The art of heat

Indian summer Józef Chełmoński, 1875.
Oil on canvas, 110,7 cm x 156,5 cm, realism, National Museum, Warsaw

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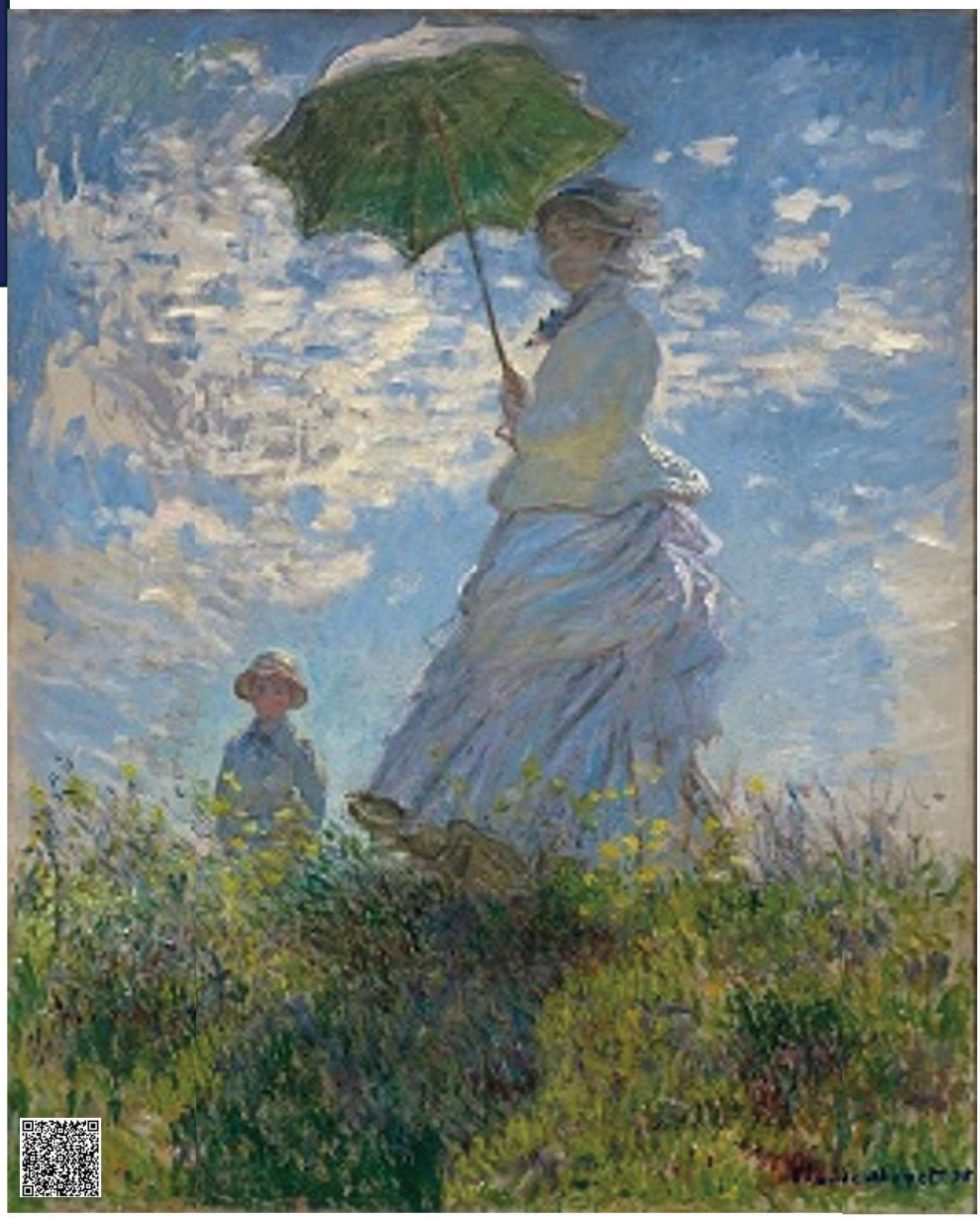
RECOMMENDATIONS



Woman with umbrella
Claude Monet, 1875. Oil on canvas, 100 x 81 cm, impressionism, National Gallery of Art, Washington.

Avoid direct sunlight. Wear airy clothes and headgear.

