

Year 7

Spring 2 Home learning pack

Renewable and non-renewable Resources

Do Now: (5 mins)

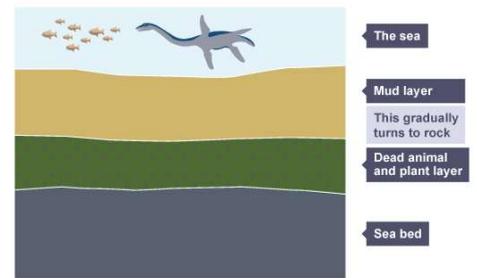
1. A student investigates what the best insulator is for keeping a drink hot:
 - a) State the independent variable. (1)
 - b) State dependent variable. (1)
 - c) Name one control variable, which must stay the same to ensure reliable results. (1)
2. Name the states convection can occur in (1)
3. What is happening to the motion of an object if the forces are un-balanced (1)
4. Name the piece of equipment used to measure a temperature change (1)
5. A man has a mass of 60kg, the gravitational field strength on Earth is 9.8 N/kg. Calculate his weight. (2)

Define renewable energy	Define renewable energy An energy resource which will never run out
Define Non-renewable energy	Define No-renewable energy An energy resource which cannot be replaced and will eventually run out
State three examples of fossil fuels	Crude oil, coal and natural gas.
State what fossil fuels are made from	The remains of dead plants and animals.
State seven examples of renewable energy resources	Solar, wind, waves, hydroelectric, geothermal, biomass, tidal

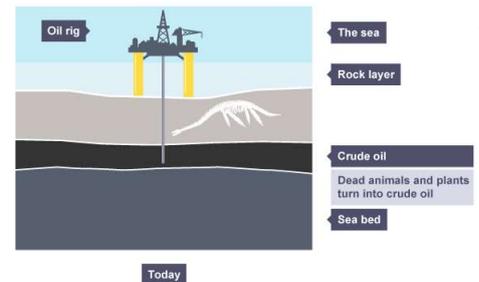
- A. Why are they called fossil fuels?
1. They are made from the remains of dead animals.
 2. They are made from the remains of dead plants.
 3. They are made from the remains of dead organisms.
- B. Which of these is not a fossil fuel?
1. Nuclear energy
 2. Coal
 3. Natural Gas
- C. How long does it take for fossil fuels to form?
1. Thousands of years
 2. Millions of years
 3. Billions of years
- D. Which two types of fuel are renewable?
1. Wind
 2. Coal
 3. Geothermal
 4. Natural gas
 5. Nuclear
- E. What does non-renewable mean
1. An energy resource that cannot be replaced and will be used up
 2. An energy resource that can be replaced and will be used up
 3. An energy resource that cannot be replaced and will not be used up

Stage 1 – A large numbers of microscopic (tiny) animals and plants died and fell to the bottom of the sea. Their remains were covered by mud.

Stage 2 - As the mud was buried by more mud, the remains of the dead animals and plants started to change into rock as the temperature and pressure increased. The plant and animal remains were altered chemically by this process, and slowly changed into crude oil and natural gas that humans extract today.



Stage 3 - The oil moved upwards through the spaces in permeable (something that allows substances through) rock and became trapped in rock layers. Oil companies then extracted the fossil fuels by drilling down.



Describe and explain how fossil fuels form over millions of years. (6)

Success Criteria

- Describe the role of microscopic animals and plants in the formation of fossil fuels
- Describe the layering of substances at the bottom of the ocean
- Describe the conditions that lead to the crude oil and gases forming
- Describe the movements of the oil through the rock and how this is extracted by oil companies

Advantages and Disadvantages

Do Now:

1. Define non-renewable
2. Name 4 non renewable energy sources
3. State the pH of a neutral substance and the colour it would turn using universal indicator
4. What do we call an experiment that has been repeated by *someone else* using **different equipment** and they obtained similar results.
5. Place these in order from smallest to largest
-2 -10 -3.5 -19.2

Energy Source	Advantages	Disadvantages
Coal	Infrastructure already in place to use the fuel so no set up costs	Produces Carbon Dioxide Will Run out
Oil		
Natural Gas		
Solar	Does not produce Carbon Dioxide	Only works when the sun is shining – During daytime Takes up a lot of space
Wind	Will not run out Free to obtain	Only works in windy area – Not reliable Ruins the landscape
Tidal		Can harm wildlife

1. An advantage of solar power is that

- a) It does not produce carbon dioxide
 - b) It does not produce carbon monoxide
 - c) It produces green house gasses
2. An advantage of using coal to produce energy is that
- a) It does not produce carbon dioxide
 - b) It does produce carbon dioxide
 - c) The infrastructure is already in place
3. An disadvantage of Wind power is that
- a) It does not produce carbon dioxide
 - b) It does not produce carbon monoxide
 - c) It only works on a windy day
4. An disadvantage of using oil to produce energy is that
- a) It does not produce carbon dioxide
 - b) It does produce carbon dioxide
 - c) The infrastructure is already in place

Task Compare Tidal power and Wind power resources:

Tidal power generates energy from falling water turning a turbine

A disadvantage of tidal power is that it can damage habitats

However, an advantage of tidal power is it does not produce carbon dioxide

In contrast, wind power energy uses wind turning a turbine .

