

Explosion risk

2017

# *S1 Energy & Sound Homework*

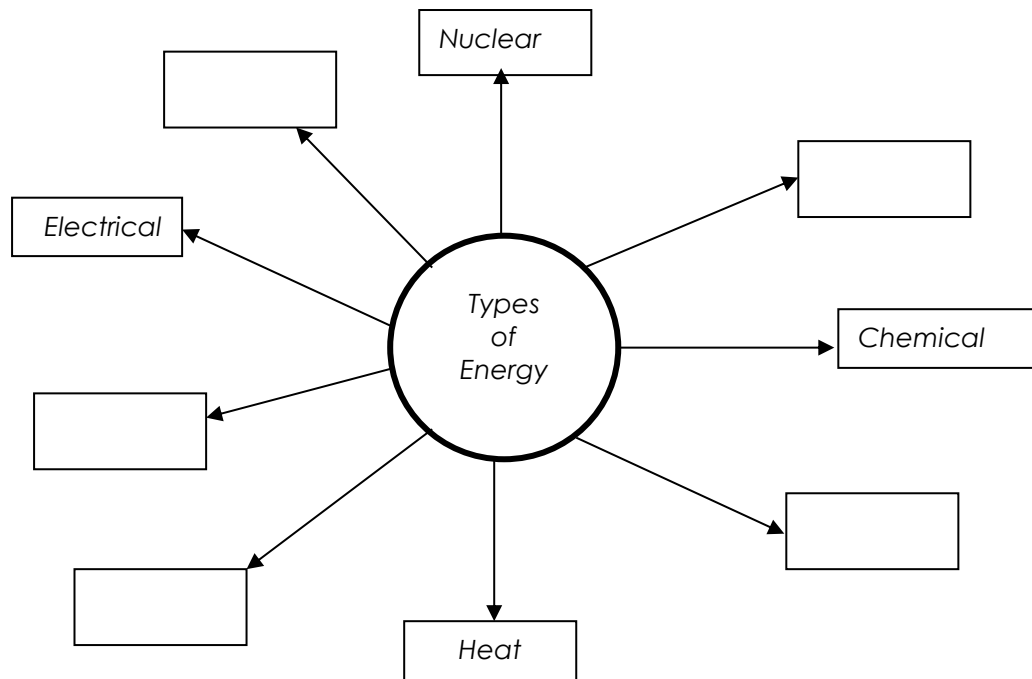


J A Hargreaves  
Lockerbie Academy  
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# Homework 1- Forms of Energy

Write in full sentences in your neatest hand writing

- Copy and complete the diagram showing the 9 different forms of energy.



- Look at this picture of Bonfire Night.



- Make a list of the things in the picture that stored chemical energy.
- List the things are converting stored energy to light.
- List the things are converting stored energy to sound.
- List the things are converting stored energy to heat.
- Which of your answers to part d) are converting energy usefully as heat?

3.



- a) In what form is this rollercoaster storing energy when it is at the top of the track?
- b) What will this be converted to as it goes down the slope?
- c) Not all of the energy will be converted to the form you gave in your answer to part b.
- d) What will happen to the rest of the energy?

4. Jack wound up a toy car and released it.

Paul told him he was storing energy in the car, which can be converted into other types.



- a) How did Jack store the energy in the car?
- b) What type of energy is stored in the car?
- c) How can Jack increase the amount of stored energy the toy car is given?
- d) How will Jack know when the car has changed all of its stored energy to other types?

I CAN... • identify energy stores and transfers • use the idea of conservation of energy

## Homework 2- Energy Changes/Transformations

Write in full sentences in your neatest hand writing

1) Copy the following into your jotter

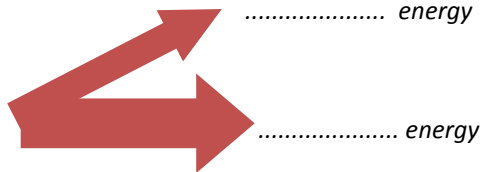
Energy cannot be created or destroyed we can only transfer it from one place to another or convert it into different forms. Eventually energy turns into heat which heats up our surroundings.

