Lesson 3 – More properties of metals
Teacher's notes

- ✓ The students must have the handouts with the power point presentation in front of them in order to take notes on them. The power point file is *L2_3.properties* from "Thermal properties" on

- ✓ **Vocabulary to be learnt**:

Thermal conductivity (conductor), pipe, central heating system, thermal expansion, linear expansion, initial length, change in length, initial temperature, change in temperature, expansion joint, railroad track, come unstuck, coefficients of linear expansion, conductor, insulator, copper, timber, attractive force, repulsive force, ferromagnetic, non-ferromagnetic, magnet, density, transparency (transparent), translucence (translucent), opacity (opaque), fusibility, to pour, cast, molten

- ✓ **Structures to be learnt**:

Ability of a material to conduct heat, increase in volume when heated, materials exert a force, the ability of a material to change into a liquid or molten state

- ✓ **Mathematical vocabulary** related with equations:

$$y=mx+b$$

y **equals** m (**multiplied) by** x **plus** b

$16 \div 2$

16 **divided by** 2
16 **over** 2

Task 1

Lf = 1 (1 +16.5 x 10^{-6} x 40) = **1.00066 m**

Task 2

Winter Lf = 140 (1 +18.7 x 10^{-6} x (-25)) = **139.935 m**
Spring Lf = 140 (1 +18.7 x 10^{-6} x 8) = **140.021 m**
Summer Lf = 140 (1 +18.7 x 10^{-6} x 20) = **140.052 m**

Max dif = Lf (summer) – Lf (winter) = 140.052 m - 139.935 m = **0.11736 m = 117.36 mm**

Task 3

Lf = 2 (1+23.6 x 10^{-6} x 40) = **2.0019 m**

Task 4

1.2002 = 1.2 (1 + 5 x 10^{-6} x ΔT) ➔ ΔT = **33.33ºC**

Task 5

A material that	Conducts electricity	An electrical conductor /conductive
	Conducts heat	A thermal conductor
	Is attracted by a magnet	ferromagnetic
	Is not attracted by a magnet	Not ferromagnetic
	Doesn't conduct electricity	An electrical insulator
	lets light go through it but objects at the other side can't be clearly seen	translucent
	doesn't let light go through it	Opaque
	lets light go through it	transparent

Task 6

a) Expansion joints are necessary because in summer the tracks, the bridge, etc have a linear expansion
b) If there are no expansion joints there would not be space enough for the tracks to expand and there

Task 7

Because there is an attractive force between the fridge (made of steel, a ferromagnetic material) and the magnet

Task 8

1 m^3 of gold is heavier than 1 m^3 of aluminium. 10 m^3 of steel are lighter than 10 m^3 of copper. Iron is slightly less dense than steel. Copper is much more dense than aluminium. The most dense material of the list is gold, the least dense of the list is aluminium.