2016

|  |
| --- |
| Pupil Progress Document | J.A. Hargreaves |

NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| J A HARGREAVES | National 4 & 5 OUTCOME STATEMENTS |

CLASS: \_\_\_\_

****

**ALL UNITS**

| No. | Level | CONTENT |  | Traffic Light |  |
| --- | --- | --- | --- | --- | --- |
| 0.1 | N5 | I know the units for all of the physical quantities used in this course. |  | **☺** | **😐** | ☹ |  |
| 0.2 | N5 | I can use the prefixes: nano (n), micro(μ), milli (m), kilo(k), Mega(M) & Giga (G) |  | **☺** | **😐** | ☹ |  |
| 0.3 | N5 | I can give an appropriate number of significant figures when carrying out calculations (This means that the final answer can have no more significant figures than the value with least number of significant figures used in the calculation). |  | **☺** | **😐** | ☹ |  |
| 0.4 | N5 | I can use scientific notation when large and small numbers are used in calculations. |  | **☺** | **😐** | ☹ |  |

**ELECTRICITY & ENERGY** **(start:\_\_\_\_\_\_\_\_end: \_\_\_\_\_\_\_\_ )**

| No. | Level | CONTENT |  | Traffic Light |
| --- | --- | --- | --- | --- |
|  |  | **1. Generation of Electricity** |  |  |  |  |
| 1.1 | N4 | I can describe the advantages and disadvantages of different methods of electricity generation and distribution. |   | **☺** | **😐** | ☹ |
| 1.2 | N4 | I can describe & explain the potential role of different methods of electricity generation in future sustainable energy supply. |   | **☺** | **😐** | ☹ |
| 1.3 | N4 | I can explain the concept of energy efficiency and energy efficiency issues related to generation, distribution and use of electricity. |   | **☺** | **😐** | ☹ |
| 1.4 | N4 | I can describe energy transformations and can relate these to basic components in power stations. |   | **☺** | **😐** | ☹ |
|  |  | **2. Conservation of Energy** |  |  |  |  |
| 2.1 | N5 | I can apply the principle of ‘conservation of energy’ to examples where energy is transferred between stores. |   | **☺** | **😐** | ☹ |
| 2.2 | N5 | I can identify and explain ‘loss’ of energy where energy is transferred. |   | **☺** | **😐** | ☹ |
| 2.3 | N5 | I am able to complete a range of calculations involving potential and kinetic energy in situations involving conservation of energy. |   | **☺** | **😐** | ☹ |
| 2.4 | N5 | I can use appropriate relationships to solve problems involving conservation of energy. |   | **☺** | **😐** | ☹ |
|  |  | **3. Electrical Charge Carriers & Electrical Fields** |  |  |  |  |
| 3.1 | N5 | I can define electrical current as the electrical charge transferred per unit time. |   | **☺** | **😐** | ☹ |
| 3.2 | N5 | I can carry out calculations using Q=It where t is measured in seconds. |   | **** | **** |  |
| 3.3 | N5 | I can discuss and research the uses of electrostatics, for example: laser printers, paint spraying, cling film, forensic science, removal of dust, electrostatic precipitators, electrostatic separators |   | **** | **😐** | ☹ |
| 3.4 | N5 | I can explain the difference between ac and dc |   | **** | **😐** | ☹ |
| 3.5 | N5 | I can compare the traces of a.c with d.c when viewed on an oscilloscope. |   | **** | **😐** | ☹ |
|  |  | **4. Potential Difference (Voltage)** |  |  |  |  |
| 4.1 | N5 | I can describe the effect of electric fields on a charged particle |   | **** | **😐** | ☹ |
| 4.2 | N5 | I can define the potential difference (voltage) of the supply as a measure of the energy given to the charge carriers in a circuit.  |   | **** | **😐** | ☹ |
| 4.3 | N5 | I can carry out calculations using E=QV  |   | **** | **😐** | ☹ |
| 4.4 | N5 | I can describe the energy transfer and show that although there is an energy transfer in the circuit the law of conservation of energy still applies. |   | **** | **😐** | ☹ |
|  |  | **5. Ohm’s Law** |  |  |  |  |
