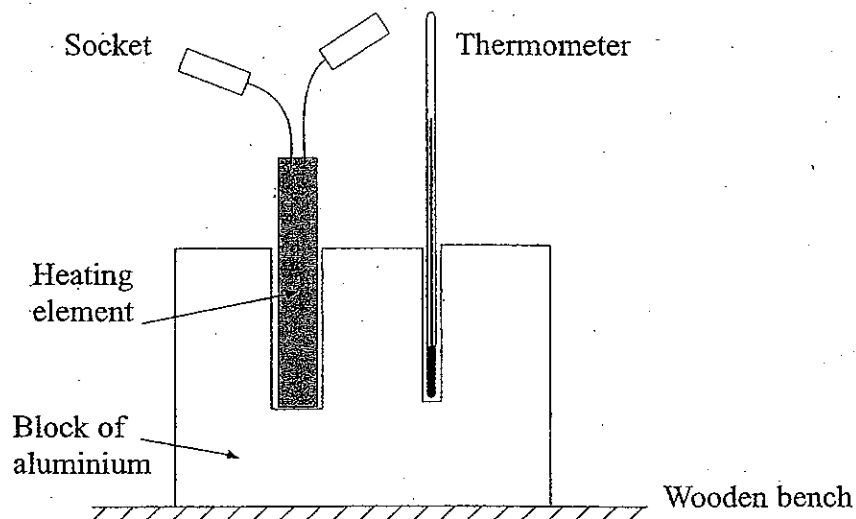
.....

.....

.....

(2)

A student decides to measure the specific heat capacity of aluminium by an electrical method. He selects his apparatus and then assembles the aluminium block, the thermometer and the heating element as shown.



The student intends to substitute his results into the relationship

$$mc\Delta T = VIt$$

Draw a diagram of the electrical circuit he would need to set up in order to be able to carry out the experiment.

(3)

What other pieces of apparatus would he need?

.....
.....

(2)

He carries out the experiment and then calculates his value for the specific heat capacity of aluminium. He discovers that his value is higher than the accepted value of $900 \text{ J kg}^{-1} \text{ K}^{-1}$.

Suggest why his result is higher than $900 \text{ J kg}^{-1} \text{ K}^{-1}$.

.....
.....

(1)

With reference to the apparatus shown in the diagram, state two modifications that he should make in order to minimise the discrepancy.

1.

.....

2.

.....

(2)

(Total 10 marks)

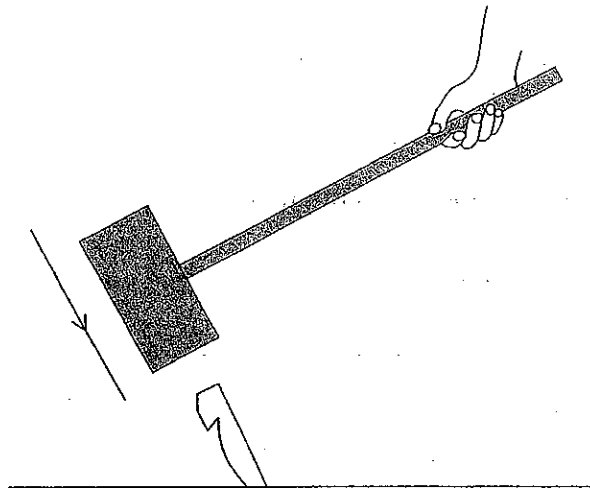
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Q5

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7. A wooden mallet is being used to hammer a tent peg into hard ground.

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blank



The head of the mallet is a cylinder of diameter 0.100 m and length 0.196 m . The density of the wood is 750 kg m^{-3} . Show that the mass of the head is approximately 1.2 kg .

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

(3)

The head strikes the tent peg as shown at a speed of 4.20 m s^{-1} and rebounds at 0.58 m s^{-1} . Calculate the magnitude of its momentum change in the collision.

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

Momentum change =

(3)

The head is in contact with the peg for 0.012 s. Estimate the average force exerted on the peg by the head during this period.

Leave blank

.....
.....

Average force =
(2)

Give a reason why your value for the force will only be approximate.

.....
.....
(1)

With reference to your calculations above, discuss whether a mallet with a rubber head of the same mass would be more or less effective for hammering in tent pegs.

.....
.....
.....
.....
(2)

Q7

(Total 11 marks)

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