	Subject: Physics	T1-T2-T3-T4	Teacher name:
	Topic: Heating Processes	Date of assessment:	Student name:

STUDENT ASSESSMENT REVIEW SHEET

Heating Processes	Pre	Post
The development of heating technologies that use conduction, convection, radiation and latent heat have had, and continue to have, significant social, economic and environmental impacts. These technologies include:	☐	☐
• passive solar design for heating and cooling of buildings	☐	☐
• the development of the refrigerator over time	☐	☐
• the use of the sun for heating water	☐	☐
• engine cooling systems in cars.	☐	☐
The kinetic particle model describes matter as consisting of particles in constant motion, except at absolute zero	☐	☐
All substances have internal energy due to the motion and separation of their particles	☐	☐
Temperature is a measure of the average kinetic energy of particles in a system	☐	☐
Provided a substance does not change state, its temperature change is proportional to the amount of energy added to or removed from the substance; the constant of proportionality describes the heat capacity of the substance	☐	☐
This includes applying the relationship $Q = m c \Delta T$	☐	☐
Change of state involves separating particles which exert attractive forces on each other; latent heat is the energy required to be added to or removed from a system to change the state of the system	☐	☐
This includes applying the relationship $Q = m L$	☐	☐
Two systems in contact transfer energy between particles so that eventually the systems reach the same temperature; that is, they are in thermal equilibrium. This may involve changes of state as well as changes in temperature	☐	☐
A system with thermal energy has the capacity to do mechanical work [to apply a force over a distance]; when work is done, the internal energy of the system changes	☐	☐
Because energy is conserved, the change in internal energy of a system is equal to the energy added by heating, or removed by cooling, plus the work done on or by the system	☐	☐
Heat transfer occurs between and within systems by conduction, convection and/or radiation	☐	☐
Energy transfers and transformations in mechanical systems always result in some heat loss to the environment, so that the usable energy is reduced and the system cannot be 100 percent efficient	☐	☐
This includes applying the relationship efficiency $\eta = \frac{\text{energy output}}{\text{energy input}} \times \frac{100}{1}\ \%$	☐	☐

	Subject: Physics	T1-T2-T3-T4	Teacher name:
	Topic: Nuclear Physics	Date of assessment:	Student name:

STUDENT ASSESSMENT REVIEW SHEET

Ionising radiation and nuclear reactions	Pre	Post
Qualitative and quantitative analyses of relative risk (including half-life, absorbed dose, dose equivalence) are used to inform community debates about the use of radioactive materials and nuclear reactions for a range of applications and purposes, including:	☐	☐
• radioisotopes are used as diagnostic tools and for tumour treatment in medicine	☐	☐
• nuclear power stations employ a variety of safety mechanisms to prevent nuclear accidents, including shielding, moderators, cooling systems and radiation monitors	☐	☐
• the management of nuclear waste is based on the knowledge of the behaviour of radiation	☐	☐
The nuclear model of the atom describes the atom as consisting of an extremely small nucleus which contains most of the atom's mass, and is made up of positively charged protons and uncharged neutrons surrounded by negatively charged electrons	☐	☐
Nuclear stability is the result of the strong nuclear force which operates between nucleons over a very short distance and opposes the electrostatic repulsion between protons in the nucleus	☐	☐
Some nuclides are unstable and spontaneously decay, emitting alpha, beta (+/-) and/or gamma radiation over time until they become stable nuclides	☐	☐
Each species of radionuclide has a half-life which indicates the rate of decay	☐	☐
This includes applying the relationship $N = N_0 \left(\frac{1}{2}\right)^n$	☐	☐
Alpha, beta and gamma radiation have different natures, properties and effects	☐	☐
The measurement of absorbed dose and dose equivalence enables the analysis of health and environmental risks	☐	☐
This includes applying the relationships $\text{absorbed dose} = \frac{E}{m}$, dose equivalent = absorbed dose × quality factor	☐	☐
Einstein's mass/energy relationship relates the binding energy of a nucleus to its mass defect	☐	☐
This includes applying the relationship $\Delta E = \Delta m c^2$	☐	☐
Einstein's mass/energy relationship also applies to all energy changes and enables the energy released in nuclear reactions to be determined from the mass change in the reaction	☐	☐
This includes applying the relationship $\Delta E = \Delta m c^2$	☐	☐
Alpha and beta decay are examples of spontaneous transmutation reactions, while artificial transmutation is a managed process that changes one nuclide into another	☐	☐
Neutron-induced nuclear fission is a reaction in which a heavy nuclide captures a neutron and then splits into smaller radioactive nuclides with the release of energy	☐	☐
A fission chain reaction is a self-sustaining process that may be controlled to produce thermal energy, or uncontrolled to release energy explosively if its critical mass is exceeded	☐	☐
Nuclear fusion is a reaction in which light nuclides combine to form a heavier nuclide, with the release of energy	☐	☐
More energy is released per nucleon in nuclear fusion than in nuclear fission because a greater percentage of the mass is transformed into energy	☐	☐

	Subject: Physics	T1-T2-T3-T4	Teacher name:
	Topic: Electrical Circuits	Date of assessment:	Student name:

STUDENT ASSESSMENT REVIEW SHEET

Electrical Circuits	Pre	Post
The supply of electricity to homes has had an enormous impact on society and the environment. An understanding of electrical circuits informs the design of effective safety devices for the safe operation of: • lighting • power points • stoves • other household electrical devices.	☐	☐
There are two types of charge that exert forces on each other	☐	☐
Electric current is carried by discrete charge carriers; charge is conserved at all points in an electrical circuit *This includes applying the relationship* $I = \frac{q}{t}$	☐ ☐	☐ ☐
Energy is conserved in the energy transfers and transformations that occur in an electrical circuit	☐	☐
The energy available to charges moving in an electrical circuit is measured using electric potential difference, which is defined as the change in potential energy per unit charge between two defined points in the circuit *This includes applying the relationship* $V = \frac{W}{q}$	☐ ☐	☐ ☐
Energy is required to separate positive and negative charge carriers; charge separation produces an electrical potential difference that drives current in circuits	☐	☐
Power is the rate at which energy is transformed by a circuit component; power enables quantitative analysis of energy transformations in the circuit *This includes applying the relationship* $P = \frac{W}{t} = V I$	☐ ☐	☐ ☐
Resistance depends upon the nature and dimensions of a conductor	☐	☐

	Subject: Physics	T1-T2-T3-T4	Teacher name:
	Topic: Electrical Circuits	Date of assessment:	Student name:

Resistance for ohmic and non-ohmic components is defined as the ratio of potential difference across the component to the current in the component *This includes applying the relationship* $R = \frac{V}{I}$	☐ ☐	☐ ☐
Circuit analysis and design involve calculation of the potential difference across the current in, and the power supplied to, components in series, parallel, and series/parallel circuits *This includes applying the relationships* series components, I = constant, $V_t = V_1 + V_2 + V_3 \ldots$, $R_t = R_1 + R_2 + R_3 \ldots$ parallel components, V = constant, $I_t = I_1 + I_2 + I_3 \ldots$, $\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \ldots$	☐ ☐ ☐	☐ ☐ ☐
There is an inherent danger involved with the use of electricity that can be reduced by using various safety devices, including fuses, residual current devices (RCD), circuit breakers, earth wires and double insulation	☐	☐
Electrical circuits enable electrical energy to be transferred and transformed into a range of other useful forms of energy, including thermal and kinetic energy, and light	☐	☐