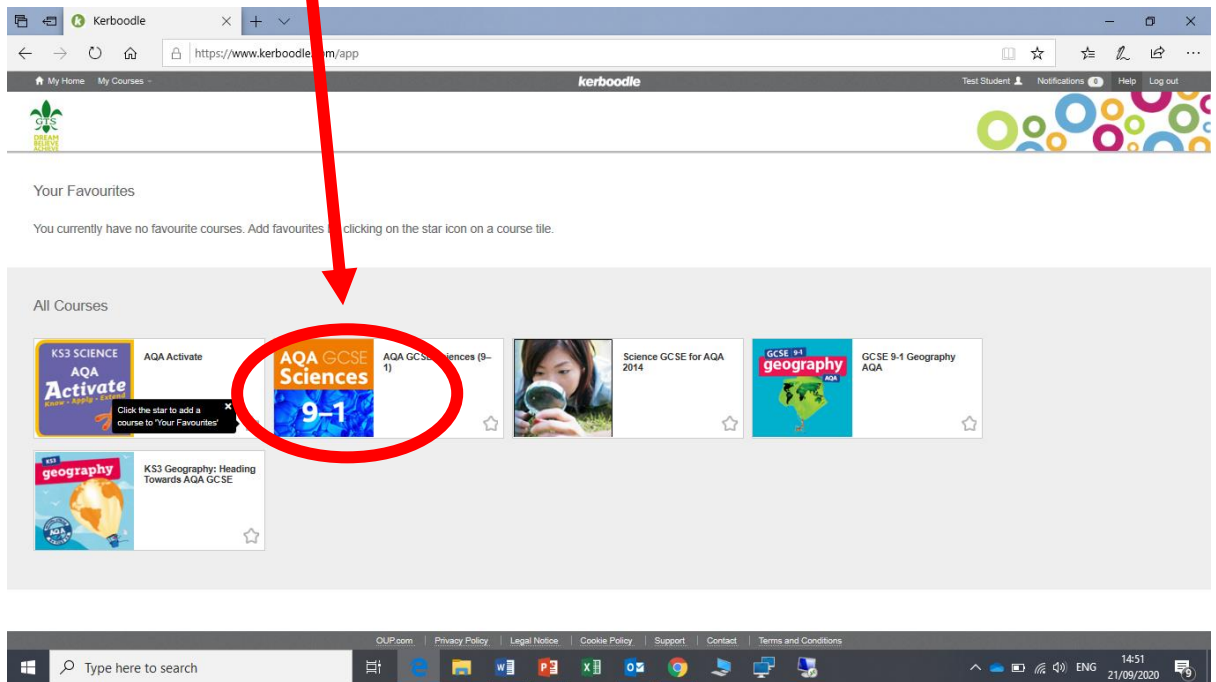
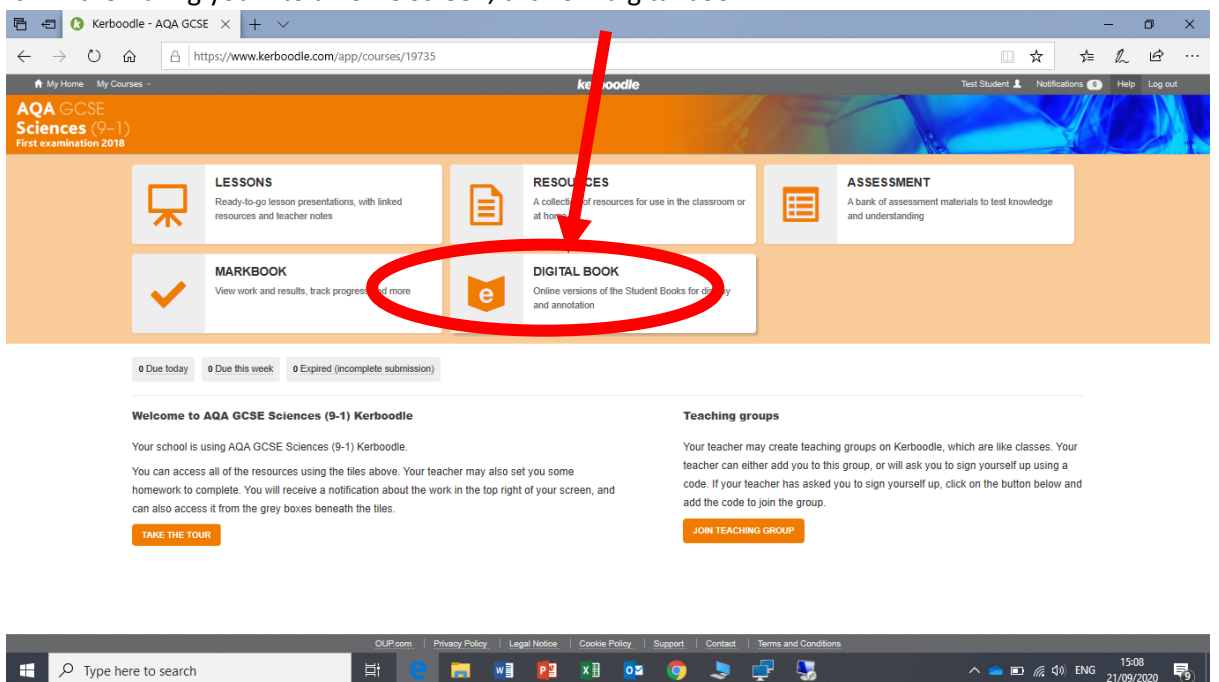