| 5.1 | N5 | I can make use of a *V-I* graph to determine resistance. (gradient of V against I graph = resistance) |   | **** | **😐** | ☹ |
| 5.2 | N5 | I can make use of an appropriate relationship to calculate potential difference (voltage), current and resistance (V = IR). |   | **** | **😐** | ☹ |
| 5.3 | N5 | I can describe the relationship between temperature and resistance of a conductor. |   | **** | **😐** | ☹ |
|  |  | **6. Practical Electricity and Electronics** |  |  |  |  |
| 6.1 | N4 | I can make measurement of current, voltage and resistance using appropriate meters in series or parallel circuits. |   | **** | **😐** | ☹ |
| 6.2 | N5 | I can make measurements of current, voltage and resistance, using appropriate meters in complex circuits. |   | **** | **😐** | ☹ |
| 6.3 | N4 | I can identify and use a range of electrical and electronic components to construct practical electronic circuits and systems. |   | **** | **😐** | ☹ |
| 6.4 | N4 | I can solve problems involving current voltage and resistance  |   | **** | **😐** | ☹ |
| 6.5 | N5 | I can make measurements of I, V and R using appropriate meters in complex circuits. |   | **** | **😐** | ☹ |
| 6.6 | N4 | I can describe the symbol, function and application of standard electrical and electronic components including cell, battery, lamp, switch, resistor, variable resistor, voltmeter, ammeter, LED, motor, microphone, loudspeaker, solar cell, fuse, LDR, relay and group these as analogue and digital devices, input and output devices |   | **** | **😐** | ☹ |
| 6.7 | N5 | I can describe the symbol, function and application of standard electrical and electronic components including cell, battery, lamp, switch, resistor, variable resistor, voltmeter, ammeter, LED, motor, microphone, loudspeaker, photovoltaic cell, fuse, diode, capacitor, thermistor, LDR, relay and transistor |   | **** | **😐** | ☹ |
| 6.8 | N5 | I can draw and identify the symbols for an npn transistor, and an n-channel enhancement MOSFET |   | **** | **😐** | ☹ |
| 6.9 | N5 | I can explain the function of the transistors above as a switch in transistor switching circuits |   | **** | **😐** | ☹ |
| 6.10 | N4 | I can apply the current and voltage relationships in a series circuit. |   | **** | **😐** | ☹ |
| 6.11 | N4 | I can describe and explain practical applications of series and parallel circuits. |   | **** | **😐** | ☹ |
| 6.12 | N4 | I can use the relationship Rs=R1+ R2+R3 + to solve problems involving total resistance of resistors in a series circuit |   | **** | **😐** | ☹ |
| 6.13 | N4 | I can use and explain the use of AND/OR/NOT logic gates in electronic circuits |   | **** | **😐** | ☹ |
| 6.14 | N5 | I can perform calculations involving current and voltage relationships in a parallel circuit. |   | **** | **😐** | ☹ |
| 6.15 | N5 | I can make use of appropriate relationships to calculate the resistance of resistors in series and in parallel circuits and with circuits with combinations of resistors in series and parallel |   | **** | **😐** | ☹ |
|  |  | **7. Electrical Power** |  |  |  |  |
| 7.1 | N4 | I am able to state that electrical power is a measure of the energy transferred by an appliance every second. |   | **** | **😐** | ☹ |
| 7.2 | N4 | I can give the approximate power consumptions of different appliances, qualitatively (info) and quantitatively (data). |   | **** | **😐** | ☹ |
| 7.3 | N4 | I am able to use an appropriate relationship between Power, Energy and time to justify energy saving measures (E = Pt). |   | **** | **😐** | ☹ |
| 7.4 | N5 | I am able to use an appropriate relationship between Power, Energy and time (E = Pt). |   | **** | **😐** | ☹ |
| 7.5 | N4 | I can understand that being energy efficient will help us conserve resources, energy and the environment |   | **** | **😐** | ☹ |
