Subject: Science

2 Week Independent Learning plan **Week 7 and 8**

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Teacher: Mrs Thomas

Year: 10 Topic/theme: P5.1 (Combined) Energy stores and transfers, Energy analysis with forces

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| Lesson  | What you need to take from this lesson  | Resource to use or hyperlink | Suggested task  |
| 1 | Energy stores and energy transfers-describe energy stores and transfers-explain what an energy store is-describe the law of conservation of energy | <https://www.youtube.com/watch?v=v-UQi_iLSTI><https://www.bbc.co.uk/bitesize/guides/zqs2k2p/revision/1><https://www.youtube.com/watch?v=JGwcDCeYRYo> | Watch the video in the first link:* Make a list of key words and their definitions
* Describe the difference between an open system and a closed system
* List the energy stores mentioned in the video

Use the second link to find the relevant part of BBC bitesize.* Expand your list of energy stores to include a description and an example of each
* Use the second page of the information to make notes on energy transfers
* Use the third page of the information to write the definition of conservation of energy and read up on some examples of energy being transferred in different situations

Watch the video in the third link – it recaps what we’ve already made notes on and has some good examples of energy transfers. Remember that ‘electrical’ is a transfer NOT a store. If you are using mains electricity it was produced in a power station, the electricity is the transfer between the energy source used by the power station (e.g. chemical if the power station burns fuel, nuclear if it’s a nuclear power station, kinetic for wind, wave, or tidal)* Come up with at least five examples of energy being transferred from store to store(s) from inside your home (assume your power station burns fuel, so if using the mains start with Chemical store -> electrical transfer ->
 |
| 2  | Energy analysis with forces 1-describe all the changes involved in the way energy is stored when a system changes for common situations-describe the changes in energy involved when a system is changed by work done by forces-make calculations of the energy changes associated with changes in a system using the equation for mechanical work-use a common scale to show the overall redistribution of energy in the system-calculate the amounts of energy associated with a moving body | <https://www.bbc.co.uk/bitesize/guides/zqs2k2p/revision/4><https://www.youtube.com/watch?v=m5sW_0hQ8pY> | The BBC bitesize link shows you the equations you will need to recall (from P2) to be able to do the calculations of this section. It may be worth looking over your notes from P2, using your revision guide, or having a look at the relevant section of BBC bitesize to remind you of prior knowledge.Watch the video in the second link:* Make notes on how to analyse a situation using energy
* Make notes on how to analyse situations using constant forces (you may want to copy the examples)
* Copy the example for calculating work done and final speed
* Answer the following questions:

1) A quad bike engine exerts a force of 800N over a distance of 20m. Calculate the final speed of the bike if it has a mass of 300kg.2) What assumption have you made in question 1?3) You can escape the gravitational field of the Earth of you leave the Earth at 11km/s. Calculate the distance over which you would need to use a drag racer with a mass of 300kg and an engine that exerts a force of 4kN to achieve this speed4) Suggest why the drag racer is unlikely to reach this speed.5) Draw an energy analysis diagram for your journey to school. |
| 3 | Energy analysis with forces 2-describe all the changes involved in the way energy is stored when a system changes for common situations-describe the changes in energy involved when a system is changed by work done by forces-make calculations of the energy changes associated with changes in a system using the equation for mechanical work-use a common scale to show the overall redistribution of energy in the system-calculate the amounts of energy associated with a stretched spring | <https://www.bbc.co.uk/bitesize/guides/zqs2k2p/revision/4><https://www.youtube.com/watch?v=VJNLk5lTtdA> | The BBC bitesize link shows you the equations you will need to recall (from P2) to be able to do the calculations of this section. It may be worth looking over your notes from P2, using your revision guide, or having a look at the relevant section of BBC bitesize to remind you of prior knowledge.Watch the video in the second link:* Make notes on how to analyse situations involving braking (you may want to copy the examples)
* Make sure to include how to calculate force
* Make notes on how to analyse situations involving springs (you may want to copy the examples)
* Make sure to include how to calculate energy
* Answer the following questions:

1) Calculate the energy transferred to the elastic potential store of a spring in the suspension of a car which compresses by 1cm. The spring constant is 100kN/m2) Estimate the force that a cyclist travelling at 6m/s needs to apply to the brakes to bring the bicycle to a stop in a distance of 15m. Ignore air resistance and friction.3) Suggest and explain how air resistance and friction affect your answer to question 2.4) Explain why it is not possible to calculate the increase in temperature of the surroundings when a car brakes. |
| 4 | Energy analysis with forces 3-describe all the changes involved in the way energy is stored when a system changes for common situations-describe the changes in energy involved when a system is changed by work done by forces-make calculations of the energy changes associated with changes in a system using the equation for mechanical work-use a common scale to show the overall redistribution of energy in the system-calculate the amounts of energy associated with a moving body-calculate the amounts of energy associated with an object raised above ground level | <https://www.bbc.co.uk/bitesize/guides/zqs2k2p/revision/4><https://www.youtube.com/watch?v=HfWjxfcjAjo&list=PLVxVpdseAfa3rH8s-I2Rew3Dxzxtg3365&index=5&t=0s> | The BBC bitesize link shows you the equations you will need to recall (from P2) to be able to do the calculations of this section. It may be worth looking over your notes from P2, using your revision guide, or having a look at the relevant section of BBC bitesize to remind you of prior knowledge.Watch the video in the second link:* Make notes on how to analyse situations involving gravity (you may want to copy the examples)
* Make sure to include how to calculate height reached
* Make notes on how to analyse situations in which objects hit obstacles (you may want to copy the examples)
* Answer the following questions:

1) A dropped pair of sunglasses has a mass of 25g, and is travelling at 2m/s just before it hits the sand. Calculate the energy transferred to the thermal store of the surroundings.2) You push a toy car up a ramp and let go immediately. The car reaches a vertical height of 40cm above the starting point. Calculate how fast it was going when you let it go. Explain why you do not need to know the mass of the toy car. |
| 5 | Summary Questions:-consolidate your knowledge through practice | <https://www.youtube.com/watch?v=D7OahLIBz_8> | The link shows how to apply what we’ve learned to a fun real life situation.Attempt the following summary questions to assess your knowledge, then spend some time filling any gaps in your knowledge and re-attempt the questions:1. Write down the law of conservation of energy
2. Write down the energy stores
3. Copy and complete the table

|  |  |  |
| --- | --- | --- |
|  | Amount of energy in this store goes down… | Amount of energy in this store goes up… |
| A toy car projected up a slope |  |  |
| A tennis ball hitting a tennis racket |  |  |
| A battery operated toy train being accelerated by a constant force |  |  |
| A cyclist slowing down |  |  |
| Bringing water to the boil using a gas camping stove |  |  |

1. Here are some different ways of transferring energy between stores:

|  |  |  |
| --- | --- | --- |
| Using an electric current | heating | Using a force |

For each of the following situations write down a suitable method of transferring energy between the stores:a) From an elastic potential store of a bungee jumper who is stationary with the cord extended at the bottom of a jump, to the gravitational potential store of the same jumper with the cord slack at the top of the jump.b) From a chemical potential store of coal and oxygen in a power station to a thermal store of the hot wire in a toaster.c) From the thermal store of the hot wire in a toaster to the thermal store of the hot toast. |
| **How will we assess you learning?**Years 7 and 8: Pupils will be set an interactive quiz using this information on Show My Homework or asked to submit a piece of work such as a photograph of art work.Year 9 to 11: Pupils may be set an interactive quiz or a written task via Show My Homework. |

**Need help?**

HomeAccess+ <https://facility.waseley.networcs.net/HAP/login.aspx?ReturnUrl=%2fhap> (use your normal school username and password).

Pupil and parent help page: <https://www.waseleyhills.worcs.sch.uk/coronavirus-independent-learning/help-for-parents-and-pupils>