2) Copy and complete the energy transfer diagram, called a Sankey Diagram.

a) Food Blender



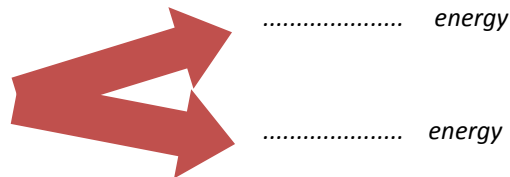
Electrical  
energy



b) Wood burning fire



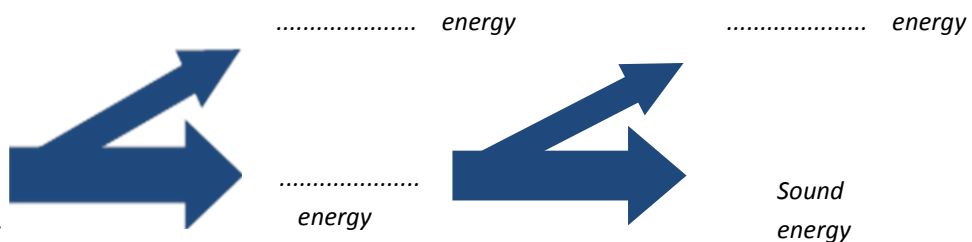
Chemical  
energy  
in wood



c) Music player



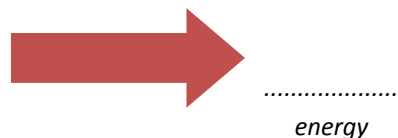
.....  
energy



d) Telephone



.....  
energy



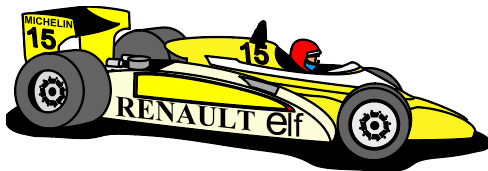
## e) Photosynthesis



.....  
energy

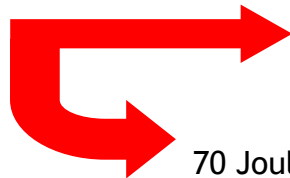


.....  
energy



Here is a picture of a racing car. In the diagram 100 Joules of energy is stored in the fuel. This produces 30 Joules of energy to move the car forward. This means 70 Joules of energy has been wasted as heat. We can represent this in a Sankey diagram as shown below.

100 J  
Potential energy  
in fuel



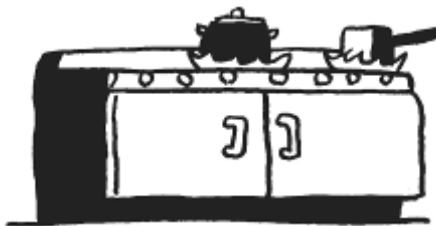
30 Joules movement energy

70 Joules heat

3. A battery stores 70 Joules of energy. If 10 Joules is given off as light in a bulb complete the diagram below.



4. A kettle produces 600 kJ of energy of electrical energy during the time it is switched on. 500 kJ are used to boil the water,  
 a) How much has been lost as the kettle is left on?  
 b) Where has this energy gone?  
 c) Construct a Sankey Diagram to show the energy transfers and changes.
- 5.



The natural gas in this cooker transfers 200kJ of stored energy to boil the water in the pan. When the water is boiling there is 168kJ of thermal energy stored in the hot water.

- a) How much wasted energy has been transferred?  
 b) Explain your answer to part a.  
 c) Where is this wasted energy stored?  
 d) Draw a Sankey diagram to represent these changes.

**I CAN...**

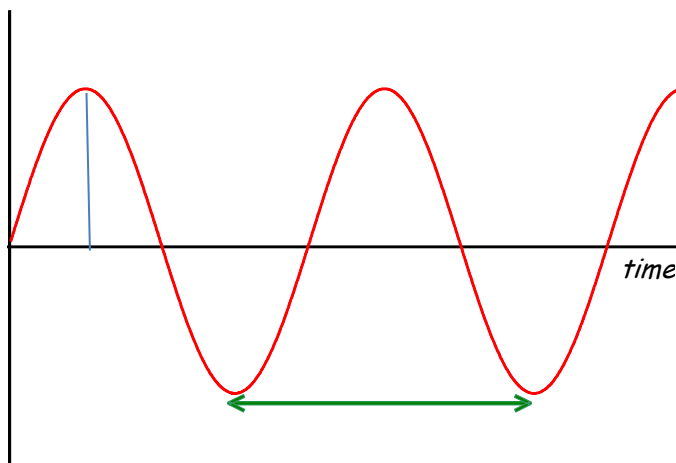
- identify energy stores and transfers
- use the idea of conservation of energy
- represent energy transfers using Sankey diagrams.

