

Advanced Thermal Energy

SAMPLE



MATRIX

CP3985

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Worksheet

Absorptivity and reflectivity of different materials

Task

Find out the differences in absorptivity and reflectivity of thermal radiation for a copper plate with white and black coating

Setup



Required Equipment

- Basic module
- Spotlight
- Digital meter
- Absorption module black/white
- Cables

Procedure

1. Put the absorption module black/white into the basic module with the white side facing the spotlight. The distance between absorption module and spotlight should be 15 cm.
2. Connect the digital meter with the absorption module black/white as shown in the figure.
3. Adjust the digital meter to the symbol °C to start the temperature measurement. Also keep a clock ready for time measurements during the experiment.
4. Note down the temperature $T(0)$ at the beginning and start the measurement by turning on the spotlight. Write down the temperature, which is measured electrically on the metal surface, every minute.
5. Turn the spotlight off and let the absorption module black/white cool down until it has returned to its approximate starting temperature.
6. Repeat the measurement with the black side of the absorption module. Take care that the distance to the spotlight is again 15 cm.

Data

Table 1.1 – Development of the temperature on the white side

Time in	0	1	2	3	4	5	6	...
Temperature								

Worksheet

Absorptivity and reflectivity of different materials

Data

Table 2.1 – Development of the temperature on the black side

Time in	0	1	2	3	4	5	6	...
Temperature								

Analysis

1. Enter your results in the depicted diagram.
2. Compare the results of the two parts of the experiment and explain the observed differences.
3. Explain which conclusions can be drawn from your results for the construction of solar thermal collectors.

Diagram

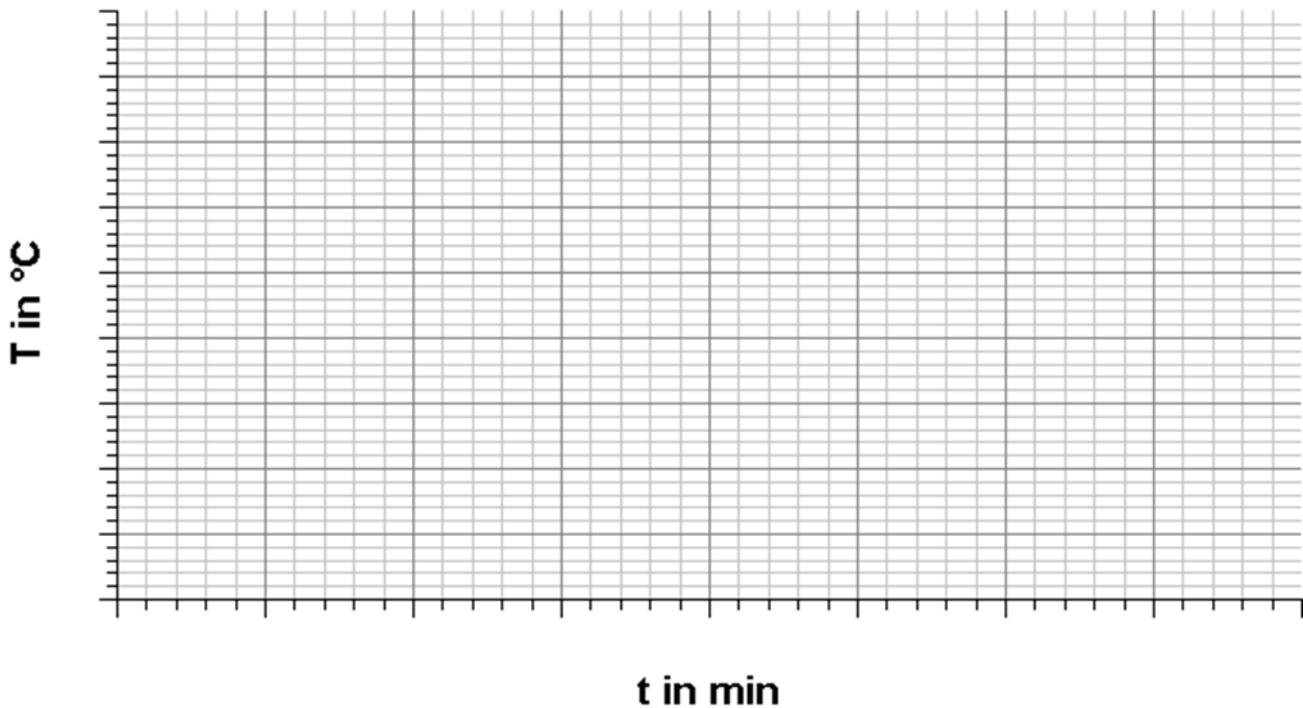


Diagram 1.1 – Development of the temperature at the absorption module black/white.

The full version of this curriculum is available upon purchase of the kit.

Please see contents for a full list of experiments from the full version.