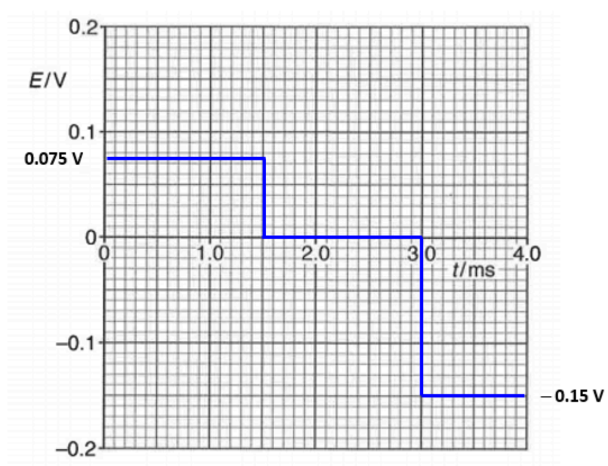
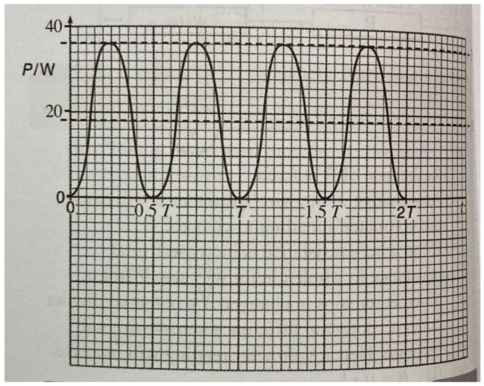
Errata

SL Education TYS

2023/P1/Q3	Answer is A instead of D, typo in the solution
2023/P2/Q8diii	The length of the rod will increase, due to the great difference in acceleration of free fall at the head and tail of the rod. The TYS solution mentioned that there is negligible difference which is wrong.
2020/P2/Q4ci	TYS solution missed out the power of ten in the axis. In addition, wavelength of light should be ~10^{-7} m. $x = \frac{\lambda D}{a}$ The gradient of the graph corresponds to $\frac{\lambda}{a}$. Gradient = $\frac{8.80 \times 10^{-3} - 4.40 \times 10^{-3}}{2.0 - 1.0} = 4.4 \times 10^{-3}$ $\lambda = (4.4 \times 10^{-3})(0.12 \times 10^{-3}) = 5.28 \times 10^{-7} m$
2020/P3/Q8a	In explosion-type collisions, relative speed of approach is 0. In completely inelastic collisions, relative speed of separation is 0. For an elastic collision, relative speed of approach = relative speed of separation, therefore for an inelastic collision, the relative speeds are not equal.
~~2019/P1/Q24~~	~~Answer is **D**, not that one stated in solution.~~ ~~When resistance of variable resistor is set to zero, the current will bypass the 1.0 kΩ resistor above it, hence effective resistance of the circuit will be just 1.0 kΩ, with the resistor on the right having a p.d. of 12 V.~~ ~~When the resistance of the variable resistor is set to 1.0 kΩ, the voltmeter will read the p.d. across the 1.0 kΩ on the right which can be calculated using the potential divider formula to be 8 V.~~
2019/P3/Q3b	Note that the solution assumes that the ideal gas is monatomic which is not necessarily true. The correct answer for this question can be obtained simply by understanding that in a cyclic process, the total change in internal energy

	is zero.
2019/P3/Q4ai	The explanation given is incomplete and confusing. Taking the initial depth that tube is submerged to be *h*. At equilibrium, the resultant of weight and upthrust will be equal to zero. $Mg = \rho A h g$ When the tube is displaced downwards, the upthrust will increase and resultant force will be upwards. $F_{net} = \rho A(h + x)g - Mg = \rho A x g$
~~2019/P3/Q6biii~~	~~The graph in the solution has **wrong shape.** The correct graph is shown below~~  ~~According to Faraday's law, the induced e.m.f. Is directly proportional to the rate of change of magnetic flux linkage.~~

