Biology Platinum	Chemistry Platinum	Physics Platinum
Carry out calculations involving magnification, real size and image size using the formula: magnification = size of image/size of real object and using standard form if needed. Explain the importance of cell differentiation. Recognise and describe situations in given contexts where mitosis is occurring. Apply knowledge and explain how stem cells can be used to treat diabetes and paralysis. Suggest advantages and disadvantages of cloning for rare species, using the cells in medicine and cloning crop plants for disease resistance including evaluation of the ethical and religious objections. Explain the need for carbon dioxide and oxygen to diffuse in gas exchange and for urea to diffuse from cells to blood plasma to be excreted at the kidney. Explain how cells and organs are adapted to maximise diffusion. Define osmosis and explain its importance in living things. Define active transport and explain why active transport is needed to absorb sugar in the small intestine for respiration and ions from the soil in root hair cells.	Suggest appropriate separation techniques for different mixtures based on the physical properties of the compounds in the mixture. Explain how and why the atomic model has developed as a result of the discoveries of the subatomic particles. Explain the conclusions drawn from Rutherford's scattering experiments. Explain why the overall charge on an atom is neutral. Explain the link between period or group number and electron configuration. Explain why different isotopes still have the same chemical properties. Suggest how Mendeleev convinced people to accept his periodic table. Suggest how Mendeleev predicted the properties of the missing elements. Suggest how Mendeleev's periodic table developed with our understanding of the subatomic particles in an atom. Explain how the reactivity of group 1 & 7 elements changes as you go down the groups, by considering their electron configurations, and give examples of their reactions to exemplify these trends. Predict reactions of fluorine and astatine based on knowledge of the other halogens. Explain in detail the factors affecting rate of reaction. Use experimental techniques to accurately measure rate of reaction	Explain what the internal energy of a system is. Explain how doubling velocity affects the kinetic energy of a moving object. Calculate spring constant from a graph of force vs extension. Calculate the energy stored in a spring using a force - extension graph. Outline how specific heat capacity can be investigated and factors that may affect the reliability of the results. Compare the efficiency of different systems and suggest ways to improve their efficiency based on reducing the "waste" energy. Explain what isotopes are and how they are similar and different they are. Explain why the different forms of radiation are best for different purposes. Identify the daughter nuclei from completed nuclear equations. Explain why gamma decay does not result in a mass change. Calculate the net decline expressed as a ratio in a radioactive emission after a given number of half-lives. Explain the importance of studies into the effects of radiation on humans and how and why peer review is an important aspect of any study into issues like this. Explain the link between specific latent heat and the change of state of a substance Explain the energy changes involved in the change of state of a substance
Biology Gold	Chemistry Gold	Physics Gold
Carry out calculations involving magnification, real size and image size using the formula: magnification = size of image/size of real object. Explain how the structure of different types of cell relate to their function in a tissue, an organ or organ system, or the whole organism. Give examples of cell differentiation. Explain how electron microscopy has increased understanding of sub-cellular structures. Understand the three overall stages of the cell cycle but do not need to know the different phases of the mitosis stage. Explain the function of stem cells in embryos, in adult animals and in the meristems in plants. Describe some beneficial uses of stem cells in both animals and plants and state the sources of these stem cells Describe what therapeutic means and evaluate the risks of organ transplant or other forms of invasive surgery versus therapy. Outline advantages of cloning for rare species, using the cells in medicine and cloning crop plants for disease resistance and give some of the risks associated with cloning.	Explain that filtration allows an insoluble solid to be separated from a liquid and crystallisation allows a soluble solid to be separated from a liquid. Explain how that chromatography is used for separation of mixtures of coloured compounds. Explain how distillation allows for the separation of two liquids with different boiling temperatures. Describe the scattering experiments performed by Rutherford and outline the discoveries of other subatomic particles and their arrangement in the atom. Calculate the numbers of protons, electrons and neutrons in different atoms, give the definition of isotopes and calculate the relative atomic masses for different elements given the % abundance of their isotopes. Explain how Mendeleev ordered and grouped the elements and why he needed to leave gaps. State and give reasons for the differences between the modern periodic table and Mendeleev's periodic table. Describe the differences between the physical and chemical properties of group 1 and transition metals. Give the electron configurations for group 1 and 7 elements and use them to explain	Rearrange equations to calculate work done, energy stored in a spring, gravitational potential energy, kinetic energy and heat energy transferred. Outline a practical to investigate the heat energy transferred to a substance. Explain the relationship between the extension of a spring and the force applied. Recall the equation to calculate power and rearrange and use it to calculate the power of different systems, energy transferred or time. Explain the meaning of the term efficiency. Calculate the number of neutrons in an atom and explain why the calculation works. Explain what happens to the charge of the atom if it loses or gains electrons. Explain how the gold scattering experiment led to the current atomic model. State the penetration power and ionising properties of the three types of radiation. Select the best type of radiation for different uses. Complete a nuclear equation if told that an atom decays with alpha, beta or gamma decay.

