

Teachers' Guide for How Hot Is Hot? Heat Versus Temperature

This lesson will take about 50 minutes. The early shots in this video were taken in Langkawi where gamat oil is produced. The lesson includes experiments to clarify about the concept of heat versus temperature. It also introduces the concept of specific heat capacity and explains the differing amounts of heat absorbed by different materials. The lesson should include discussions on the following:

- 1. Heat is different from temperature. They are not identical ideas but they are related. Heat is the total amount of energy possessed by the molecules in a piece of matter. Heat is measured in Joules.*
- 2. Temperature is not energy. It relates to the average (kinetic) energy of a single (or every?) particle in the system. It is measured in Kelvin (K) or Celsius (C) or Fahrenheit (F)*
- 3. When heat is transferred to a substance, the substance can experience a rise in temperature as a result of an increase in the average kinetic energy of the particles in the substance.*
- 4. Student should watch the animation showing the vibration and movement of particles in different liquids when the same amount of heat is applied.*
- 5. Other than carrying out experiment, teacher can also use demonstration method (if the apparatus and materials are not sufficient).*

Remark : More information on gamat : http://en.wikipedia.org/wiki/Sea_cucumber

Learning Outcomes:

At the end of the lesson, a student should be able to:

- 1. Explain the definition of heat and temperature*
- 2. Understand the difference between heat versus temperature*
- 3. Understand the term "specific heat capacity" and recognize the difference between a high or low specific heat capacity.*
- 4. Understand the term "thermal diffusivity" and how this relates to the topic of heat versus temperature.*
- 5. Explain the applications of heat versus temperature in daily life*

Prerequisites :

Before watching this video, a student should have prior knowledge on:

- 1. The basic concept of heat and temperature*
- 2. Heat capacity of different materials or substances*

Suggested activities :

- 1. Problem solving - Brainstorming session*
- 2. Carry out a simple experiment on the concept of heat and temperature*
- 3. Mind mapping*

Note:

Other than carrying out experiment, teacher can also use demonstration method (if the apparatus and materials are not sufficient).

Activity 1 :

Students will have to discuss with their friends and answer these questions:

1. What can you observe regarding the surface of the oil?
2. Why do you think the tourists are not willing to dip their fingers in the boiling oil?
3. What do you think is the temperature of the boiling gamat oil?

Activity 2:

Teacher asks students to get into groups and perform an experiment to compare the temperature of the water and oil.

Each group is given two test tubes, the same amount of oil and water and a thermometer
Students have to place the test tubes in a boiling water bath for two minutes

Teacher post questions to the student:

Compare the temperature of the water and oil in both situations after two minutes

Activity 3

In this activity, students will have to measure the temperature of the boiling water and oil.

Students will have to compare the amount of energy supplied by the boiling water and figure out why is the temperature of oil higher than the temperature of water.

	Oil	Water
Volume/cm ³		
Heating time/minute		
Temperature/ C		

Remark for teacher:

Activity 2: (students compare the temperature of oil and water)

Activity 3 :(students record the temperature of oil and water to relate the amount of heat absorbed)