| 7.6 | N5 | I can use appropriate relationships to determine the power, voltage, current and resistance in electrical circuits  |   | **** | **😐** | ☹ |
| 7.7 | N5 | I know that I would use a 3A fuse for most appliances rated up to 720W and a 13A fuse for appliances rated over 720W.  |   | **** | **😐** | ☹ |
| 7.8 | N5 | I could select the appropriate fuse rating given the power rating of an electrical appliance |   | **** | **😐** | ☹ |
| 7.9 | N4 | I can explain the concept of energy efficiency as a key factor in energy generation, distribution and use. |   | **** | **😐** | ☹ |
| 7.10 | N4 | I can calculate efficiency, given input and output Power / Energy (% efficiency = (useful Eo/Ei) x 100% ). |   | **** | **😐** | ☹ |
|  |  | **8. Electromagnetism** |  |  |  |  |
| 8.1 | N4 | I am able to describe the relationship between electricity and magnetism.  |   | **** | **😐** | ☹ |
| 8.2 | N4 | I can sketch the magnetic field pattern between poles of a magnet |   | **** | **😐** | ☹ |
| 8.3 | N4 | I can give practical applications of magnets and electromagnets. |   | **** | **😐** | ☹ |
| 8.4 | N4 | I can explain how transformers are used in high voltage transmissions and can use the formula Ns/Np =Vs/Vp |   | **** | **😐** | ☹ |
|  |  | **9. Specific Heat Capacity** |  |  |  |  |
| 9.1 | N5 | I understand that the same mass of different materials can require different quantities of heat energy to raise their temperature by 1 degree Celsius. |   | **** | **😐** | ☹ |
| 9.2 | N5 | I am able to explain that the temperature of a substance is a measure of the mean kinetic energy of its particles. |   | **** | **😐** | ☹ |
| 9.3 | N5 | I can explain the connection between temperature and heat energy. |   | **** | **😐** | ☹ |
| 9.4 | N5 | I am able to use appropriate relationships to carry out calculations involving: mass, heat energy, temperature change and specific heat capacity (Eh = cm∆T). |   | **** | **😐** | ☹ |
| 9.5 | N5 | I can use the principle of conservation of energy to determine heat transfer. |   | **** | **😐** | ☹ |
|  |  |  |  |  |  |  |
|  |  | **10. Gas Laws and the kinetic model**  |  |  |  |  |
| 10.1 | N5 | I can explain that pressure is the force per unit area exerted on a surface. |   | **** | **😐** | ☹ |
| 10.2 | N5 | I am able to use an appropriate relationship to calculate pressure, force and area (P = F/A). |   | **** | **😐** | ☹ |
| 10.3 | N4 | I can describe the kinetic model of a gas. |   | **** | **😐** | ☹ |
| 10.4 | N5 | I can describe the kinetic model of a gas and how this accounts for pressure |   | **** | **😐** | ☹ |
| 10.5 | N4 | I can explain the effects of varying pressure, temperature and volume on a fixed mass of ideal gas |   | **** | **😐** | ☹ |
| 10.6 | N4 | I can give some examples of applications of the kinetic model of a gas using knowledge of pressure, volume and temperature (for a mixed mass of ideal gas.) (e.g. weather balloons, free diving, pressurised aircraft cabin) |   | **** | **😐** | ☹ |
| 10.7 | N5 | I am able to describe applications of the kinetic model of a gas using knowledge of pressure volume and temperature for a fixed mass of gas. |   | **** | **😐** | ☹ |
| 10.8 | N5 | I can explain the relationship between the volume, pressure and temperature of a fixed mass of gas using qualitative (info) in terms of kinetic theory. |   | **** | **😐** | ☹ |
| 10.9 | N5 | I can use an appropriate relationship to calculate the volume, pressure and temperature of a fixed mass of gas (P1V1/T1(K) = P2V2/T2(K)). |   | **** | **😐** | ☹ |
| 10.10 | N5 | I can convert temperatures between Kelvin and degrees Celsius and understand the term absolute zero of temperature. |   | **** | **😐** | ☹ |
|  |  |  |  |  |  |  |

