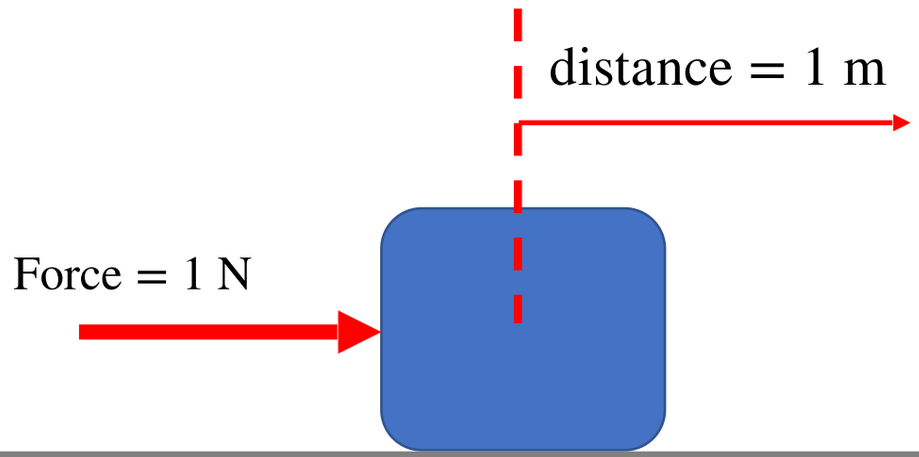
Global Warming
Lecture 1.4
Global Warming and Security

Energy

SI unit of energy: Joule (J)

$$1\ \mathrm{J} = 1\ \mathrm{kg} \bullet m^2 \bullet s^{-2}$$

$$1\ \mathrm{J} = 1\ \mathrm{N} \bullet m \quad (1\ \mathrm{N} = 1\ \mathrm{kg} \bullet m \bullet s^{-2})$$



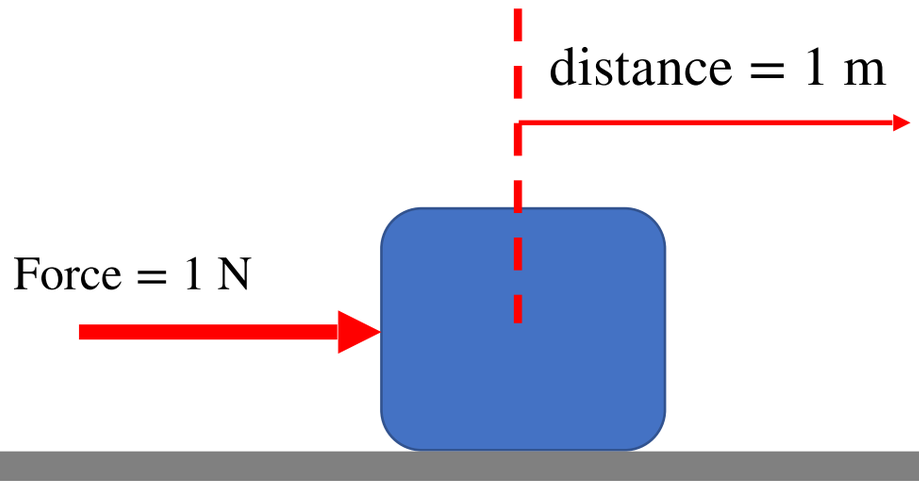
apply a force of 1N on an object and move it for 1m distance, 1 J = the energy it takes to do this

Energy

SI unit of energy: Joule (J)

$$1\ \mathrm{J} = 1\ \mathrm{kg} \bullet m^2 \bullet s^{-2}$$

$$1\ \mathrm{J} = 1\ \mathrm{N} \bullet m \quad (1\ \mathrm{N} = 1\ \mathrm{kg} \bullet m \bullet s^{-2})$$



apply a force of 1N on an object and move it for 1m distance, 1 J = the energy it takes to do this

do this in one second

Power: energy consumed/produced per unit time

SI unit of power: Watts (W)

$$1\ \mathrm{W} = 1\ \mathrm{J/s}$$

$$1\ \mathrm{W} = 1\ \mathrm{N} \bullet m \bullet s^{-1}$$

Energy

SI unit of energy: Joule (J)