A disadvantage of wind power energy is that is only works on windy days

On the other hand, an advantage of wind energy is it does not produce carbon dioxide

Task:

Compare Wind to and solar resources

Solar power generates energy from

A disadvantage of solar power is

However, an advantage of solar power is

In contrast, wind power energy uses wind turning a turbine .

A disadvantage of wind power energy is

On the other hand, an advantage of wind energy is

Task:

Compare fossil fuels and tidal energy resources:

_____ energy is...

A disadvantage of _____ energy is...

However, an advantage of _____ energy is...

In contrast, _____ energy uses...

A disadvantage of _____ energy...

On the other hand, an advantage of _____ energy is

Osmington Bay in Weymouth wants to start using a renewable energy source to generate its electricity. Evaluate which energy source Weymouth should invest in.

A renewable resource that would be suitable to use in Osmington Bay would be... this works by...

An advantage of this is...

A disadvantage of this is...

Another renewable resource that would be suitable is...

An advantage of this is...

A disadvantage of this is...

To conclude, the renewable energy resource I would choose to build in Osmington Bay would be.... The reason for this is because...

Nuclear Energy

Do Now:

1. Define a non renewable energy resource? (1)
2. Name 3 fossil fuels (3)
3. Name the four ways energy can be transferred (1)
4. State the piece of apparatus I should use to measure out 25cm³ of acid. (1)
5. Put the following numbers in order from biggest to smallest:
12, 10.5, -1, 2, 1.5

Define nuclear energy	A non-renewable resource that releases energy from nuclear reactions
State the two advantages of using nuclear energy?	1. A large amount of energy is released from very little fuel
	2. No greenhouse gases are released
State the three disadvantages of using nuclear energy?	1. The waste that is produced when using nuclear fuel is radioactive and very harmful.
	2. Nuclear power stations are at risk from terrorist attack and sabotage.
	3. The world uranium supplies may run out in about 50 years.

A) Define nuclear energy

1. A resource that releases energy from nuclear reactions
2. An energy that releases energy from nuclear reactions
3. A resources that produces energy from nuclear reactions

B) State an advantage of nuclear energy

1. The waste that is produced is harmful
2. The world uranium supplies will not run out
3. No greenhouse gases are released

C) A disadvantage of nuclear energy is

1. Nuclear power stations are at risk from terrorist attack and sabotage and a large amount of energy is released
2. No greenhouse gases are released and the waste radioactive and very harmful.
3. The waste that is produced when using nuclear fuel is radioactive and very harmful and the world uranium supplies may run out in about 50 years

D) Nuclear energy resource are

1. Renewable
2. Non-Renewable

Fact	Advantage or Disadvantage
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Fuel is inexpensive	
High start up costs to build a power plant, store waste and deal with accidents	
Lots of energy is released	
High safety record	
No carbon dioxide or sulphur dioxide released	
Nuclear waste is harmful to living things	
Non-renewable as the uranium is mined from the earth	
People don't like the idea of living near a nuclear power plant	

Evaluate the use of nuclear energy (6 Marks)

Answer these 4 questions to write a perfect answer to this 6 mark question

1. Nuclear energy is...
2. One advantage of nuclear energy is ...
3. A second advantage is...
4. Two risks of nuclear power are that...

Calculations of Power and Energy costs

Do Now:

1. Name 4 renewable energy sources
2. Name the gas released by burning fossil fuels
3. Calculate the efficiency of a petrol engine that uses 1000J of chemical energy and does 250J of work
4. Calculate the efficiency of an electric motor that uses 50J of electrical energy and does 40J of work
5. When carrying out an investigation, what can you do to check your results are precise?

Define "power"	How quickly energy is transferred by a device
State the standard unit of power	Watt (W)
State the equation that links power, energy transferred and time	$Power(W) = \frac{Energy\ transferred(J)}{time(s)}$
State the equation that links power, work done and time	$Power(W) = \frac{Work\ done(J)}{time(s)}$
State the equation to calculate the cost of energy at home	$Cost = power(kw) \times time(hours) \times price(kWh)$
How do you convert watts into kilowatts?	Divide by 1000

A) What are the units for power?