**WAVES & RADIATION (start:\_\_\_\_\_\_\_\_end: \_\_\_\_\_\_\_\_ )**

| No. | Level | CONTENT |  | Traffic Light |
| --- | --- | --- | --- | --- |
|  |  | **1. Wave Characteristics** |  |  |  |  |
| 1.1 | N4 | I can recognise and compare longitudinal and transverse waves. |  | **** | **** |  |
| 1.2 | N4 | I can explain frequency as the number of waves per second. |  | **** | **** |  |
| 1.3 | N4 | I can describe the wavelength and amplitude of transverse waves. |  | **** | **** |  |
| 1.4 | N4 | I can use appropriate relationships to solve problems involving frequency, no. of waves and time (*f=N/t*) |  | **** | **** |  |
| 1.5 | N4 | I can make use of numerical or graphical data to determine the frequency of a wave. |  | **** | **** |  |
| 1.6 | N4 | I am able to use an appropriate relationship between wave speed, frequency and wavelength (*v = f λ*) |  | **** | **** |  |
| 1.7 | N4 | I can make appropriate use of the relationship between distance, speed and time for waves (*d = vt*). |  | **** | **** |  |
|  |  | **2. Wave Parameters** |  |  |  |  |
| 2.1 | N5 | I can state that energy can be transferred as waves. |  | **** | **** |  |
| 2.2 | N5 | I can determine the frequency, wavelength, amplitude and wave speed for longitudinal and transverse waves. |  | **** | **** |  |
| 2.3 | N5 | I can make use of the relationships between wave speed, frequency, wavelength, distance and time (*v = f λ*) (*d = vt*)(*f=1/T*) (*f=no./t*) (*λ=d/no.*). |  | **** | **** |  |
| 2.4 | N5 | I can describe diffraction and associated practical limitations. |  | **** | **** |  |
| 2.5 | N5 | I can make comparisons of long wave and short-wave diffraction. |  | **** | **** |  |
|  |  | **3. Sound** |  |  |  |  |
| 3.1 | N4 | I can analyse sound waveforms where amplitude and frequency change. |  | **** | **** |  |
| 3.2 | N4 | I can make use of different methods to measure the speed of sound in air. |  | **** | **** |  |
| 3.3 | N4 | I can make sound level measurements (including use of the decibel scale). |  | **** | **** |  |
| 3.4 | N4 | I can identify sources of noise pollution and the risks to human hearing . |  | **** | **** |  |
| 3.5 | N4 | I can suggest methods of protecting hearing, such as absorbing sound using different materials. |  | **** | **** |  |
| 3.6 | N4 | I can describe & explain applications of sonar and ultrasound. |  | **** | **** |  |
| 3.7 | N4 | I can describe sound reproduction technologies. |  | **** | **** |  |
| 3.8 | N4 | I can describe applications of noise cancellation, especially as a way of reducing the risk of damage to hearing. |  | **** | **** |  |
|  |  | **4. Electromagnetic Spectrum** |  |  |  |  |
| 4.1 | N4 | I can describe the applications and hazards associated with electromagnetic radiations. |  | **** | **** |  |
| 4.2 | N4 | I can describe approaches to minimize the risk associated with electromagnetic radiations, e.g use of sunglasses to protect from UV and IR  |  | **** | **** |  |
| 4.3 | N4 | I can describe how the invisible parts of the EM spectrum can be detected. |  | **** | **** |  |
| 4.4 | N5 | I can state the relative frequency and wavelength bands of the electromagnetic spectrum. |  | **** | **** |  |
| 4.5 | N5 | I can make reference to typical sources, detectors and applications, of the electromagnetic spectrum. |  | **** | **** |  |
| 4.6 | N4 | I can give a description of refraction in terms of change of direction (where angle of incidence is greater than 0°). |  | **** | **** |  |
| 4.7 | N5 | I can describe the qualitative (info) relationship between the frequency and the energy associated with a form of radiation. |  | **** | **** |  |
