Heat sensitivity of skin (Item No.: P1042100)

Curricular Relevance

Area of Expertise: Physics
Education Level: Age 14-16
Topic: Thermal physics
Subtopic: Measurement of temperature
Experiment: Heat sensitivity of skin

Difficulty	Preparation Time	Execution Time	Recommended Group Size
Easy	10 Minutes	10 Minutes	2 Students

Additional Requirements:

- Butane burner, Labogaz 206 type 32178-00
- Butane cartridge C206, without valve 47535-00
- Matches

Experiment Variations:

Keywords:

Task and equipment

Information for teachers

Additional Information

In this experiment the students should determine that the heat sensitivity of their skin does not allow a reliable estimation of the temperature. Its estimate is, on the contrary, dependent on which temperature was available previously for comparison.

Remark

In the second experiment the fingers must be left in the warm or cold water long enough (at least 1/2 minute) for the temperature difference between the initial water bath and the middle beaker to be distinctly felt on immersion.

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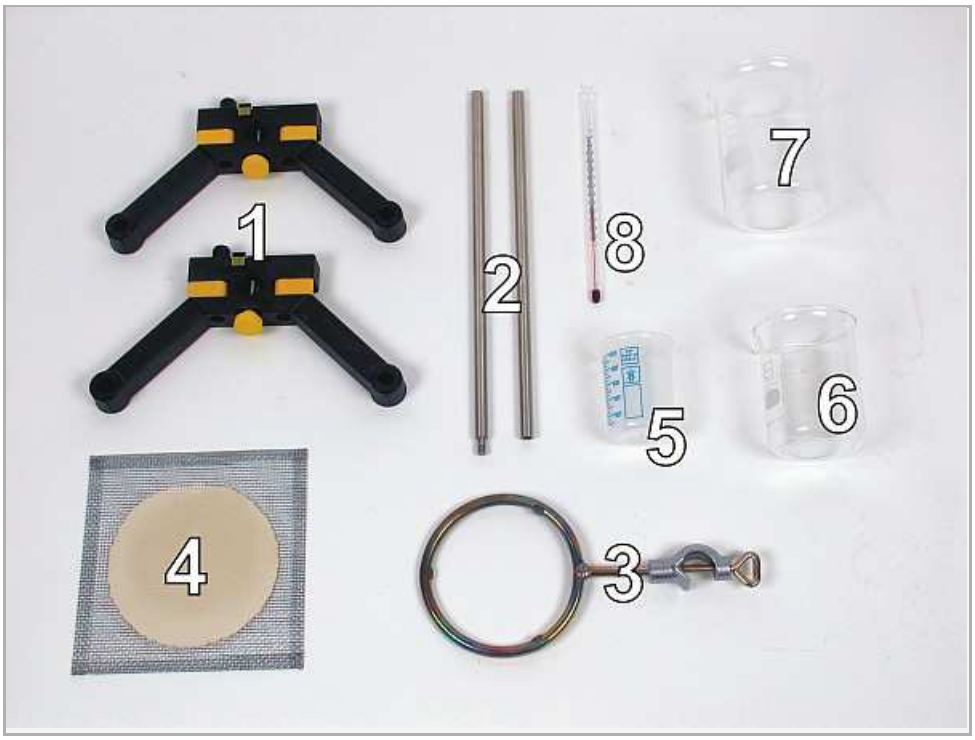
Task and equipment

Task

Warm or cold?

Investigate the heat sensitivity of your skin by touching water baths which have different temperatures.

Equipment



Position No.	Material	Order No.	Quantity
1	Support base, variable	02001-00	1
2	Support rod, stainless steel, l = 600 mm, d = 10 mm	02037-00	1
3	Ring with boss head, i. d. = 10 cm	37701-01	1
4	Wire gauze with ceramic, 160 x 160 mm	33287-01	1
5	Beaker, low form, plastic, 100 ml	36011-01	1
6	Glass beaker DURAN®, short, 250 ml	36013-00	1
7	Glass beaker DURAN®, short, 400 ml	36014-00	1
8	Students thermometer,-10...+110°C, l = 180 mm	38005-02	1
Zusätzliches Material:			
9	Butane burner, Labogaz 206 type	32178-00	1
10	Butane cartridge C206, without valve	47535-01	1
11	Matches		

Set-up and procedure

Set-up

Warning!

During heating of the water the support ring and the wire gauze become extremely hot! When the hot water is being transferred to another container, the beaker can be only held up by its flanged rim.

Setup

- Set up the experiment according to the figures 1 to 8.

Fig. 1

Fig. 2

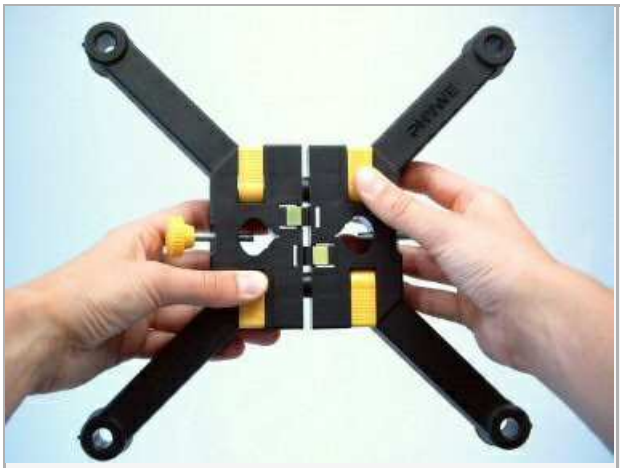


Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

- Pour 300 ml of water into the biggest beaker and heat it with the butane burner to about 40 °C.
- Pour 100 ml of cold tap water into the middle-sized beaker and add 100 ml of hot water.
- Fill the small beaker completely with cold water.

Fig. 9

Fig. 10

Procedure

First experiment

Dip one of your fingers successively into each of the three beakers. How warm does the water feel in each case? Note the order of the beakers from warm to cold in the report.

Abb. 11

Second experiment

Hold one finger of your right hand into the hot water and one finger of your left hand into the cold water. Hold your fingers in their respective beakers for ca. ½ minute and move them around a bit. Take your fingers out of the beakers and immerse them immediately in the middle beaker; move them around again. Note the result of this in the report.

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Report: Heat sensitivity of skin

Result - Observation 1

Note your observations.

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Result - Observation 2

Note your observations.

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Evaluation - Question 1

Can you tell the difference between warm and cold reliably with your fingers?

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Evaluation - Question 2

What does your decision as to "warm" or "cold" depend on?

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Evaluation - Question 3

Can you give other examples of this type of observation?

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Evaluation - Question 4

Have you ever touched a very hot object? What does your skin’s heat sensitivity tell you then?

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Evaluation - Question 5

Have you ever touched a very cold object? What does your skin’s heat sensitivity tell you then?

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