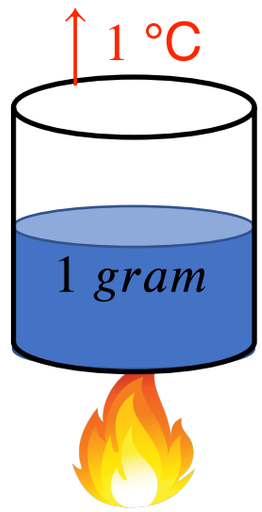
$$1\ \mathrm{J} = 1\ \mathrm{kg} \bullet m^2 \bullet s^{-2}$$

$$1\ \mathrm{J} = 1\ \mathrm{N} \bullet m$$

Calories:

$$4.184\ \mathrm{J} = 1\ \mathrm{calorie}$$

heat 1 gram of water and let its temperature increase 1 °C ,
1 cal = the heat needed for this.



Energy

SI unit of energy: Joule (J)

$$1\ \mathrm{J} = 1\ \mathrm{kg} \bullet m^2 \bullet s^{-2}$$

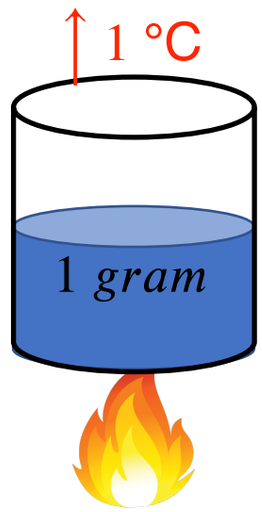
$$1\ \mathrm{J} = 1\ \mathrm{N} \bullet m$$

Calories:

$$4.184\ \mathrm{J} = 1\ \text{calorie}$$

$$1\ \text{dietary Calorie} = 1000\ \text{calorie}$$

heat 1 gram of water and let its temperature increase 1 °C ,
1 cal = the heat needed for this.



Energy

SI unit of energy: Joule (J)

$$1\ \mathrm{J} = 1\ \mathrm{kg} \bullet m^2 \bullet s^{-2}$$

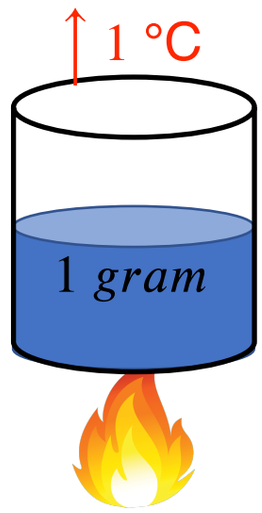
$$1\ \mathrm{J} = 1\ \mathrm{N} \bullet m$$

Calories:

$$4.184\ \mathrm{J} = 1\ \text{calorie}$$

$$1\ \text{dietary Calorie} = 1000\ \text{calorie}$$

heat 1 gram of water and let its temperature increase 1 °C ,
1 cal = the heat needed for this.



A typical human needs 2000 Calories per day to survive.

Energy

SI unit of energy: Joule (J)

$$1\ \mathrm{J} = 1\ \mathrm{kg} \bullet m^2 \bullet s^{-2}$$

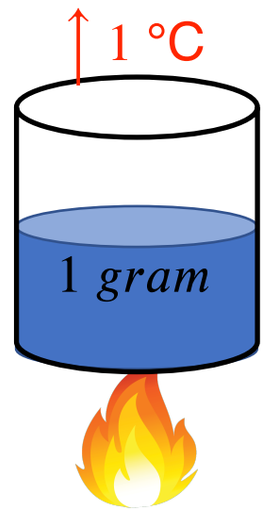
$$1\ \mathrm{J} = 1\ \mathrm{N} \bullet m$$

Calories:

$$4.184\ \mathrm{J} = 1\ \text{calorie}$$

$$1\ \text{dietary Calorie} = 1000\ \text{calorie}$$

heat 1 gram of water and let its temperature increase 1 °C , 1 cal = the heat needed for this.