Explain the need for carbon dioxide and oxygen to diffuse in gas exchange. Describe how lungs, gills, intestines and leaves are adapted to maximise diffusion. Define osmosis give an example of its use in living things. Define active transport and explain how active transport is used to absorb sugar in the small intestine and ions from the soil in root hair cells.	why these elements are grouped together. State how the reactivity of group 1 & group 7 elements changes as you go down the group. Give the electron configurations for ions formed from group 1, 2, 6 & 7 elements and their charges. Draw dot and cross diagrams for the formation of compounds between group 1 & 7 elements and describe the electron transfers taking place as they form. Describe that particles must collide with enough energy to react. Link the use of catalyst to the term activation energy. Recall how different factors affect rate of reaction. Use equipment to safely investigate rates of reaction.	Use data of penetration and half life to identify a radioactive source. Explain why the precautions suggested would be effective in terms of the penetrating and ionising properties of the radiation. Explain the factors affecting gas pressure in terms of kinetic energy of gas particles. Calculate specific latent heat. Calculate density and explain the link between density and floating and sinking in different fluids. Use displacement to investigate the density of different materials. Explain the changes in the particle model during changes of state.
Biology Silver	Chemistry Silver	Physics Silver
Demonstrate an understanding of the scale and size of cells. Describe how the structure of different types of cell relate to their function in a tissue, an organ or organ system, or the whole organism. Explain how the main sub-cellular structures, including the nucleus, cell membranes, mitochondria, chloroplasts in plant cells and plasmids in bacterial cells are related to their functions. Outline how microscopy techniques have developed over time. Explain the need for cells to divide in order for an organism to grow (e.g. human zygote to human adult). Describe the function of stem cells in embryos, in adult animals and in the meristems in plants. Explain what therapeutic means and explain why it might be a better option than organ transplant or other forms of invasive surgery. Suggest uses and benefits of using cloning. Define diffusion and know that three factors that affect the rate at which it happens. Explain why cells need to be small in order to maximise the rate of diffusion. Define osmosis and active transport and give examples of their occurrence in plants and animals.	Explain the difference between a compound and a mixture; recognise substances as elements, compounds or mixtures from particle diagrams. Outline the methods for crystallisation, distillation, filtration and separation. Describe the plum pudding model for the atom and how it I different to the modern model of the atom. Know the masses, charges and locations of the subatomic particles. Calculate the numbers of protons, neutrons and electrons in an atom. Work out the electron configuration for different atoms. Outline developments in the structure of the periodic table and know how Mendeleev arranged the elements. Identify group 1 and transition metal and describe some differences between them. Describe the reactions of group 1 metals with water and the displacement reactions of group 7 elements.	Define energy as the capacity of a system to do work. Describe energy transfers and draw energy flow diagrams. Use equations to calculate work done, energy stored in a spring, gravitational potential energy, kinetic energy and heat energy transferred. Describe the relationship between the extension of a spring and the force applied. Describe what specific heat capacity is. Define power. Draw and interpret Sankey diagrams. Define efficiency and calculate it as a percentage or decimal. State what the numbers on a chemical symbol represent and can therefore state the number of protons and electrons in a neutral atom. Explain how the discovery of the electron led to the plum pudding model. State the device used for detecting radiation. Explain what it means to be ionising. Complete nuclear equations when given all the products but not their masses and proton numbers. Use a graph to find the half life of a source. Calculate the passage of time using a change in activity and knowledge of the half life. State what irradiation is and isn't. Compare the hazards associated with contamination and irradiation. State suitable precautions to take when using radioactive substances. Describe the motion and arrangement of particles in the particle model. Recall a definition for specific latent heat. Describe the link between density, mass and volume. Explain what causes gas pressure. Relate changes of state to changes in energy in the system.

Biology Bronze	Chemistry Bronze	Physics Bronze
Explain that cells are very small and a microscope is needed to see them. Describe how the main sub-cellular structures, including the nucleus, cell membranes, mitochondria, chloroplasts in plant cells and plasmids in bacterial cells are related to their functions. Describe that chromosomes are made of DNA molecules, that chromosomes contain many genes and that they are normally found in pairs. Describe the function of stem cells in embryos and in adult animals. State the difference between therapy and surgery. State some possible uses for stem cells. Describe the process of diffusion and give some of the factors that affect the rate of diffusion.	Define the terms element and atom, they will understand that the periodic table lists all of the elements and use the periodic table to find the symbols for the elements. Know that filtration, crystallisation, distillation and chromatography are used to separate mixtures. Describe the structure of an atom and identify the subatomic particles. Know that the modern periodic table was first proposed by Mendeleev. State some typical properties of metals and non metals. Identify metals and non metals based on the position of elements in the periodic table. Know that group 0 elements are unreactive. Recall what is meant by rate of reaction Recall some fast and slow chemical reactions	State the law of conservation of energy. Give the units for energy, mass, height, force, power, speed, temperature and work done. Give the relationship between force and extension using a force - extension graph. Interpret Sankey diagrams to find total input, useful output and wasted energy. Name most of the different circuit symbols. Draw the structure of an atom. State what the plum pudding model was. State that radioactive decay is random. State the units of activity. State the three types of radiation. Calculate the mass number and proton number when given a nuclear equation with the alpha and beta particles already written out. State what the half life of a radioactive source is. State what radioactive contamination is and the associated hazards. State the units for density. Recall the properties of solids, liquids and gasses and interpret cooling curves. Recall the names of the changes of state. Draw particle diagrams for solids, liquids and gases.