| 4.8 | N5 | I can state that all radiations in the electromagnetic spectrum travel at the same speed of light (3x108 m/s in air) |  | **** | **** |  |
|  |  | **5. Light** |  |  |  |  |
| 5.1 | N5 | I can draw diagrams to describe refraction of light including identification of the normal, angle of incidence and angle of refraction. |  | **** | **** |  |
| 5.2 | N5 | I can give a description of refraction in terms of change of wave speed, change of l and change of direction (where angle of incidence is greater than 0°). |  | **** | **** |  |
|  |  | **6. Nuclear Radiation** |  |  |  |  |
| 6.1 | N4 | I can identify natural and artificial sources of radiation, and the associated medical and industrial applications. |  | **** | **** |  |
| 6.2 | N4 | I have considered the pros and cons of generating electricity using Nuclear Fuel. |  | **** | **** |  |
| 6.3 | N4 | I can compare the risk due to nuclear radiation and the other environmental hazards (e.g. global warming) and the management of these risks.  |  | **** | **** |  |
| 6.4 | N5 | I understand the nature of alpha, beta and gamma radiation: including the relative effect of ionization, their relative penetration.  |  | **** | **** |  |
| 6.5 | N5 | I can use the appropriate relationship to solve problems involving activity, number of nuclear disintegrations and time (*A=N/t*) |  | **** | **** |  |
| 6.6 | N5 | I can identify background sources of radiation, e.g. cosmic radiation from space, radioactivity from rocks (e.g. granite) and soil of the earth, radiation from buildings e.g radon, radiation from the human body etc artificial sources, such as medical, fallout from weapons tests or power stations and radioactive waste. |  | **** | **** |  |
| 6.7 | N5 | I can use appropriate relationships to solve problems involving absorbed dose and equivalent dose energy, mass and radiation weighting factor. (H = DWR, D = E / m). |  | **** | **** |  |
| 6.8 | N5 | I can compare equivalent dose due to a variety of natural and artificial sources. |  | **** | **** |  |
| 6.9 | N5 | I know that the average annual background radiation in the UK is 2.2 mSv |  | **** | **** |  |
| 6.10 | N5 | I can use the appropriate relationship to solve problems involving equivalent dose and time to calculate an equivalent dose rate (H dot=H/t) |  | **** | **** |  |
| 6.11 | N5 | I know that the average annual effective dose limit for a member of the public in the UK is 1 mSv (ie 1 mSv/y) |  | **** | **** |  |
| 6.12 | N5 | I am aware that there are limits to the equivalent dose rate and exposure limits for the public and for workers in radiation industries in terms of annual effective equivalent dose. |  | **** | **** |  |
| 6.13 | N5 | I can give some applications of nuclear radiation |  | **** | **** |  |
| 6.14 | N5 | I can use the appropriate relationship to solve problems involving equivalent dose rate, equivalent dose and time (H dot= H/t) |  | **** | **** |  |
| 6.15 | N5 | I can state that the activity of a source is measured in becquerels. |  | **** | **** |  |
| 6.16 | N5 | I can define half life as the ***Time for activity to decrease by half or time taken for half of the radioactive atoms to decay***  |  | **** | **** |  |
| 6.17 | N5 | I can use graphical and numerical data to determine the half-life |  | **** | **** |  |
| 6.18 | N5 | I can provide a qualitative (info) description of fission and fusion, emphasizing the importance of these processes in the generation of energy. |  | **** | **** |  |
|  |  |  |  |  |  |  |

