**Year 7**



**Topic 1 Chemical reactions**

**Topic 2 Motion**

**Topic 3 Energy**

**Topic 4 Plant reproduction**

**Topic 1: Reactions**

**6 lessons**

1. Chemical reactions
2. Work equations
3. Combustion
4. Thermal decomposition
5. Conservation of mass
6. exothermic and endothermic reactions

**Useful links**

Reactions:<https://www.bbc.co.uk/bitesize/topics/zypsgk7/articles/zwxhk2p>

Types of reaction: <https://www.bbc.co.uk/bitesize/guides/zqd2mp3/revision/1>

Combustion: <https://www.bbc.co.uk/bitesize/topics/zypsgk7/articles/zcwxcj6>

**Lesson 1: Chemical reactions**

1. What is the difference between a chemical reaction and a physical change?
2. What are 4 key signs that show a chemical reaction is taking place?
3. Write down 2 examples of chemical reactions and 2 examples of physical changes

**Lesson 2: Word equations**

a) reactants: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 products: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) reactants: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 products: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c) reactants: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 products: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Lesson 3: combustion**

1. Name 4 examples of fuels
2. What does a fuel do that is useful?
3. What 2 elements are fuels mainly made up of?
4. What are the two products of combustion?
5. Write a word equation for a fuel burning below

**Lesson 4: Thermal decomposition**

1. What does thermal decomposition mean?

**Lesson 5: Conservation of mass**

1. What does the principle of conservation of mass state?
2. Complete the sentence:

In a reaction the total mass of the reactants \_\_\_\_\_\_\_\_\_\_\_ the total mass of the products. This is called \_\_\_\_\_\_\_\_\_\_\_\_ of mass.

1. In a reaction, 15g of a reactant was weighed out. What is the TOTAL mass of products the reaction will make? \_\_\_\_\_\_\_\_g
2. A combustion reaction made 20g of water and 30g of carbon dioxide as the products, what is the total mass of the reactants? \_\_\_\_\_\_\_\_g

**Lesson 6: exothermic and endothermic reactions**

1. What does exothermic mean?
2. What does endothermic mean?
3. Complete the sentences…

In an exothermic reaction the surroundings get \_\_\_\_\_\_\_\_\_\_, the temperature on the thermometer \_\_\_\_\_\_\_\_\_. In an endothermic reaction the surroundings get \_\_\_\_\_\_\_\_\_, the temperature on the thermometer \_\_\_\_\_\_\_\_\_\_.

**Topic 2: Motion**

**4 lessons**

1. Vectors and scalars
2. Calculating speed
3. Distance-time graphs
4. Velocity-time graphs

**Useful links**

Calculating speed: <https://www.bbc.co.uk/bitesize/guides/zwwmxnb/revision/1>

Using distance-time graphs <https://www.bbc.co.uk/bitesize/guides/zwwmxnb/revision/2>

**Lesson 1 Vectors and scalars**

1. Scalars are quantities with only m\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Vectors are quantities with magnitude and d\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Distance is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ quantity.
4. Displacement is a vector as it is distance with d\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. Speed is a scalar quantity. Velocity is s\_\_\_\_\_\_\_\_\_\_\_\_\_ with direction so it is a v\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. Circle the vectors and underline the scalars

|  |  |
| --- | --- |
| DistanceVelocityAccelerationEnergyPowerTimeSpeed | TemperatureForceMagnetic FieldDensityVolumeDisplacement |

**Lesson 2 Speed**

What is speed, and how is it measured?

the formula for calculating speed is:

Speed (m/s) = distance (m) ÷ time (s)

OR sometimes written as

Speed (m/s) = distance (m)

time (s)

The formula for speed can be rearranged to either make speed, distance or time the subject of the equation.

Speed (m/s) = distance (m)

time (s)

Distance (m) = speed (m/s) x time (s)

Time (s) = distance (m)

speed (m/s)

1. Luke walks 200 metres in 40 seconds. What is his speed?
2. Laura covers 2000 m in 1,000 seconds. What is her speed?
3. How **long** would it take to run 100 metres if you run at 10m/s?
4. Lisa travels at 50 m/s for 10s. How **far** does she go?

