Week 4

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Task 1

R_{wood} = (0,03+0,14+0,11+0,63+0,079+0.12)= 1,109 m2°C/W
$R_{insulation}$ = (0,03+0,14+0,11+3,528+0,079+0,12)= 4,007 m2°C/W
$U_{wood} = 1/R_{wood} = 1/1,109=0,9017$ W/m²°/C
$U_{insulation} = 1/R_{insulation} = 1/4,007=0,2496$ W/m² °C

$U_{total} = U_{wood} * A_{wood}/A_{total} + U_{insulation} * A_{insulation}/A_{total}$
$=25\%*0,9017+75\%*0,2496=0,4126$ W/m²°C
$R_{value} = 1/U_{total} = 1/0,4126=2,4237$ m²°C/W
$Q_{total} = U_{total} * U_{total} * \Delta T=0,4126*50*25*(1-20\%)*22-(-2)=990,24$ W

Task 2

Thermal energy is the internal energy of an object due to the kinetic energy of its atoms and/or molecules. The atoms and/or molecules of a hotter object have greater kinetic energy than those of a colder one, in the form of vibrational, rotational, or, in the case of a gas, translational motion. Thermal radiation is electromagnetic radiation emitted from a material that is due to the heat of the material, the characteristics of which depend on its temperature. Radiation is a method of heat transfer that does not rely upon any contact between the heat source and the heated object. For example, we feel heat from the sun even though we are not touching it. Heat can be transmitted though empty space by thermal radiation. Electromagnetic radiation is energy that is propagated through free space or through a material medium in the form of electromagnetic waves, such as radio waves, visible light, and gamma rays. The term also refers to the emission and transmission of such radiant energy. Radio waves, microwaves, visible light, and x rays are all examples of electromagnetic waves that differ from each other in wavelength. ... These waves are also called “electromagnetic radiation” because they radiate from the electrically charged particles. Waves need not be restricted to travel through matter. As Maxwell showed, electromagnetic waves consist of an electric field oscillating in step with a perpendicular magnetic field, both of which are perpendicular to the direction of travel. These waves can travel through a vacuum at a constant speed of 2.998 × 108 m/s, the speed of light (denoted by c).
All waves, including forms of electromagnetic radiation, are characterized by, a wavelength (denoted by λ), a frequency (denoted by ν), and an amplitude. Wavelength and frequency are inversely proportional: As the wavelength increases, the frequency decreases.