**DYNAMICS & SPACE** **(start:\_\_\_\_\_\_\_\_end: \_\_\_\_\_\_\_\_ )**

| No. | Level | CONTENT |  | Traffic Light |
| --- | --- | --- | --- | --- |
|  |  | **1. Speed and Acceleration** |  |  |  |  |
| 1.1 | N4 | I can perform calculations involving the relationship between speed, distance and time (*d = vt*) |   | **** | **** |  |
| 1.2 | N4 | I can determine average and instantaneous speed. |   | **** | **** |  |
| 1.3 | N4 | I can interpret speed-time graphs to describe motion and can calculate distance travelled from them for objects which are speeding up, slowing down, stationary and moving |   | **** | **** |  |
| 1.4 | N4 | I can use the relationship involving acceleration, change in speed and time (a = ∆v/t). |   | **** | **** |  |
| 1.5 | N5 | I can use appropriate relationships to solve problems involving acceleration, initial velocity (or speed) final velocity (or speed) and time of change (a = (v – u)/t ). |   | **** | **** |  |
| 1.6 | N5 | I can find the acceleration from a velocity–time graph. |   | **** | **** |  |
|  |  | **2. Velocity and displacement - vectors and scalars** |  |  |  |  |
| 2.1 | N5 | I can define scalar quantities and vector quantities a scalar has magnitude/size, and unit only, a vector has magnitude/size and unit + direction |   | **** | **** |  |
| 2.2 | N5 | I can identify vector and scalar quantities such as: force, speed, velocity, distance, displacement, acceleration, mass, time and energy. |   | **** | **** |  |
| 2.3 | N5 | I can calculate the resultant of two vector quantities in one dimension or at right angles. |   | **** | **** |  |
| 2.4 | N5 | I can determine displacement and/or distance using scale diagram or calculation. |   | **** | **** |  |
| 2.5 | N5 | I can make use of appropriate relationships to solve problems on velocity, displacement and time in one dimension (s = ṽt). |   | **** | **** |  |
|  |  | **3. Velocity–Time Graphs** |  |  |  |  |
| 3.1 | N5 | I can draw velocity–time graphs for objects from recorded or experimental data. |   | **** | **** |  |
| 3.2 | N5 | I can interpret velocity–time graphs to describe the motion of an object. |   | **** | **** |  |
| 3.3 | N5 | I can find displacement from a velocity–time graph. |   | **** | **** |  |
|  |  | **4. Newton’s Laws** |  |  |  |  |
| 4.1 | N5 | I can use Newton’s laws and balanced forces to explain constant velocity (or speed), making reference to frictional forces. |   | **** | **** |  |
| 4.2 | N5 | I can use appropriate relationships to solve problems involving unbalanced force, mass and acceleration for situations where more than one force is acting, (F=ma) |   | **** | **** |  |
| 4.3 | N5 | I can use appropriate relationships to solve problems involving work done, unbalanced force, and distance or displacement. (Ew=Fd) |   | **** | **** |  |
| 4.4 | N5 | I can use appropriate relationships to solve problems involving weight mass and gravitational field strength, including on different planets (W=mg, where g is given on page 2 of section1) |   | **** | **** |  |
| 4.5 | N5 | I can use Newton’s 2nd law and its application to space travel, including rocket launch and landing. |   | **** | **** |  |
| 4.6 | N5 | I can use Newton’s 3rd law and its application to explain motion resulting from a ‘reaction’ force.  |   | **** | **** |  |
| 4.7 | N5 | I can use Newton’s laws to explain free-fall and terminal velocity. |   | **** | **** |  |
|  |  | **5. Relationship between forces, motion and energy** |  |  |  |  |
| 5.1 | N4 | I can use Newton’s 1st law and balanced forces to explain constant speed, making reference to frictional forces. |   | **** | **** |  |
| 5.2 | N4 | I can use Newton’s 2nd law to explain the movement of objects in situations where only one force is acting. |   | **** | **** |  |
| 5.3 | N4 | I can carry out calculations using the relationship between force, mass and acceleration in situations where only one force is acting. (F = ma).  |   | **** | **** |  |
| 5.4 | N5 | I can carry out calculations using the relationship between weight, mass and gravitational field strength within our solar system (W = mg).  |   | **** | **** |  |
| 5.5 | N5 | I understand the risks and benefits associated with space exploration including challenges of re-entry to a planet’s atmosphere. The use of thermal protection systems to protect spacecraft on re-entry. |   | **** | **** |  |
| 5.6 | N5 | I can carry out calculations involving the relationship between unbalanced force, mass and acceleration for situations where more than one force is acting (F = ma). |   | **** | **** |  |