### Homework 3- Waves

1. Draw labelled diagrams to show the difference between a longitudinal and a transverse wave.
2. Draw a table with the headings longitudinal and transverse waves as shown below

Transverse	Longitudinal

3. Place the following words in the correct column in the table  
Sound, Radio, Microwaves, Light, Water, p-waves (primary waves- earthquake), s-waves (secondary waves - earthquake). Can you add any of your own?
4. Copy and complete the diagram. Adding the following terms  
wavelength, amplitude, crest, trough, axis



5. Explain the meaning of the following terms  
wavelength, amplitude, crest, trough, frequency

**I CAN...**

- identify the two types of waves
- draw and label waves
- use correctly the language associated with waves

## Homework 4- Speed of Sound

Speed of sound in materials

Material	Speed in $\text{m s}^{-1}$
Aluminium	5200
Air	340
Bone	4100
Carbon dioxide	270
Glycerol	1900
Muscle	1600
Steel	5200
Tissue	1500
Water	1500

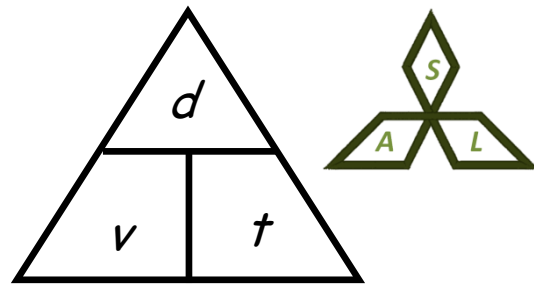
Sound travels at different speeds through different materials. It travels fastest through solids because the particles are closer together.

Calculations involving the speed of sound can be carried out using the equation:

$$v = \frac{d}{t}$$

$$d = v \times t$$

$$t = \frac{d}{v}$$



Where:

$v$  is speed, measured in metres per second (m/s)

$d$  is distance, measured in metres (m)

$t$  is time, measured in seconds (s)

During a storm, lightning is seen in the distance and the thunder is heard 5 seconds later. How far away was the lightning strike?

$$d = ?$$

$$v = 340 \text{ m/s}$$

$$t = 5 \text{ s}$$

$$d = v t$$

$$= 340 \times 5$$

$$= \underline{\underline{1700 \text{ m}}}$$

## Speed of Sound Questions

1. Describe an experiment to measure the speed of sound in air

2. Find the missing values in the following table:

	Speed (m/s)	Distance (m)	Time (s)
(a)		15 000	5
(b)		38	0.02
(c)	1 500		0.25
(d)	5 200		0.01
(e)	340	17	
(f)	330	3 465	

3. The speed of sound in tissue is 1500 metres per second. How far would sound travel in tissue in a time of 0.0002 seconds?

4. Sound in jelly can travel a distance of 0.435 metres in a time of 0.000 3 seconds. What is the speed of sound in jelly?

5. How long would it take for sound to travel 0.435 m through air if the speed of sound in air is 340 m/s?

6. The speed of sound in muscle is 1 600 m/s. How far would sound travel in muscle in a time of 0.0005 seconds?

7. Calculate the speed of sound in bone given that it takes 0.00005 s for sound to travel 0.15 m through bone.

**I CAN...** • use  $\text{speed} = \text{distance} \div \text{time}$  to calculate speed distance and time of sound waves



## Alternative Homework 4- Sound levels

8. At home, go to a search engine, such as Google and type in the following:

**'Human Hearing Range Youtube'**

Click on the first link.

Alternatively, type the full web address in to your browser:

[www.youtube.com/watch?v=2G9Q-r2leyw](http://www.youtube.com/watch?v=2G9Q-r2leyw)

9. Play this to different people in your family and record the highest frequency that they can hear in the table below:

Name	Age (don't lie!)	Highest Frequency Heard (kHz)

See if you can try this with at least four people.

