

Lesson 3 - Other properties of Materials

Task 1

The initial length of a bar of copper is 1 meter at 0°C. Work out the final length at 40°C

Note: find the coefficient of linear expansion α in the power point handout

Task 2

A railway track made of steel has a length of 140m at 20°C. Its coefficient of linear expansion is $18.7 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$. Find out the length in winter (-5°C), in spring (28°C), in summer (40°C) and the maximum difference of lengths.

Note: find the coefficient of linear expansion α in the power point handout

Task 3

An aluminium profile in a frame of a window has a length of 2 m at 0°C. Which length will have in summer (40°C).

Note: find the coefficient of linear expansion α in the power point handout

Task 4

A piece of parquet (made of wood) in a house has a change of length from 1.2m to 1.2002 metres from winter to summer. Find out the change of temperature in the house.

Note: find the coefficient of linear expansion α in the power point handout

Task 5

Write sentences from the following substitution list:

A material that	conducts electricity	is	opaque
	conducts heat		a thermal conductor
	is attracted by a magnet		an electrical insulator
	is not attracted by a magnet		translucent
	doesn't conduct electricity		an electrical conductor /conductive
	lets light go through it but objects at the other side can't be clearly seen		non-ferromagnetic
	doesn't let light go through it		ferromagnetic
	lets light go through it		transparent

Task 6

- a) Why it is necessary to have expansion joints in rail tracks and points?
- b) What happens if a railway track is set up with no expansion joints at all?

Task 7

Why is it a magnet stuck to a fridge?

Task 8

Look at the following grid and fill in the gaps in the text with the words of the list below:

Substance	Density (kg/m³)
Gold	19300
Copper	8960
Iron	7870
Steel	7850
Aluminium	2700

1 m³ of gold _____ is than 1 m³ of aluminium. 10 m³ of steel are _____ than 10 m³ of copper. Iron is _____ than steel. Copper is _____ than aluminium. _____ material of the list is gold, _____ of the list is aluminium.

lighter
heavier

slightly less dense
the least dense

the most dense
much more dense

Task 9

Relating materials and their properties using the following substitution table:

Copper	is	an electrical conductor	because	it conducts electricity
Diamond		brittle		it breaks easily if it's dropped
Glass		an insulator		it doesn't conduct electricity
Lead		a thermal conductor		it conducts heat
Aluminium		dense		it's heavy
Steel		malleable		can be drawn into a thin wire
Concrete		tough stiff		we can obtain a foil from it we can't bend it