Energy

Task 1: Energy in food and in fuels

Look at the table of information below and answer the questions.

Food or fuel	Energy (J/kg)
coal	30 000 000
wood	15 000 000
petrol	46 000 000
cheese	16 000 000
bread	9 500 000
lettuce	550 000

1 A new power station is opening in your local area. State the fuel you would choose for this power station using the table above. Explain your answer.

_____

_____

Leon and James students are in the same class. Leon is very sporty while James likes to play on his games console in his spare time.

Their typical daily energy requirements are 8700 kJ and 12 400 kJ.

2 a Link the correct energy requirement for each student.

Leon: _____

James: _____

b Describe the types of food you would recommend to Leon and James as part of their diet using the table above. Explain your answer.

_____

_____

_____

Task 2: Conservation of energy

1 State the law of conservation of energy.

_____

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2 A coal fire is burning in the fireplace. Describe the energy before and after this change.

_____

_____

_____

3 The diagram below shows a lever in action. Explain how this lever follows the law of conservation of energy.

Fill in the gaps using the following words:

force multiplier **force** **distance** **pivot**
simple machine **bigger** **smaller**

A lever is a _____ _____.

In this example, a screwdriver is used to open a paint tin.

The _____ is where the end of the screwdriver is resting on the edge of the paint tin. The _____ appied to the lid by the lever is _____ than the _____ that you apply with just your hand. This means that a lever is a _____ _____.

Energy is conserved because the _____ the lid moves up is _____ than the _____ moved by your hand.

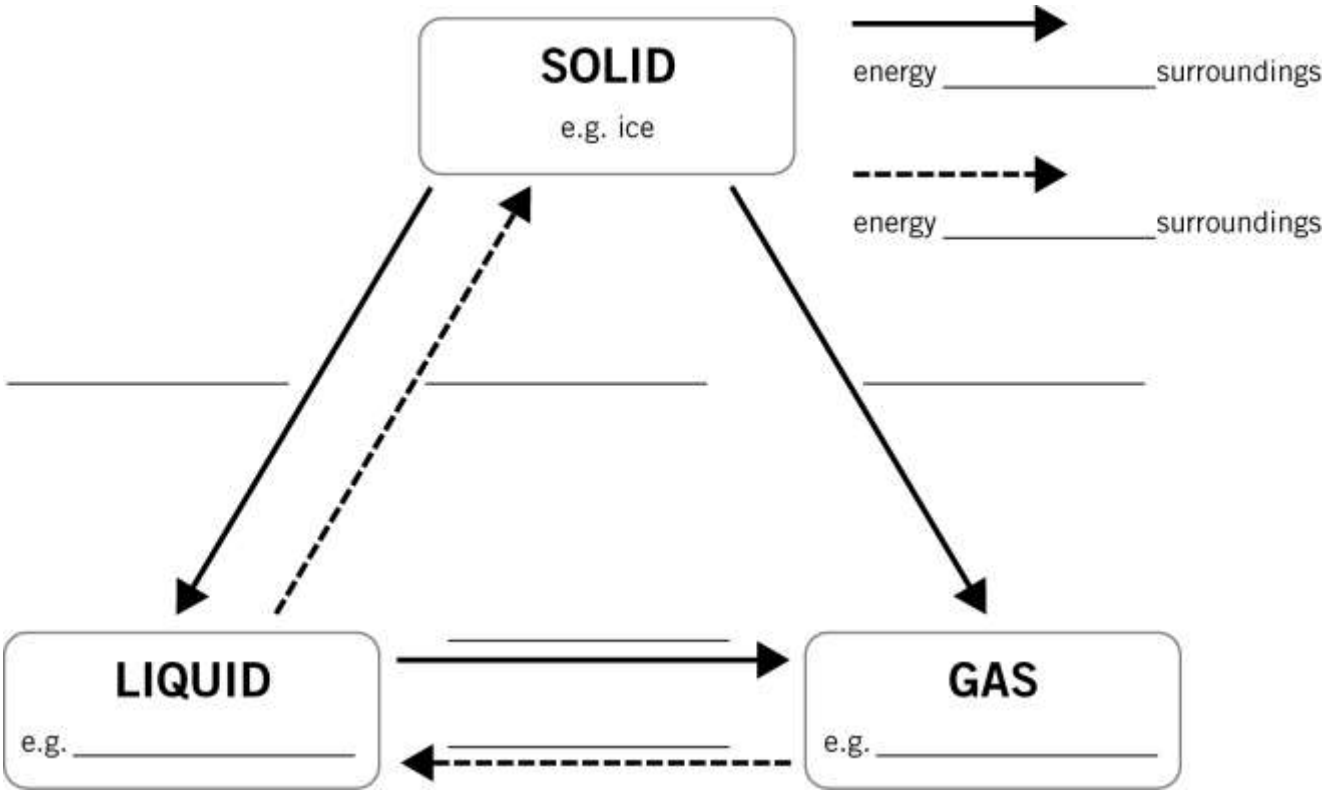
Task 3: Energy transfers

1 Link each key word with the correct definition provided.

energy	The energy in the store associated with the temperature of an object.
temperature	A measure associated with changes in temperature or with work, measured in joules.
internal energy	A measure of how hot or cold something is, measured in degrees Celsius.

2 Complete the diagram to describe what happens during changes of state. Fill in the gaps and label each arrow using the words and phrases below.

melting **evaporation or boiling** **sublimation** **condensation**
freezing **to** **from** **water** **steam**



3 Two objects are in contact with each other. Explain what brings about the transfer of energy between the two objects using the term **equilibrium**.

4 Use the image below to answer the following questions.

a Draw an arrow on the diagram to show the direction of energy transfer.

b Describe how conduction occurs through the sides of the cup. You should include the phrase **vibration of particles** in your answer.

c Suggest a suitable material for the manufacture of this cup. Explain your answer in terms of conduction and insulation.

5 a Choose from the following list sources of infrared radiation.
Circle the correct answers.

ice cube **the Sun** **a metal saucer** **a lamp** **a fire**

b Describe what all sources of infrared radiation have in common.

_____

_____

c Explain how energy is transferred by radiation. State whether particles are required for this method of energy transfer.

_____

_____

Task 4: Energy resources

1 Wood and coal are two different types of energy resources. Describe the difference between them in terms of renewable and non-renewable energy sources.

_____

_____

2 Describe how electricity is generated in a power station by completing the table below.
Use these phrases:

heats water to steam **generates electricity**
spins the generator **burns the fuel**

Part of the power station	Function
furnace	
boiler	
turbine	
generator	

Task 5: Energy, power, and work done

1 Explain the difference between energy and power by filling in the table below. Use the following phrases to help you:

increases **joule** **stays the same** **watt**

	Energy	**Power**
Unit		
How this quantity changes as the circuit component is left running		

2 An incandescent light bulb and an energy-saving light bulb have power ratings of 40 W and 12 W respectively.

a Calculate the energy transferred by both light bulbs over 10 hours in kWh. Show your working.

Remember: 1000 W = 1 kW

energy (kWh) = power (kW) × time (h)

b Compare the costs of running these two light bulbs over a 10-hour period. You should include the relative amounts of fuel used in each case.

3 a Pete pulls a pulley and lifts a 20 N weight by 0.5 m. Calculate the work done.

Work done = force (N) × distance moved (m)

= _____ × _____

= _____ J

b Pete uses the pulley again to lift another weight. Pete's energy supplied 40 J to lift the weight. The weight gains 30 J. Calculate the amount of energy dissipated to the surroundings. Show your working.

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