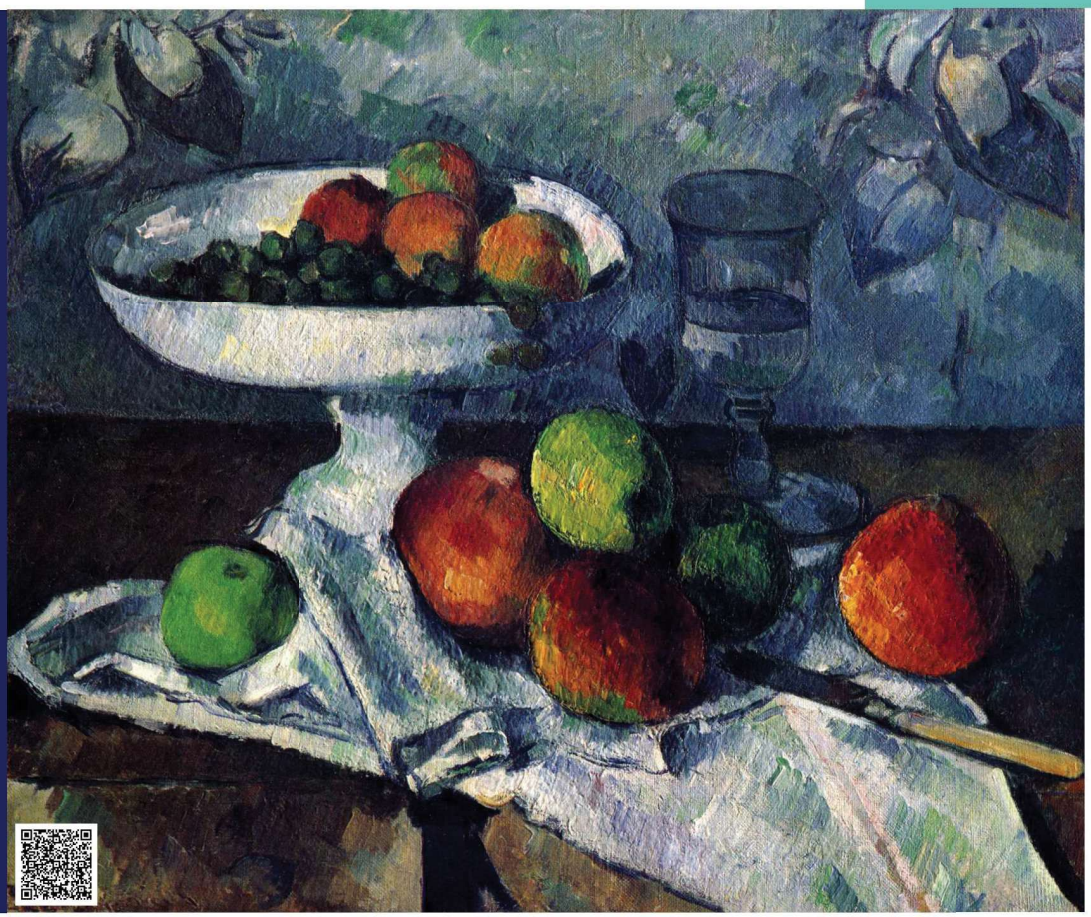
Solar radiation is one of the meteorological elements that is crucial for our thermal comfort. Besides the visible spectrum, a large amount of energy is radiated in infrared (thermal) radiation range. Light clothes, in bright colors, reflect the sunlight and insulate skin (and underlying tissues) from heating. It prevents over-drying of skin and limits erythema and sunburn. Clothes should be flimsy and breathable because the body in heat sweats to get rid of excess heat. If humidity is kept close to the skin, the possibility of thermoregulation and reducing heat surplus is limited. The headgear plays a huge role too. Particularly sensitive (due to high density of vessels) are head, face and neck tissues. We must prevent ourselves from heat-stroke.

Siesta Vincent van Gogh, 1890.
Oil on canvas, 73 x 91 cm, postimpressionism, Musee d' Orsay, Paris.

Take frequent breaks from work

Heat makes us tired and decreases the body's efficiency, especially the burdened heart. The heart works hard to ensure thermoregulation; the pulse rate increases, and vessels get wider so that a greater volume of heated blood can flow through them in a shorter time. Overheated air contains less oxygen by weight, so brain cells work less efficiently influencing its cognitive function and the ability to drive mental and physical performance.

