

Name _____

This work will take a number of hours to complete. **DO NOT LEAVE IT UNTIL THE DAY BEFORE YOU COME BACK TO SCHOOL.**

This work, along with other assessments and your target grade, will form part of the evidence used to decide on the set you will be in next year.

You are expected to attempt every question. If when you first read a question you do not know the answer you are expected to carry out research and find out what the answer is. You ARE allowed to use any resources you can find to help you complete the work. You ARE allowed to get together with friends and complete the work together. However, you will be assessed on your ability to answer questions based on this work on your return to school in September so take this seriously and complete it to the best of your ability.

Have a lovely summer.

Mr M O'Flaherty

Head of Science

Another copy of this whole document can be found on the school website. If you want to start again because you made a mistake or didn't do it well enough first time you tried print off another copy and improve it!

You have been given a bright yellow sheet with 21 equations on it. **Task 1 is to learn those equations.** You will be required to have learned these for your GCSE exam, you will need to be able to recall the equation and write it down (there will be marks awarded in the GCSE exam for doing this). You will then be required to use the equation you just remembered to solve a problem. I have included many example problems that you can only solve if you identify the correct equation from the yellow sheet.

Task 2 is to solve the following problems:

1. A man throws a ball into the air, the ball has a mass of 120g and rises to a maximum height of 12.2m. What is the ball's gravitational potential energy at this height?
2. A car travelling at 12.2m/s for 120s travels how far during that time?
3. The acceleration of a 12g bullet is 3000m/s^2 . What force does the gun apply to the bullet when it fires it?

4. The bullet in question 3 is now travelling at 1200m/s , what is its kinetic energy?
5. A wave with a wavelength of 1.2m and a frequency of 34Hz is travelling how fast?
6. What work is done when using a force of 300N to push a heavy box 17m ?
7. What pressure is exerted by a stiletto heel, with an area of 1.2cm^2 , onto a man's foot when his 450N wife accidentally stands on his foot with the heel of one shoe?
8. What is the density of steel if a 3m^3 block has a mass of $24,150\text{kg}$?

9. How much charge flows if a current of 1000A flows for 12 minutes?
10. What is the electrical power generated by a circuit that has a current of 0.5A flowing through a 120Ω resistor?
11. What is the maximum height that a 12g bullet can reach if when it is fired it has the kinetic energy you calculated in question 4?
12. How efficient is a fan if it is supplied with 100J of electrical energy, wastes 2J as sound energy, 1.5J as heat energy and the rest of the supplied energy is turned to kinetic energy of the air the fan moves?
13. What is the power of an electric motor if it can transfer 15000J in 12s?

14. A bird flies 3000m up into the air carrying a small stone that has a mass of 2.7g. Just before the bird released the stone to fall back to Earth how much gravitational potential energy does the stone have?
15. After a short fall the stone reaches a constant velocity of 45m/s. The stone falls for 3s before it hits the top of a tall building how far did the stone fall during this time?
16. A builder does 134,000J of work moving a pile of bricks to where he will be building a wall. He does this in 33minutes. What average power does he develop to do this?
17. What force was exerted on a spring, with a spring constant of 34.7N/m, to stretch it 50cm?
18. A light wave travelling at 300,000,000m/s is reflected from the moon and travels to Earth. The Moon is travels the 384,400km from the Earth. How long does the light take to get from the Moon to the Earth?

Task 3 – Chemistry – Atomic Structure:

1. There are 3 types of particle that make up most atoms. Write the names of each of the particles below and then find out as much as you can about each type of particle, create an information sheet for each one and attach your information to this work sheet.

2. In the space below draw a diagram that represents an Oxygen atom. You must show the correct number of each of the 3 types of particle (that you researched for question 1 in this section) in the correct position.

3. Draw an isotope of an Oxygen atom in the space below. You must show the correct number of each of the 3 types of particle (that you researched for question 1 in this section) in the correct position.

4. Complete the table below:

Symbol	Element	Atomic number	Atomic mass	Number of protons	Number of neutrons	Number of electrons	arrangement of electrons 2,8,8,
	Hydrogen						
	Helium						
	Lithium						
	Beryllium						
	Boron						
	Carbon						
	Nitrogen						
	Oxygen						
	Fluorine						
	Neon						
	Sodium						
	Magnesium						
	Aluminium						
	Silicon						
	Phosphorus						
	Sulphur						
	Chlorine						
	Argon						
	Potassium						
	Calcium						

5. What does the atomic number of an atom tell you about that atom?

What does the mass number of an atom tell you about that atom?

How can you identify the number of electrons an atom (or ion) has?

6. In the space below draw 'dot and cross' diagrams for a) a water molecule, b) an oxygen molecule, c) a methane molecule and d) a molecule of sodium chloride.

Task 4 – Biology – Cell Division:

1. In the space below draw a diagram that shows to process of mitosis. You must include labels that explain what is happening at each stage in the process DO NOT JUST COPY AND PASTE A DIAGRAM FROM THE INTERNET, YOU MUST DRAW THE DIAGRAM.

2. In the space below draw a diagram that shows the process of meiosis. You must include labels that explain what is happening at each stage in the process DO NOT JUST COPY AND PASTE A DIAGRAM FROM THE INTERNET, YOU MUST DRAW THE DIAGRAM.

Task 5 – Biology – Movement of Substances:

1. What are the differences between Diffusion, Osmosis and Active Transport? (In your answer you should give an example of at least one place where each process happens).

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Task 6 starts on the next page.

Task 6 – Physics – What happened at Chernobyl?

The first part of this task is to watch a video that can be found on YouTube.

- Go to the search page on the YouTube website.
- Enter the phrase 'Chernobyl - surviving disaster' (including the dash) and the first search result should be a 59 minute and 30s video of the same name.
- Watch the video.
- Complete all the part of task 6.

1. What happened at Chernobyl over the 2 days of the 25th and 26th of April in 1986?

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Task 6 continues on the next page.

2. Just after 9:30 into the video 2 men start to realise something has happened to the skin on their faces. Explain what has happened.

3. What 'escaped' when the explosion and fire happened at the reactor?

4. What has Chernobyl got to do with Scottish farms?

Well done, that's it you've finished or have you? Did you just rush through the work to get it out of the way or did you actually spend some time on it and do a good job? This work has been set because completing it well will help prepare you to be successful in your studies and then your GCSEs. Take 5 minutes to go back and read through the work and see if you could add more detail if you did a bit more research. You don't have to do it all today. Improve your answer to one question now and do another tomorrow then another the day after. Have a great summer, see you again in September (with a quality piece of work completed to the best of your ability).