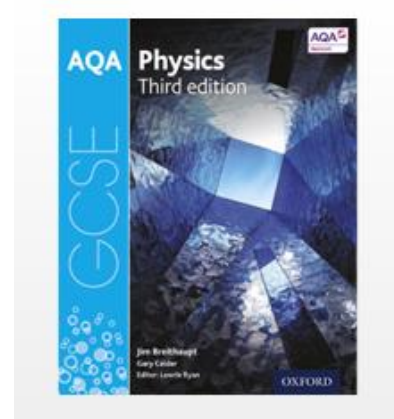
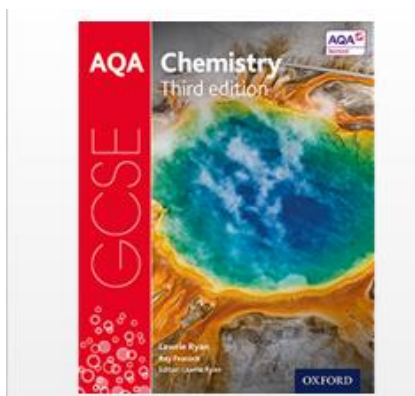
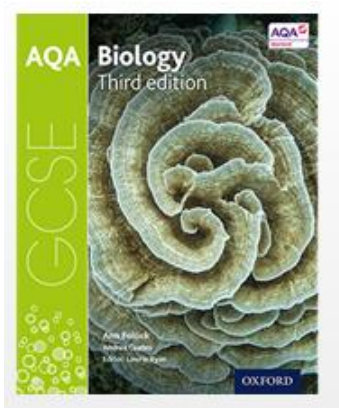
1. Login to kerboodle ([www.kerboodle.com](http://www.kerboodle.com)), if you are logging in for the first time your username is your first initial followed by your surname with no gaps so for example 'Joe Bloggs' would be jbloggs. Your password is the same as your username (you will be asked to change it, make it the same as the password you use to log into the school computers). The institution code is ir1. If you forget your password email Mrs Holman ([eholman@gts.devon.sch.uk](mailto:eholman@gts.devon.sch.uk)) and she will re-set it for you.
2. If you are in years 9, 10 or 11 click on the blue and orange square, AQA GCSE Science.



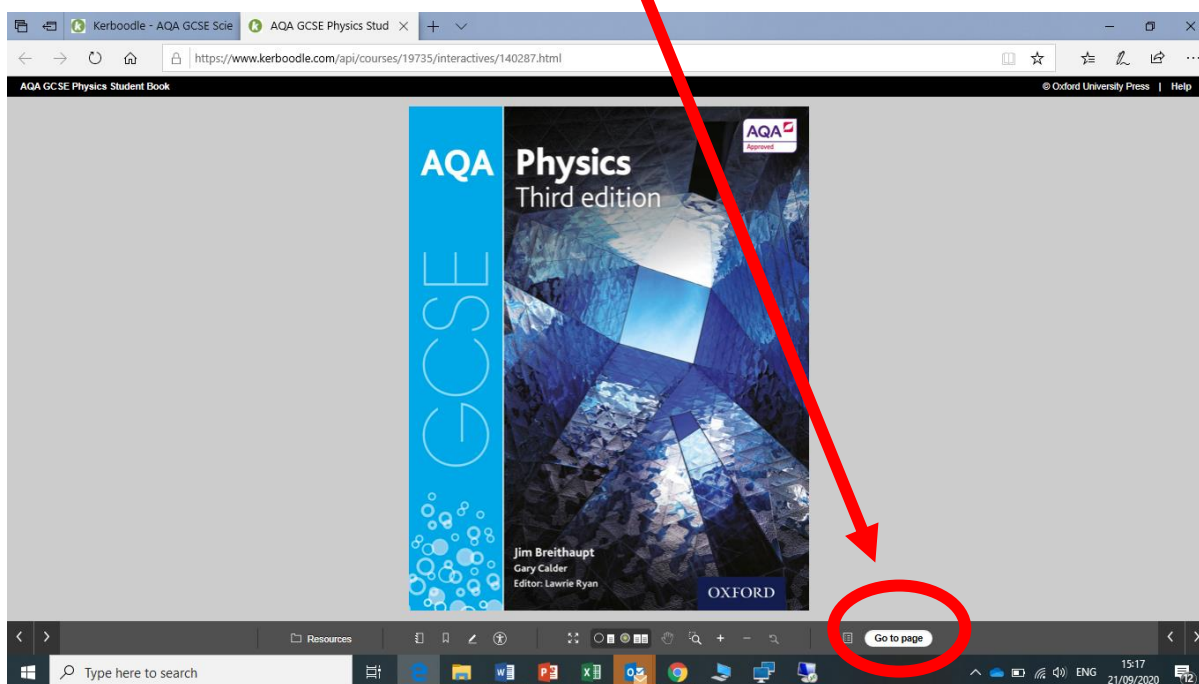
3. It will then bring you into a home screen, click on 'digital book'.