According to the law, heat is when the employee works in an open space and the air temperature exceeds 25 degrees Celsius, or if he/she works in a room and the temperature is higher than 28 degrees Celsius. The regulations don't specify the upper limit of air temperature in the workspace when employees can stop working. It is written that when the work conditions are hazardous and life-threatening, the employee can stop working and report it to his/her superior. The thermal criteria are described only for young employees. The employer cannot oblige them to work when temperature exceeds 30 degrees Celsius and relative humidity exceeds 65%.



Still life with fruits Paul Cezanne, 1879.
Oil on canvas, 46,4 x 54,6 cm, postimpressionism, The Museum of Modern Art. MoMA, New York.

Eat light meals

During the heat, appetite decreases, because the body minimizes internal (metabolic) Energy production, e.g. by limiting the activity of the digestive system. Processes, such as digestion and absorption, still occur but at a slower rate. For this reason, loading up on highly processed, sugary, or heavy-digesting foods can make us feel worse than usual afterward; there will be post-meal discomfort or a feeling of sluggishness.

A starvation diet during the heat is also a bad idea. The processes connected with cooling the body and thermo-regulating of the main internal organs require a lot of energy. If we resign from meals, the body will be simplytoo weak to realize the main physiological functions.

It would be best to keep the three basic meals of the day but balance them to be easily digestible. You can partially abandon solid foods in favor of those that contain more liquids, which will benefit the body's overall fluid balance. In hot weather, eating vegetables and fruits is especially recommended.

Stańczyk Jan Matejko, 1862.
Oil on canvas, 88 x 120 cm, realism, National Museum, Warsaw.

Limit physical activity

To get rid of heat excess from the body, in a relatively short timescale the circulation system raises the pulse rate and diastole the tiny blood vessels to increase blood circulation in upper skin layers. It is estimated that a rise of internal temperature by 1 degree requires an increase of pulse rate by 10 beats/minute in the first 5 minutes and then even by 20 beats/minute (the sauna experiment). Thus the heart is much more loaded than in neutral conditions. Physical activity leads to additional internal temperature growth (due to the work of muscles and the increased necessity for oxygen). Taking into account the enormous load of circulation and respiratory systems every additional physical effort can be excessive and lead to adverse effects such as heat cramps of muscles, heat stroke or even arythmia or circular system insufficiency. Even healthy persons who adapted to seasonal heat must remember that their body stamina depends on many external and internal factors, so we cannot estimate the level of risk of the particular situation. In the case of severe heat, no additional physical activity is recommended. It is better to give up running, or to shift that to the late evening hours.