A typical human needs 2000 Calories per day to survive.

Power

$$1\ \mathrm{W} = 1\ \mathrm{J/s}$$

$$2000 \frac{\text{Calories}}{\text{day}} = \frac{\mathrm{J}}{\mathrm{s}}$$

Energy

SI unit of energy: Joule (J)

$$1\ \mathrm{J} = 1\ \mathrm{kg} \bullet m^2 \bullet s^{-2}$$

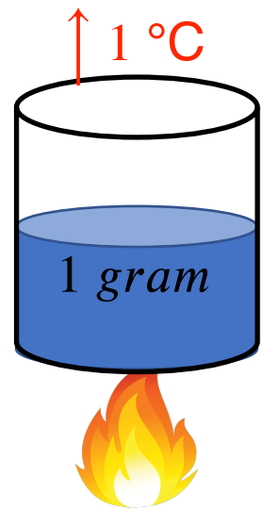
$$1\ \mathrm{J} = 1\ \mathrm{N} \bullet m$$

Calories:

$$4.184\ \mathrm{J} = 1\ \text{calorie}$$

$$1\ \text{dietary Calorie} = 1000\ \text{calorie}$$

heat 1 gram of water and let its temperature increase 1 °C ,
1 cal = the heat needed for this.



A typical human needs 2000 Calories per day to survive.

$$2000\ \frac{\text{Calories}}{\text{day}} \times \frac{1000\ \text{calories}}{1\ \text{Calorie}} \times$$

Power

$$1\ \mathrm{W} = 1\ \mathrm{J/s}$$

$$= \frac{\mathrm{J}}{\mathrm{s}}$$

Energy

SI unit of energy: Joule (J)

$$1\ \mathrm{J} = 1\ \mathrm{kg} \bullet m^2 \bullet s^{-2}$$

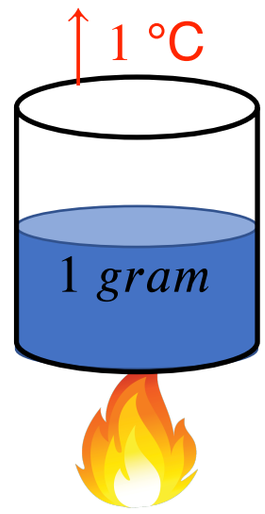
$$1\ \mathrm{J} = 1\ \mathrm{N} \bullet m$$

Calories:

$$4.184\ \mathrm{J} = 1\ \text{calorie}$$

$$1\ \text{dietary Calorie} = 1000\ \text{calorie}$$

heat 1 gram of water and let its temperature increase 1 °C ,
1 cal = the heat needed for this.



A typical human needs 2000 Calories per day to survive.

$$2000\ \frac{\text{Calories}}{\text{day}} \times \frac{1000\ \text{calories}}{1\ \text{Calorie}} \times \frac{4.184\ \text{J}}{1\ \text{calorie}} = \frac{\text{J}}{\text{s}}$$

Power

$$1\ \mathrm{W} = 1\ \mathrm{J/s}$$

Energy

SI unit of energy: Joule (J)

$$1\ \mathrm{J} = 1\ \mathrm{kg} \bullet m^2 \bullet s^{-2}$$

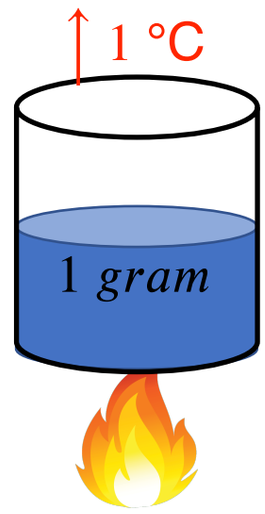
$$1\ \mathrm{J} = 1\ \mathrm{N} \bullet m$$

Calories:

$$4.184\ \mathrm{J} = 1\ \text{calorie}$$

$$1\ \text{dietary Calorie} = 1000\ \text{calorie}$$

heat 1 gram of water and let its temperature increase 1 °C , 1 cal = the heat needed for this.