|  |  | **6. Projectile Motion** |  |  |  |  |
| 6.1 | N5 | I can give an explanation of projectile motion. |   | **** | **** |  |
| 6.2 | N5 | I can use appropriate relationships to solve problems involving projectile motion from a horizontal launch using appropriate relationships and graphs. (horizontal motion is constant velocity, v=d/t, and vertical is constant acceleration, a=(v-u)/t)). |   | **** | **** |  |
| 6.3 | N5 | I can give an explanation of satellite orbits in terms of projectile motion. |   | **** | **** |  |
|  |  | **7. Satellites** |  |  |  |  |
| 7.1 | N4 | I can describe the range of heights and functions of satellites in orbit around the earth, including geostationary and natural satellites. |   | **** | **** |  |
| 7.2 | N4 | I can describe & explain that the higher the altitude of a satellite (height) the longer the period of orbit. |   | **** | **** |  |
| 7.3 | N4 | I can describe and explain the use of parabolic reflectors to send and receive signals. |   | **** | **** |  |
| 7.4 | N4 | I can use the relationship between distance, speed and time in scenarios related to satellite communication (d = vt). |   | **** | **** |  |
| 7.5 | N4 | I can describe a range of applications of satellites including telecommunications, weather monitoring and environmental monitoring. |   | **** | **** |  |
| 7.6 | N4 | I understand the use of satellites in developing our understanding of the global impact of mankind’s actions. |   | **** | **** |  |
|  |  | **8. Space exploration** |  |  |  |  |
| 8.1 | N5 | I can give evidence to support our current understanding of the universe from telescopes and space exploration. |   | **** | **** |  |
| 8.2 | N5 | I can give the benefits of satellite, for example GPS, weather forecasting, communications and space explorations (Hubble Telescope and ISS) |   | **** | **** |  |
| 8.3 | N5 | I can qualitatively explain that the greater the altitude (height) of a satellite the longer the period of its orbit. |   | **** | **** |  |
| 8.4 | N5 | I understand the potential benefits of space exploration including associated technologies and the impact on everyday life. |   | **** | **** |  |
| 8.5 | N5 | I can describe the risks and benefits associated with space exploration, including challenges of re-entry to a planet’s atmosphere, travelling large distances with the possible solution of attaining high velocity by using ion drive (producing a small unbalanced force over an extended period of time) or using a catapult from a fast moving asteroid, moon or planet |   | **** | **** |  |
| 8.6 | N5 | I can explain the manoeuvring of a spacecraft in zero friction environment, possibility of docking with the ISS |   | **** | **** |  |
| 8.7 | N5 | I can explain the difficulties of maintaining sufficient energy to operate life support systems in a spacecraft with the possible solution of using solar cells with area that varies with distance from the sun, |   | **** | **** |  |
| 8.8 | N5 | I understand the risks associated with manned space exploration, for example fuel load on take-off, potential exposure to radiation, pressure differential, and challenges of re-entry to a planet's atmosphere. |   | **** | **** |  |
| 8.9 | N5 | I can use the appropriate relationship to solve problems involving heat energy, mass and specific latent heat. (*EH = ml*) |   | **** | **** |  |
|  |  | **9. Cosmology** |  |  |  |  |
| 9.1 | N4 | I can define: planet, moon, star, solar systems, exo-planet, galaxy and universe. |   | **** | **** |  |
| 9.2 | N4 | I have an understanding of the scale of the solar system and universe measured in light years. |   | **** | **** |  |
| 9.3 | N4 | I have knowledge of space exploration and its impact on our understanding of the universe and planet Earth. |   | **** | **** |  |
| 9.4 | N4 | I understand the conditions required for an exo-planet to sustain life. |   | **** | **** |  |
| 9.5 | N5 | I can use the term ‘light year’ and convert between light years and metres. |   | **** | **** |  |
| 9.6 | N5 | I can give a description, origin and age of the observable universe. |   | **** | **** |  |
| 9.7 | N5 | I can describe how different parts of the electromagnetic spectrum are used to obtain information about astronomical objects. |   | **** | **** |  |
| 9.8 | N5 | I can identify continuous and line spectra. |   | **** | **** |  |
| 9.9 | N5 | I can use spectral data for known elements, to identify the elements present in stars. |   | **** | **** |  |
|  |  |  |  |  |  |  |

**Notes**