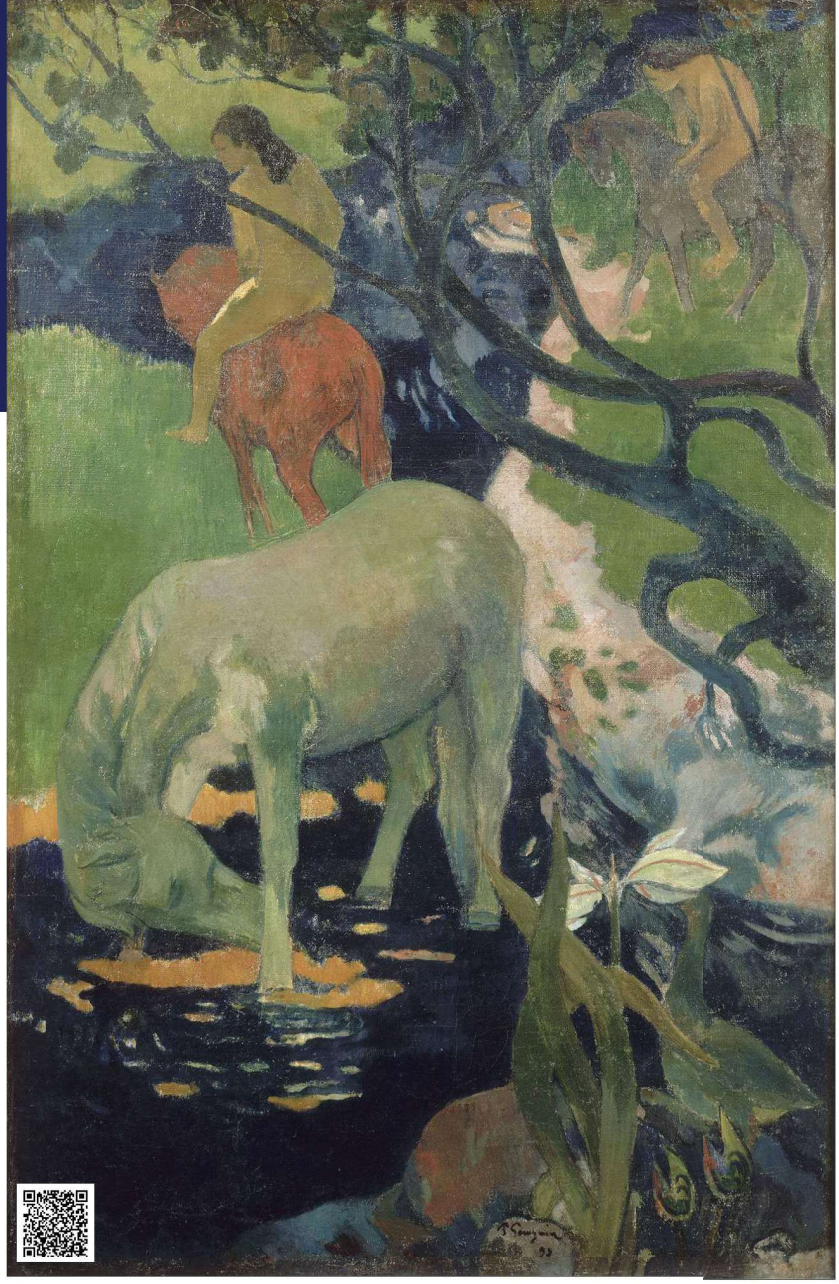
Woman with a water jug Johannes Vermeer, 1662.
Oil on canvas, 45,7 cm x 40,6 cm, baroque, Metropolitan Museum of Art, New York.

Drink a lot of water

Sweating is the most effective way to eliminate excess heat from the body, especially in hot surroundings. On sunny and hot day, a man loses about 1 liter of liquids per hour, which means a 400 W/m^2 excess energy loss.

Water and electrolytes are needed for this process to work properly. Especially when sweating is very intense, sweat gland fatigue, dehydration and heat exhaustion can occur. This is very dangerous because when the body loses control over sweating, it also loses control over inhibiting the temperature rise of the most essential organs. The use of oral supplements - in the form of sweat blockers in the summer can have serious adverse health consequences.

The feeling of thirst appears only after losing more fluids (more than 2% of body mass). Children dewater significantly faster than adults, due to their faster metabolism and higher water content in relation to their body mass. They should supply water continuously, preferably with frequent, smaller doses.



The White Horse Paul Gauguin, 1898.
Oil on canvas 140 x 91,5 cm, postimpressionism, Musée d'Orsay, Paris.

Take care of animals and let them access water

Animals in high percent regulate their body temperature by removing excess heat. And they require a water supply. Dogs engage their respiratory system. Along with panting, the fluid excess is significant, depending on the tempo of internal temperature regulation. Loss of fluids such big as 10-15% of body mass can be fatal, especially for puppies.

During heat, the animals should have easy access to drinkable water of good quality. The water should be exchanged often because bacteria multiply in the hot environment. Vet norms regulate the amout of water for cattle and pigs. The owners of household pets can be in trouble recognizing the needs. Food can also provide some water, fulfilling the total balance. According to norms, the animal should receive on average 20-50 milliliters of water per kilogram of body mass daily. Bathing can be a relief during the heat, but one must remember that there should be no high contrast between air and water temperatures (to avoid heat shock).

In arbour Aleksander Gierymski, 1882.
Oil on canvas, 135,5 cm x 148 cm, realism, National Museum, Warsaw.

Take care of yourself and your relatives - have a rest

When the general stamina of the body drops, every physical/mental activity may require more time or more effort to be performed. And returning to full efficiency and preventing the risk of overheating body may require longer and quality rest. The physiological research proves that shorter and more frequent breaks may improve heat comfort compared to longer but less frequent stops (even for the same total rest time). The harder and difficult work, the longer stops should be taken. In extremely hard conditions (high air temperature and humidity) the rest time to work time should be in proportion 1:1 or even 2:1 (with excessive loads). During heat, one should take care of other people. Children have an immature thermoregulatory system, and elderly/ill persons have lower efficiency and may need medical support sooner.

