# U-value Question

FORMULA:

$$R = \frac{T}{K} \qquad R = T \times r \qquad U\text{-value} = \frac{1}{R}$$

R = Resistance
r = resistivity
k = Conductivity

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## Table — PART (a)

| ELEMENT | THICKNESS T | RESISTIVITY r | CONDUCTIVITY k | RESISTANCE R |
|---------|-----------|-------------|--------------|------------|
| ISR     |           |             |              | 0.104      |
|         |           |             |              |            |
|         |           |             |              |            |
|         |           |             |              |            |
| ESR     |           |             |              | 0.413      |

Total Resistance = _____

$$\frac{1}{TR} = U \text{ value} \underline{\hspace{2cm}} \text{w/m}^2\text{k}.$$

NB For thickness units must change from

MM to m    ie.    100mm → 0.1

20mm → 0.02

13mm → 0.013

3mm → 0.003

Divide by 1000 or move decimal
point 3 spaces forward.

PART (b)

2 ways → 1.) Cost of heat loss

5 steps

2.) Size of insulation required to achieve a certain U-value.

_____

① Cost of heat loss – 5 steps

① Heat loss/s = U-value × area × temp. different.

② Heating time = 60 × 60 × hrs × 7 × Wks

③ Heat loss/yr = $\dfrac{\text{Ans ① × Ans ②}}{1000}$ =

④ Litres of Oil = $\dfrac{\text{Ans ③}}{37350}$ =

⑤ Cost = Ans ④ × Cost = _____

② Size of insulation Required

• You __cannot__ add or subtract U-values. You must work with the Total Resistance instead.

— Convert your old U-value to total Resistance
— Convert you new U-value to total Resistance

- Subtract new resistance from old resistance. This will give you the Resistance of the additional new insulation-R.

- Use the conductivity for the new insulation given in the question and the formula $R = \frac{T}{k}$ to find T - thickness

Part (c) — include a good sketch if it is required.