1. Joules (J)
2. Power (P)
3. Watts (W)

B) What are the units for work done?

1. Joules (J)
2. Power (P)
3. Watts (W)

C) What are the units for time when calculating power ?

1. Seconds
2. Minutes
3. Hours

D) State the equation to calculate the cost of electricity

- 1) $\text{Cost} = \text{power(kw)} \times \text{time(hours)} \times \text{price(per kWh)}$
- 2) $\text{Cost} = \text{power(kw)} \times \text{time(hours)} / \text{price(per kWh)}$
- 3) $\text{Cost} = \text{power(w)} \times \text{time(hours)} \times \text{price(per k)}$
- 4) $\text{price(per kWh)} = \text{power(kw)} \times \text{time(hours)} \times \text{cost}$

E) State the equation linking power, work done and time.

1. $\text{Power (kw)} = \text{Energy Transferred (J)} / \text{Time (s)}$
2. $\text{Power (w)} = \text{Energy Transferred (J)} / \text{Time (s)}$
3. $\text{Power (kw)} = \text{Energy Transferred (J)} \times \text{Time (s)}$
4. $\text{Power (kw)} = \text{Energy Transferred (J)} / \text{Time (h)}$

Example 1:

A kettle uses 0.5 J in 0.25s.

Calculate its power.

1. Check that the units are correct.
2. Write down the equation.
3. Substitute in the numbers
4. Find the answer.

1. Yes
2. $\text{Power} = \text{Energy Transferred} / \text{Time}$
3. $\text{Power} = 0.5 / 0.25$
4. $\text{Power} = 2 \text{ W}$

$$\text{Power} = \text{Energy Transferred} / \text{Time}$$

Example 2:

A drill uses 30J of energy in 10s.

Calculate its power.

1. Check that the units are correct.
2. Write down the equation.
3. Substitute in the numbers
4. Find the answer.

3. $\text{Power} = 0.5 / 0.25$
4. $\text{Power} = 2 \text{ W}$

Example 3:

A Hoover is on for 2 seconds and has a power rating of 60W. Calculate the Energy Transferred

1. Check that the units are correct.
2. Write down the equation.
3. Substitute in the numbers
4. Find the answer.

Questions:

1. Calculate the power of a kettle that uses 720J every 4s.
2. Calculate the power of a light bulb that uses 3600J every minute. (Remember 1 minute is 60seconds).

3. What is the equation is to calculate work done if you know the power and time?
4. Calculate the work done by a 100W hair dryer if it is on for 500s.
5. What is the equation is to calculate time if you know the power and work done?
6. Calculate how long a 50W kettle takes to boil if it uses 1500J each time it is used

$$\text{Cost} = \text{power(kw)} \times \text{time(hours)} \times \text{price(per kWh)}$$

Cost	Power (kw)	Time (hours)	Price (per kWh)
a)	0.5	0.25	£0.50
60	b)	2	£0.25
7	70	c)	£0.10
80	d)	0.2	£1.00
60	30	10	e)
6	0.1	f)	£2.00

Coal is a non-renewable energy resource.

- (a) Give **two other** non-renewable energy resources.

.....(2)

Wood is a renewable energy resource.

- (b) Why can wood be described as a renewable energy resource?

.....(1)

- (c) Give **two other** renewable energy resources..

.....(2)

- (d) Complete the statement below to describe what happens when wood burns. When wood burns, chemical energy in the wood is transformed into energy, which is transferred to the surroundings. (1)

/6

Renewable and Non renewable

1. Define nuclear energy (1)

2. State the two advantages of using nuclear energy? (2)

3. State the three disadvantages of using nuclear energy? (3)

/5

Nuclear Energy

1. Calculate the power of needed to transfer 50kJ of energy in 1.9 s (2)

2. Amount of energy transferred by a 20W kettle in 2 hours (2)

3. Give your answer to question 2 in kJ (1)

4. Calculate the cost of running a 4000W kettle for half an hour if the cost per kWh is £0.80 (2)

/7

Power and Cost

<p style="text-align: center;">MAD Task</p> <p>1. Create a table that compares the advantages and disadvantages of 2 types of renewable and 2 types of non renewable fuels</p> <p>2. Write a paragraph explaining which fuel you think England should be using to generate electricity and why.</p>	<p style="text-align: center;">MAD Task</p> <p>1. Create a poster about the use of Nuclear energy including a definition, advantages and disadvantages</p> <p style="text-align: right;">Nuclear Energy</p>
	<p style="text-align: center;">MAD Task</p> <p>1. Practice rearranging the power equation</p> <p>Power =</p> <p>Energy Transferred =</p> <p>Time =</p> <p style="text-align: right;">Power and Cost</p>