A typical human needs 2000 Calories per day to survive.

Power

$$1\ \mathrm{W} = 1\ \mathrm{J/s}$$

$$2000 \frac{\text{Calories}}{\text{day}} \times \frac{1000\ \text{calories}}{1\ \text{Calorie}} \times \frac{4.184\ \mathrm{J}}{1\ \text{calorie}} \times \frac{1\ \text{day}}{24\ \text{hours}} = \frac{\mathrm{J}}{\mathrm{s}}$$

Energy

SI unit of energy: Joule (J)

$$1\ \mathrm{J} = 1\ \mathrm{kg} \bullet m^2 \bullet s^{-2}$$

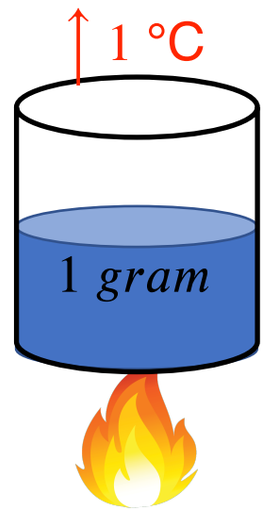
$$1\ \mathrm{J} = 1\ \mathrm{N} \bullet m$$

Calories:

$$4.184\ \mathrm{J} = 1\ \text{calorie}$$

$$1\ \text{dietary Calorie} = 1000\ \text{calorie}$$

heat 1 gram of water and let its temperature increase 1 °C , 1 cal = the heat needed for this.



A typical human needs 2000 Calories per day to survive.

Power

$$1\ \mathrm{W} = 1\ \mathrm{J/s}$$

$$2000\ \frac{\text{Calories}}{\text{day}} \times \frac{1000\ \text{calories}}{1\ \text{Calorie}} \times \frac{4.184\ \mathrm{J}}{1\ \text{calorie}} \times \frac{1\ \text{day}}{24\ \text{hours}} \times \frac{1\ \text{hour}}{3600\ \mathrm{s}} = 97\ \frac{\mathrm{J}}{\mathrm{s}}$$

Energy

SI unit of energy: Joule (J)

$$1\ \mathrm{J} = 1\ \mathrm{kg} \bullet m^2 \bullet s^{-2}$$

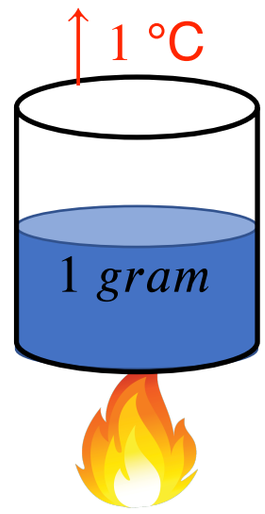
$$1\ \mathrm{J} = 1\ \mathrm{N} \bullet m$$

Calories:

$$4.184\ \mathrm{J} = 1\ \text{calorie}$$

$$1\ \text{dietary Calorie} = 1000\ \text{calorie}$$

heat 1 gram of water and let its temperature increase 1 °C , 1 cal = the heat needed for this.



A typical human needs 2000 Calories per day to survive.

Power

$$1\ \mathrm{W} = 1\ \mathrm{J/s}$$

$$2000\ \frac{\text{Calories}}{\text{day}} \times \frac{1000\ \text{calories}}{1\ \text{Calorie}} \times \frac{4.184\ \mathrm{J}}{1\ \text{calorie}} \times \frac{1\ \text{day}}{24\ \text{hours}} \times \frac{1\ \text{hour}}{3600\ \text{s}} = 97\ \frac{\mathrm{J}}{\mathrm{s}} = 97\ \mathrm{W}$$