Strange garden Józef Mehoffer, 1903.
Oil on canvas 222,5 x 208,5cm, art nouveau, National Museum, Warsaw.

Take advantage of green areas - look for a shade

Exposure to direct sunlight can raise the noticeable temperature even by 10 degrees Celsius, and, above all, can increase heat excess of the body. Looking for a shade is one of the best short-term strategies for adaptation to heat. But it depends on the shaded area. It may not help if we choose a place with many concrete buildings, artificial surfaces, and tiny airflow. A much better option is to choose green areas (parks, squares, and forests) but only when the heated air can circulate. The research shows that in city parks the air temperature can be 1-4 degrees lower, and in the case of larger forests the effect persists even 400 m from the borders of the park. Investing in greenery can improve our thermal resilience for the future. Additional cooling effect may be achieved by watering the grasslands and plants during the day because the transpiration induces heat loss (provided the air circulation at place).

La Grenouillère Auguste Renoir, 1869.
Oil on canvas 88 x 81 cm, impressionism, Nationalmuseum, Sztokholm.

Have a rest close to the lake or river

Water reservoirs positively influence thermal conditions in the areas in close vicinity. Differences in heat capacity and albedo impact thermal contrasts between surfaces of water and land. That induces local air circulation. Airing influences local thermal conditions and reduces the feeling of heat. Moreover, humidity evaporating above the water channels large heat quantities and decreases temperature also in their neighborhood. The areas with high water retention are usually more resistant to the changes of hydrological conditions and natural resources or green areas longer fulfill thair biological functions at unchanged level.

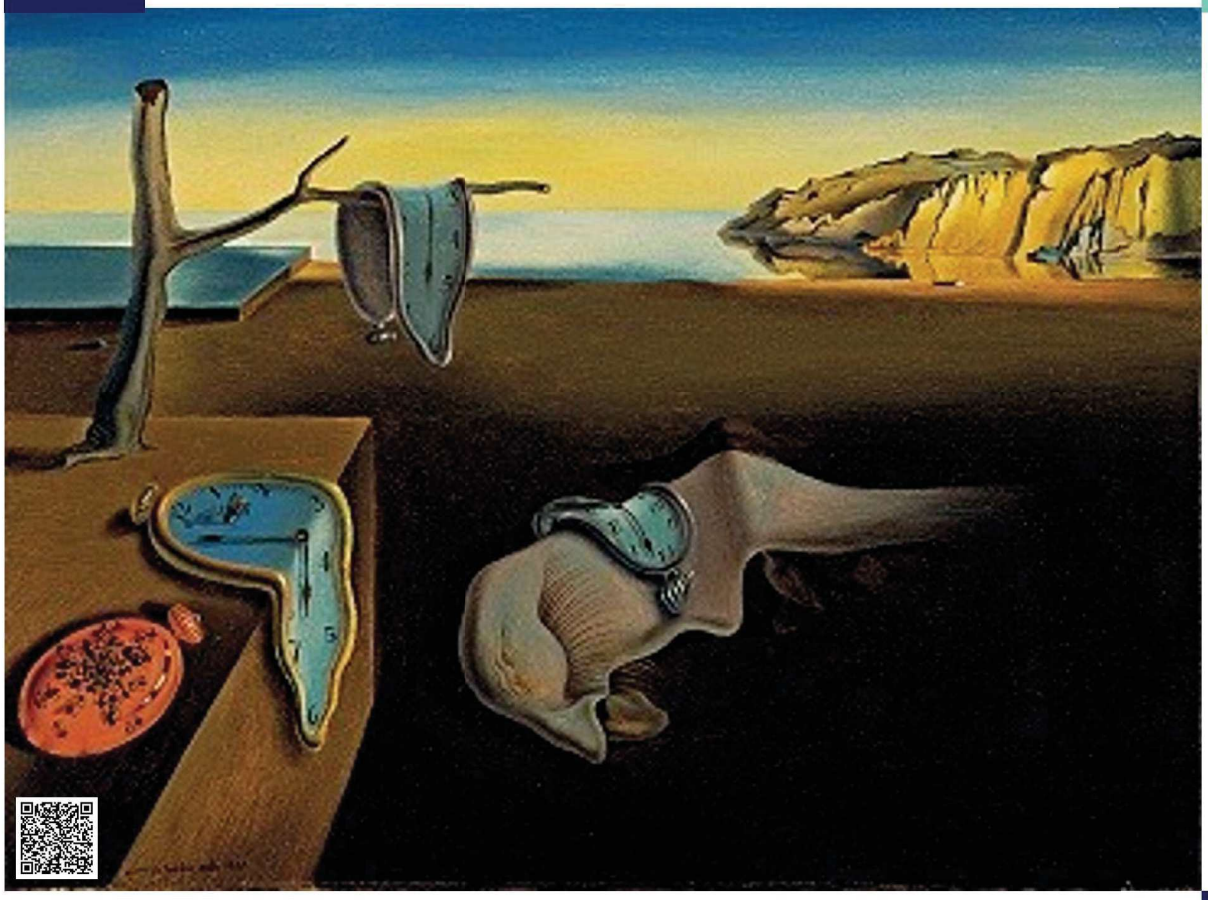
The quality of our rest environment is important to us. That's why resting near the open water reservoirs or rivers is highly recommended during the heat. It should be reasonably planned.