4. Check the school website for details on whether you need Biology, Chemistry or Physics. Make sure you click on the correct book (images below to help, use the side arrows to scroll through the available books)



5. Look back on the school website to see what page number you need, you can then go to the page you need by clicking on the 'Go to page' button in the bottom right hand corner of the screen.



6. You can then use the controls at the bottom of the page to zoom in and move around the book page. Make notes on the double page spread, before completing the summary questions (in the blue box at the bottom of the right hand p

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# P 1 Conservation and dissipation of energy

## 1.1 Changes in energy stores

**Learning objectives**  
After this topic, you should know:

- the ways in which energy can be stored
- how energy can be transferred
- the changes in energy stores that happen when an object falls
- the energy transfers that happen when a falling object hits the ground without bouncing back.

**On the move**  
Cars, buses, planes, and ships all use fuels as chemical energy stores. They carry their own fuel. Electric trains use energy transferred from fuel to power stations. Electricity transfers energy from the power station to the train.



**Figure 1** The French TGV4 Grande vitesse electric train can reach speeds of more than 300 km/h.

Energy can be stored in different ways and is transferred by heating, waves, an electric current, or when a force moves an object. Here are some examples:

- Chemical energy stores include fuels, foods, or the chemicals found in batteries. The energy is transferred during chemical reactions.
- Kinetic energy stores describe the energy an object has because it is moving.
- Gravitational potential energy stores are used to describe the energy stored in an object because of its position, such as an object above the ground.
- Elastic potential energy stores describe the energy stored in a springy object when you stretch or squish it.
- Thermal energy stores describe the energy a substance has because of its temperature.


Energy can be transferred from one store to another. In a torch, the torch battery pushes a current through the bulb. This makes the torch bulb emit light and also get hot.

When an electric kettle is used to boil water, the current in the kettle's heating element transfers energy to the thermal energy store of the water and the kettle.

**Figure 2** Changes in energy stores in a torch lamp

When an object starts to fall freely, it speeds up as it falls. The force of gravity acting on the object causes energy to be transferred from its gravitational potential energy store to its kinetic energy store.

Look at Figure 3. It shows an object that hits the floor with a thud. All of the energy in its kinetic energy store is transferred by heating to the thermal energy store of the object and the floor, and by sound waves moving away from the point of impact. The amount of energy transferred by sound waves is much smaller than the amount of energy transferred by heating.



**Figure 3** An energetic ship. On impact, energy is transferred to the thermal energy store of the surroundings by heating and by sound waves.

**Key points**

- Energy can be stored in a variety of different energy stores.
- Energy is transferred by heating, by an electric current, or by waves when it moves an object.
- When an object falls and gains kinetic energy, its store of gravitational potential energy decreases and its kinetic energy increases.
- When a falling object hits the ground and bounces back, its kinetic energy store decreases. Some or all of the energy is transferred to the surroundings – the thermal energy store of the surroundings increases, and energy is also transferred by sound waves.

**Figure 4** An energetic ball. An energetic ball falls and bounces.

- Describe the changes to energy stores that take place when:
  - a ball falls in air. (2 marks)
  - an electric heater is switched on. (2 marks)
- List two different objects you could use to light a room if you have a power cut. For each object, describe the energy transfers and changes in energy stores that occur when it lights up the room. (4 marks)
  - Which of the two objects is:
    - easier to obtain energy from? (1 mark)
    - easier to use? (1 mark)
- Describe the changes in energy stores of an electric train as it:
  - moves up a hill at constant speed. (2 marks)
  - approaches a station and brakes to a halt. (2 marks)
- Describe the changes in energy stores that take place when food is heated in a microwave oven. (2 marks)