**One more thing!** Be careful when using Google...

*In your house, there are lots of things that give off sound energy. Some are electrical appliances and some are even animals!*

10. In this task you have to either take photographs of (or draw) some things in your house that are giving off **sound** energy.

11. Stick your photographs (or drawings) in the boxes below and write down the energy change occurring in that object.

**Example:**

**Object:** Cat

**Energy Change:** Chemical  $\rightarrow$  Kinetic + Heat  
+ Sound



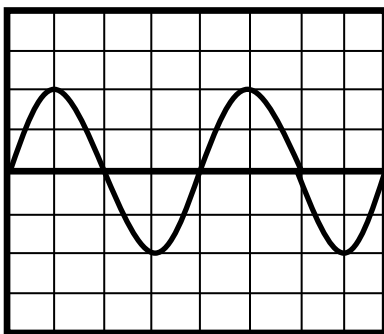
**Object:**

**Energy Change:**

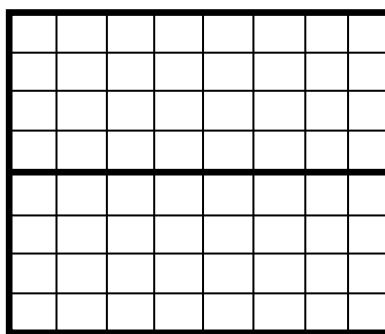

## Homework 5- Summary

Copy and complete the following passage about waves

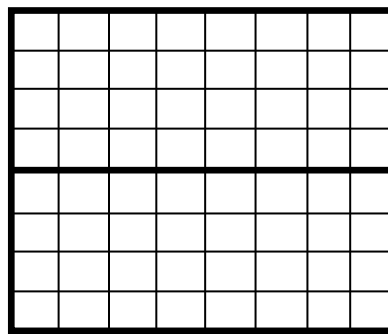
1. Sound is a \_\_\_\_\_ caused by \_\_\_\_\_.
2. Sound can travel is \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_ but not in a \_\_\_\_\_.
3. Sound travels faster/slower\*(write in the correct word) in solids than gases.
4. It travels at \_\_\_\_\_ m/s in air. \_\_\_\_\_ is an example to show that speed of light is very much greater than the speed of sound.
5. The range of human hearing is \_\_\_\_\_ and that sound above this frequency is called \_\_\_\_\_. This can be used to scan pregnant women.
6. On an oscilloscope traces can represent sound. \_\_\_\_\_ is indicated by the amplitude and \_\_\_\_\_ is represented by the pitch.
7. On graph paper or squared paper draw the following sound waves as seen on an oscilloscope Draw loud and quiet, high and low pitched sounds.



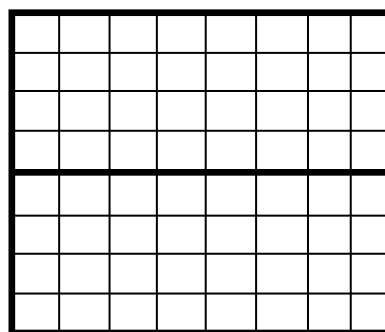
Normal Note



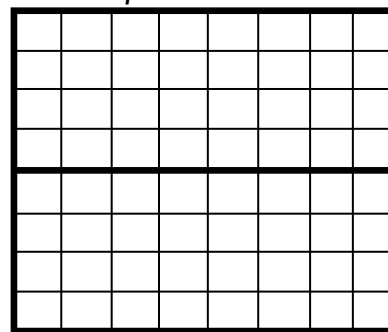
loud note



quiet note



high pitched note



low pitched note

8. Sound levels are measured in \_\_\_\_\_ and that the danger level of sound is \_\_\_\_\_ which can cause permanent damage to hearing.
9. Copy the Sound level line and indicate which sounds are likely to be at what level

Sound Source	Sound Level (dB)
Jet Air craft @ 1m	140
Threshold of hearing (quietist sound human's can hear)	120
Snoring quietly	100
Normal Conversation	80
Power Tools	40
Cars / Busy Street	20
A bird Singing	0
Pain	

10. \_\_\_\_\_ can be used to increase the strength of a signal, the \_\_\_\_\_ the curved reflector the greater the strength of the signal collected.

**I CAN...**

- understand the terms relating to sound
- draw traces to show how different sounds would be represented on an oscilloscope.
- estimate different sound levels.