**Lesson 3 Distance-time graphs**

We can describe the journey represented by a distance time graph by using the key terms that you have already learned. To do this the graph must be split up into sections so that they can be clearly described.

|  |  |
| --- | --- |
| **Graph** | **Description of journey** |
|  | Section A - |
| Section B -  |
| Section C - |
| Section D - |
|  | Section A -  |
| Section B - |
| Section C - |
| Section D - |
| Section E - |

**Lesson 4 Velocity-time graphs**

$$Acceleration (m/s/s)= \frac{Change in velocity (m/s)}{Time taken for change (s)}$$



1. How **fast** was the object going after 10 seconds?

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1. Describe what was happening between 10 and 20 seconds.

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1. Calculate the **acceleration** between 20 and 30 seconds.

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**Topic 3: Energy**

**6 lessons**

1. Energy resources
2. Energy and Power
3. Work, energy and power
4. Kinetic energy
5. Gravitational potential energy
6. Efficiency

**Useful links**

Energy resources: <http://www.darvill.clara.net/altenerg/index.htm>

Energy and power: <https://filestore.aqa.org.uk/textbooks/sample/KS3-Science/AQA-KS3SCI-OXFORD-SAMPLE-SB1.PDF>

Work, energy and power: <https://www.bbc.co.uk/bitesize/guides/zttfyrd/revision/7>

Kinetic energy: <https://www.bbc.co.uk/bitesize/guides/zhvv2sg/revision/1>

Gravitational energy: <https://www.bbc.co.uk/bitesize/guides/zhvv2sg/revision/3>

Efficiency: <https://www.bbc.co.uk/bitesize/guides/zp8jtv4/revision/3>

**Lesson 1: energy resources**

Match up the energy resource to how it works. Then match the advantages and disadvantages. Add an **R** next to the renewable resources. The first one has been done for you. <http://www.darvill.clara.net/altenerg/index.htm>

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Energy resource | How it works |  | Advantages and disadvantages | Rank |
| 1**Nuclear** | Radiation given off by fuels like uranium is used to heat water. This makes steam, which turns a turbine, and then a generator, which produces electricity. |  | + cheap fuel+ reliable- produces greenhouse gases- non-renewable |  |
| 2 | Solar panels convert sunlight into electricity. |  | + doesn’t give off any greenhouse gases- expensive- radiation is harmful- non-renewable |  |
| 3 | Coal, oil and natural gas are burnt to release heat to boil water. This makes steam, which turns a turbine, and then a generator, which produces electricity. |  | + fuel is free+ doesn’t produce greenhouse gases- only works in a few parts of the world |  |
| 4 | Water from a reservoir flows through turbines which are connected to generators to produce electricity.  |  | + fuel is free+ doesn’t produce greenhouse gases- Doesn’t work at night - Solar panels can be expensive |  |
| 5 | In some places, rocks underground are hot. Water can be heated by pumping it through the rocks. |  | + doesn’t produce greenhouse gases- reservoirs take up huge amounts of space - dams can destroy habitats  |  |
| 6 | Wind turns the large turbine blades which are connected to a generator to produce electricity. |  | + fuel is easy to grow/produce+ uses waste products- produces greenhouse gases |  |
| 7 | When plants and animal waste rots, they produce methane gas (the same as natural gas). An example is wood. Alternatively, fast growing trees are use to produce wood to burn. |  | + fuel is free+ doesn’t produce greenhouse gases- doesn’t work if it isn’t windy- wind turbines are expensive |  |

**Lesson 2: Energy and Power**



Power can be measured in Watts (W) or kilowatts (kW). To convert a power in kW into Watts you need to multiply the value in kW by 1000

**e.g. 2 kW = 2000 W or 0.9 kW = 900 W.**

Time is measured in seconds. To convert from minutes to seconds, you need to multiply by 60

**e.g. 5 minutes = 5 x 60 = 300 seconds.**

To convert from hours to seconds you need to multiply by 3600 – this is because there are 60 minutes in an hour and 60 seconds in a minute, so 60 x 60 = 3600

**e.g. half and hour = 0.5 x 3600 = 1800 seconds or 2 hours = 2 x 3600 = 7200 seconds.**

1. A kettle is rated 1800 W. It is used for 2 minutes (120 seconds) to boil water. Calculate the energy used.
2. A microwave is rated 1000 W. It is used for 8 minutes to heat up some food. Calculate the energy used.
3. A television is rated 0.5 kW. It is used for 1 hour. Calculate the energy used.

