

# FS6 Heat and Temperature

## Module 1

This module will give you an introduction to the subject of heat and temperature.



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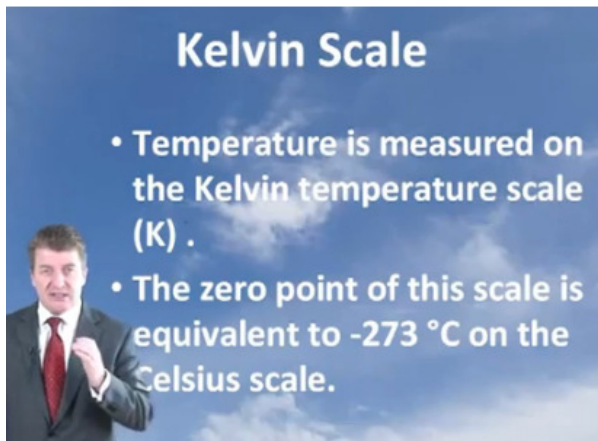
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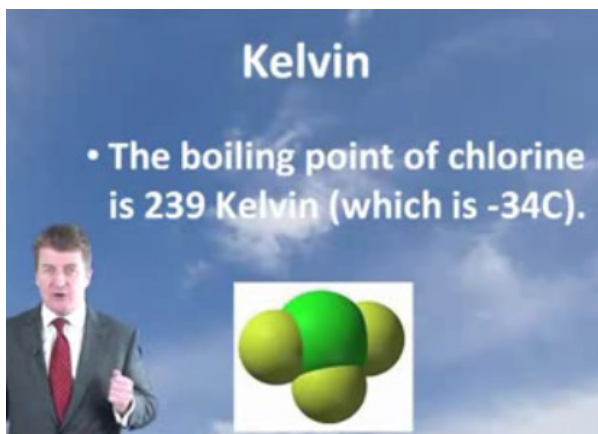
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Q. How much heat is required to turn a 2.5kg block of ice at absolute zero to water vapour at 200C?

Specific heat capacity of ice = 2.108 kJ/kgK

Specific heat capacity of water = 4.187 kJ/kgK

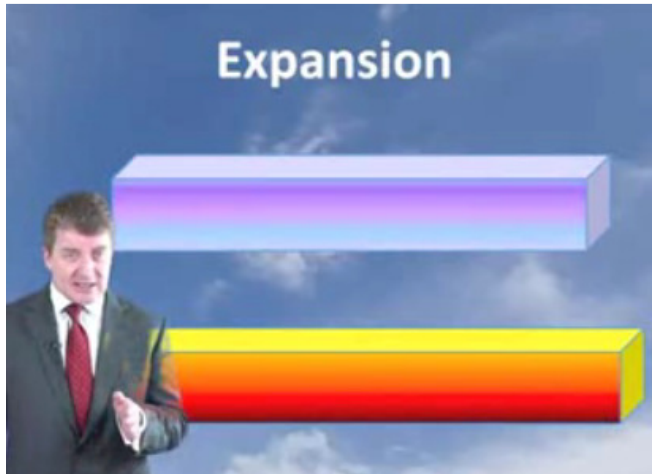
Specific heat capacity of water vapour = 1.996 kJ/kgK

Latent heat of melting = 334 kJ/kg

Latent heat of vapourisation = 2,270kJ/kg

## Module 2

This module will give you an introduction to the subject of expansion. Attempt the following questions and then view the module.



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1. Determine the final length of a beam that is heated in a fire to 415C.

Ambient temperature of beam = 15C

Co-efficient of linear expansion = 0.000015 C

Original length of beam = 7.5m

2. Determine how much a metal bridge will expand on a freezing cold day when the sun comes out and heats it to 30C

Temperature of = -10C

Co-efficient of linear expansion = 0.000032 C

Original length of bridge = 50m

### Module 3

At 25C a sphere has a diameter of 1m. It is involved in a fire and heated to 100C. What is the final volume of the sphere?

Ambient temperature of steel = 15C

Co-efficient of linear expansion = 0.0000150C

#### **Module 4**

The density of a liquid is  $1000\text{kg.m}^3$  at  $0\text{C}$  and it is  $900\text{kg.m}^3$  at  $100\text{C}$ .

Determine the coefficient of cubical expansion of the liquid?

## Module 5

A bulk fuel storage cylinder 5m in diameter and 8.5m high made of steel is 90% filled with aircraft fuel at a temperature of 18°C. If the storage cylinder is involved in a fire and heated to 415°C, how much fuel will be forced out?

Co-efficient of linear expansion of steel =  $3.75 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$

Co-efficient of cubical expansion of aircraft fuel =  $950 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$

## Module 6

A petrol tanker with a mass of 16 tonnes fully laden is travelling at 60 km.hour on level ground. The tanker carries out an emergency stop, how hot will the brakes be?

Mass of brakes on each wheel = 7.5kg

The vehicle has 10 wheels.

The outside temperature is 5C.

The specific heat capacity of the metal brakes is 350j/kg/K