Why is insulation used when building new houses?

Cavity wall, loft insulation & double glazing reduce heat lost by convection. Keeps house warmer for longer so reduces heating bills.

What is meant by 'renewable/non-renewable'?

Renewable can be easily replaced.

Non-renewable cannot be replaced easily

How can you work out the energy efficiency of a fuel?

$$\%\text{Efficiency} = \frac{\text{useful energy output}}{\text{total energy input}} \times 100$$

Why isn't a light bulb 100% efficient?

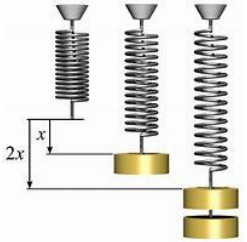
Some energy is lost as heat transferred to surroundings by radiation or convection. This increases the internal energy of the air molecules.

30 Quick questions: Answer these in your book

1 When an object is thrown up into the air the store of kinetic energy it has turns into a store of what type of energy?
2 What is the equation for weight?
3 What does g stand for in the gravitational potential energy formula?
gravitational field strength
4 What is the unit for weight?
5 Which if these is correct: i) KG ii) kG iii) kg
6 Work done is another way of saying energy transferred. What is the equation for work done?
7 What is the equation for speed?
8 If a cow runs 50m in 25 seconds, how fast is it running? include the unit in your answer
9 Which of the following is the most powerful: i) a motor that lifts a 4kg mass up a height of 2m in 10s. Or ii) a motor that lifts a 5 kg mass up a height of 3m in 20s? Assume g=10N/kg
10 What is power measured in?
11 What is the equation for kinetic energy?
12 If a car and a lorry are travelling at the same speed, which one has the most kinetic energy and why?
13 What is the equation for gravitational potential energy?
14 Where would a bear have more gravitational potential energy, 2m up a tree on the Earth or 2m up inside a rocket on the moon?
15 What is the equation for power?
16 All energies are measured in what unit?
17 What is the formula for elastic potential energy?
18 What does the k stand for in the equation for elastic potential energy?
19 Does a stiff spring like we use in car suspensions have a greater or less k than the spring designed to close a fire door?
20 What is the equation for specific heat capacity?
21 How could you save money on your heating bills at home?
22 Where does all the energy end up after it has been usefully used?
23 What is the equation for efficiency?
24 Name 3 fossil fuels and give a reason why we are starting to use less?
25 Name as many alternative, renewable energy resources.
26 Why is a hydroelectric power station more reliable than a wind 'farm'?
27 Nuclear fuel does not produce carbon dioxide so is better for the environment than fossil fuels. Why is it controversial?
28 Why is a vacuum flask good at keeping drinks hot?
29 What are the unit N/m used for?
30 Write down the definition for specific heat capacity.

Module 1 Energy

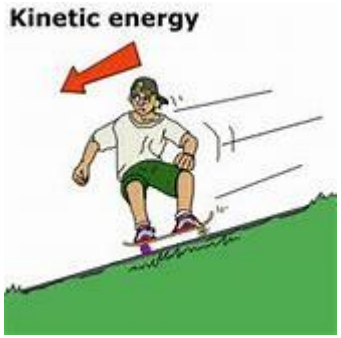
Knowledge Organiser



Name:

KEY WORDS/IDEAS TO REMEMBER

elastic
gravitational
potential
spring constant, k
lubrication
mgh
$0.5mv^2$
conduction
convection
radiation
newtons, N
joules, J
temperature
specific heat capacity
P=w/t
P=E/t
power
$0.5ke^2$
J/kg^0C
4200 J/kg^0C
insulation
efficiency
renewable
dissipated
resources
conservation



How can you increase the amount of energy stored in an object?
Apply more force
Stretch it more
Increase the height
Heat it.

What is the equation for calculating elastic potential energy? Calculate the energy stored in a spring when it extends by 6cm. The spring constant is 150N/m.

$$E_e = \frac{1}{2} ke^2$$

$$E_e = 0.5 \times 150 \times (0.06)^2$$

$$E_e = 0.27 \text{ J}$$

Describe the main energy sources available on Earth.
Non-renewable sources (fossil fuels)- coal, natural gas, oil.
Renewable sources-solar, wind, wave, hydroelectric, biomass
Give 2 ways of generating electricity when no fuel is burnt.
Solar, wind. wave, hydroelectric, geothermal

How do you calculate work done? Give a worked example.
work (in J) = F (in N) x s(in m)
600N x 5m = 3000J

Explain why a hot water bottle is so good at warming a bed.
Water has a high SHC so can absorb a large amount of thermal energy. Energy is transferred from the thermal energy store to the surrounding area. This releases a lot of energy without a large drop in temperature, so it will stay hotter for longer.

Explain ways of reducing unwanted energy transfer.
Lubrication- oiling machine parts reduces friction.
Thermal insulation- surrounding a hot object with insulating material reduces the rate heat is transferred.
Cavity wall/loft insulation- reduces the amount of energy transferred by conduction.

What is meant by 'Conservation of energy'?
Energy cannot be created or destroyed, only transferred from one source to another.
How can we preserve energy resources?
Use renewable energy sources.
Reduce unwanted energy transfer.
Switch off electrical appliances when not in use

Describe how the kinetic energy of an object changes as its speed changes. If you double the speed what happens to the kinetic energy?
Kinetic energy increases as speed increases.
Doubling the speed increases KE by factor of 4
How is energy transferred?
Conduction, convection or radiation

Simon weighs 800N. He climbs 5m vertically in 10s when he runs upstairs.
A) How much work does he do?
work = force x distance
800N x 5m = 4000J
B) Calculate his power.

$$\text{Power(W)} = \frac{\text{work Done (J)}}{\text{time (s)}}$$

$$\frac{4000(J)}{10(s)} = 400W$$

What is the difference between heat and temperature?
Heat is a form of energy.
Temperature measures how hot or cold something is.
What is meant by 'Specific Heat Capacity'?
The specific heat capacity of a substance is the amount of energy needed to change the temperature of 1 kg of substance by 1°C.
Different substances have different specific heat capacities. The SHC for water is 4200 J/kg^{0}C