**Lesson 3: Work, energy and power**

1. Calculate the work done when a book of 3 N is lifted from the floor to a table 0.7 m. high. Show your working.
2. Pete pulls a pulley and lifts a 20 N weight by 0.5 m. Calculate the work done.
3. 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 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ applied to the lid by the lever is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that you apply with just your hand. This means that a lever is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Lesson 4: Kinetic energy**



1. A sprinter has a mass of 68 kg. He can reach a top speed of 11 m/s. What is his maximum kinetic energy?
2. Calculate the kinetic energy of a pigeon of mass 0.40 kg that is flying with a velocity of 20m/s.
3. A car of mass 500 kg is a moving with a velocity of 10m/s. calculate the kinetic energy.
4. The car now accelerates and doubles its speed to 20 m/s. what is the new kinetic energy?

**Lesson 5: Gravitational potential energy**



1. A 5 kg cat is lifted 2 m into the air. How much gravitational potential energy does it gain?
2. A cyclist has a mass of 68 kg. He cycles up a hill that is 50 m high. What is his gravitational potential energy?
3. An astronaut has a mass of 70 kg. He climbs 2 m to get into his space shuttle before take-off. What gravitational potential energy does he gain?
4. An astronaut lands on the moon. He has a mass of 70 kg. He climbs 2 m to get back into his space shuttle what gravitational potential energy does he gain? The value of g on the moon is g = 1.6 N/kg.

**Lesson 6: Efficiency**

Calculate the efficiencies of these 3 cars. These can be found in your workbook. Write your answer as both a **decimal** and a **percentage**.



Hydrogen fuel cell car

Total energy input = 2000 J

Useful energy output (kinetic) = 800 J



Hybrid car

Total energy input = 100 J

Useful energy output (kinetic) = 68 J



Petrol car

Total energy input = 500 J

Useful energy output (kinetic) = 95 J

**Topic 4: reproduction in plants**

**3 lessons**

1. Flowers and Pollination
2. Fertilisation and germination
3. Sexual and Asexual reproduction

**Useful links**

Flowers and Pollination: <https://www.bbc.co.uk/bitesize/guides/zs7thyc/revision/1>

<https://www.bbc.co.uk/bitesize/guides/zs7thyc/revision/4>

Fertilisation and germination: <https://www.bbc.co.uk/bitesize/guides/zs7thyc/revision/2>

<https://www.bbc.co.uk/bitesize/guides/zs7thyc/revision/3>

Sexual and Asexual reproduction: <https://www.bbc.co.uk/bitesize/guides/z2xg87h/revision/1>

**Lesson 1: Flowers and Pollination**

1. The male parts of the flower are called the \_\_\_\_\_\_\_\_\_\_ and consists of the \_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_. The female part of the flower is called the \_\_\_\_\_\_\_\_\_\_\_. It consists of the \_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_. The male gamete is made in the \_\_\_\_\_\_\_\_\_\_\_ and is found inside the \_\_\_\_\_\_\_\_\_\_ grain. The female gamete is found in the \_\_\_\_\_\_\_\_\_\_\_ and is called an \_\_\_\_\_\_\_\_\_\_\_\_.



1. What is pollination?
2. What is the difference between insect pollinated flowers and wind pollinated flowers?
3. How are insect-pollinated flowers adapted?
4. How are wind-pollinated flowers adapted?

**Lesson 2: Fertilisation and germination**

1. What is a fruit?
2. What is a seed?
3. Put these sentences in the correct order:
	1. As the bee passes the anthers, pollen grains stick to the hairs on the bee’s body.
	2. The pollen-grain nucleus joins with the egg-cell nucleus.
	3. The bee flies to another flower, carrying pollen from the first flower with it.
	4. A bee visits a flower to feed on nectar. The bee wriggles deep into the flower past the anthers.
	5. Pollen grains from the bee get stuck on the sticky stigma.
	6. The fertilised egg develops into a seed
	7. A pollen grain develops a pollen tube that grows down the style to the ovule.
	8. The bee feeds on the nectar of the second flower.

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| --- | --- | --- | --- | --- | --- | --- | --- |
| D |  |  |  |  |  |  | F |

1. What is germination?

**Lesson 3: Sexual and Asexual reproduction**

|  |  |  |
| --- | --- | --- |
|   | Sexual  | Asexual  |
| Number of parents  |   |   |
| Involves gametes?  |   |   |
| Offspring are clones?  |   |   |
| Does it lead to variation?   |   |   |
| Examples of organisms that can reproduce this way  |   |   |