Bathers in Asnières Georges-Pierre Seurat, 1883.
Oil on canvas 201 × 300 cm, post-impressionism, National Gallery, London.

Cool down your skin

Evaporation of sweat or moisture from the surface of the skin results in cooling. More intense in low humidity conditions and if there is air flow. Heated portions of air are removed, and if the skin surface still remains moist the process proceeds, and the skin surface cools or its temperature does not increase at least. However, the opposite effect may occur if the air becomes saturated with water vapor and latent heat takes over. Such an effect can be experienced in a steam sauna.

Cooling the skin's Surface, therefore, has a beneficial effect on the overall cooling of the body in hot weather, if favorable meteorological conditions are present. However, it is important not to cause thermal shock - using water at too low a temperature relative to surrounding conditions. The neck area will be particularly too sensitive. It is best to start such cooling support from the legs and arms. It is also worth bearing in mind that if we intensify the process of evaporation excessively, we can unintentionally lead to excessive dryness and redness of the skin.



The Persistence of Memory, Salvador Dali, 1931.
Oil on canvas, 24x33 cm, surrealism, Museum of Modern Art, New York.

Plan a regeneration after a hot day

Heat exhaustion usually occurs when conditions are very strenuous or the strain has already lasted for another 24 hours, and we have limited opportunity to rest from them. If we do not set aside time for recovery, we limit our ability to adapt (relative to our capabilities) to cope with strenuous environmental conditions. It is crucial to take care of the quality of night rest. If the environment during sleep is not comfortable, then the body (especially the brain!) uses energy for adaptation instead of rest and regeneration. In addition, if the conditions in the environment are oppressive, the stress hormone cortisol is secreted. This is an antagonist to melatonin - a hormone that generally "quiets" the body and promotes the resting phase. In a warm and particularly sultry and stuffy environment, there is also usually (by weight) less oxygen per unit of air, hence this translates into the ability to oxygenate brain cells. Hence, the feeling of fatigue, lethargy and even apathy.

Sleep hygiene, unfortunately, also translates into daytime functioning. Especially when the next day is also hot, and the body is again stressed. Then it tolerates the heat less well, and heat exhaustion progresses more quickly.

Summer evening Józef Chełmoński, 1875.
Oil on canvas, 84 cm x 117 cm, realism, National Museum, Poznan.

Air your flat only after sunset

To improve thermal conditions, proper ventilation of the apartment is important. The air in a closed room on a hot day will heat up more slowly if you close all the windows and use curtains. Especially on days with a lot of sunlight. Windows and curtains act as baffles - they limit the penetration of heat radiation inward. Even a slight tilting of the window can cause the previously cooler air in the room to also heat up when it comes into contact with the overheated air from outside. It is a good idea to open the window only when the temperature outside is at least the same as the prevailing temperature inside or drops to 21-24 degrees. Then - to improve air circulation and exchange, it is beneficial to use fans and to make draught by tilting windows with exposure to different sides. The window should be left open as long as the temperature outside does not begin to rise. In summer, this can occur shortly after sunrise, although on a cloudy morning, potentially a bit longer than on a sunny one. On the other hand, if it promises to be a humid and hot day then it is also a good idea to close the window in the morning so as not to worsen the humidity conditions inside the room.