	~~Since the magnetic flux density in a solenoid is directly proportional to the current flowing through it, for time 0.0 to 1.5 ms and time 3 to 4 ms, where current is changing at a constant rate, the magnetic flux density is changing at a constant rate as well.~~ ~~Hence by Faraday's law, we should expect the induced e.m.f. to be constant.~~
2019/P3/Q7a	The definition in solution did not refer to heating effect. Use the definition given here. It is equivalent to the steady direct current that converts electrical energy to heat energy at the same average rate as the alternating current in a given resistance.
2018/P1/Q11	Answer is **C,** not the one stated in solution booklet. D is possible if spacecraft is launched with initial KE.
2018/P1/Q19	Answer is **C,** not the one stated in solution booklet. This follows the definition given in notes.
2018/P2/Q3dii	As $\theta = n\lambda$ / OP where n is the n-th minimum and θ is small, θ is directly proportional to λ. At the centre O, $\theta = 0°$ for all wavelengths, hence all wavelengths overlap or interfere to form white light.
2018/P2/Q7d	The quantity of 730 mWh is the total amount of charge available from the supply. The current and time could vary provided the total, when the product of current and time is calculated, gave 730 mAh.
2018/P3/Q4aii	Magnetic flux is the product of the magnetic flux density B and the area normal to the field through which the field is passing. The magnetic flux linkage is defined as the product of the number of turns of the coil and the magnetic flux passing through the coil.
2018 P3 Q5c	The same question appeared in both 2018 P3 Q5 and 2019 P3 Q7. The SL solution for 2019 is correct while the SL solution for 2018 is wrong.

	 There should be two maximum power peaks within one period.
2018/P3/Q6c	$Force = \frac{final\ momentum\ of photons - initial\ momentum\ photons}{time}$ $= \frac{number\ of\ photons\ (final\ momentum\ of\ a\ photon\ - initial\ momentum\ of\ a\ photon}{time}$ $Energy\ of\ a\ photon = \frac{hc}{\lambda} = \rho c$ $momentum\ of\ a\ photon = \frac{E}{c} = \frac{2.925\ \times 10^{-19}}{3.0\ \times 10^{8}} = 9.75\ \times 10^{-28}\ kg\ m\ s^{-1}$ For photons that are reflected, $Force = \frac{final\ momentum\ of photons - initial\ momentum\ photons}{time}$ $= (0.55)(1.2\ \times 10^{16})[(9.75\ \times 10^{-28})cos52\ - (-9.75\ \times 10^{-28})cos52]$ $= 7.923\ \times 10^{-12}\ N$ For photons that are absorbed, $Force = \frac{final\ momentum\ of photons - initial\ momentum\ photons}{time}$ $= (0.45)(1.2\ \times 10^{16})[(9.75\ \times 10^{-28})cos52\ - 0]$ $= 3.241\ \times 10^{-12}\ N$ $Total\ Force\ normal\ to\ surface = 7.923\ \times 10^{-12}\ + 3.241\ \times 10^{-12}\ = 1.12\ \times 10^{-11}$ N
2018/P3/Q8ciii	Heat supplied given incorrectly, so
2017/P2/Q3a	Polarisation is where oscillations in a wave are confined to one direction only. The direction being at right angles to the direction of propagation of the wave.
2017/P2/Q4a	Clockwise!!! Not anticlockwise as stated in solution booklet.

2017/P2/Q6b	kinetic energy of electrons increases de Broglie wavelength decreases hence radius of circles decreases
~~2017/P2/Q6c~~	$\cancel{eV = \frac{1}{2} m v^2}$ $\cancel{= 2.05 \times 10^7 \text{ m s}^{-1}}$ $\cancel{\lambda = h/p = h/mv}$ $\cancel{= 3.5 \times 10^{-11} \text{ m}}$
2017/P3/Q1bii	The acceleration for v = 30 m s^{-1} should be determined using the gradient of the graph, a = 5.8 ± 0.2 m s^{-2} and (g - a) determined using the difference of 9.8 and the value for a.
2017/P3/Q5bi	"resolved" will not be accepted as it is considered not clear. Need to say "distinguishable" instead.
2017/P3/Q7c	"relatively small diameter compared with that of the atom" will not be accepted. Need to say "extremely or very small compared with that of atom".
2015/P3/Q8bii 2	$t_2 - t_1 = \frac{1}{2}T$ not T as stated in solution.
2015/P1/Q18	*C* The pulse undergoes a hard reflection at O since it is fixed. Therefore there will be a phase change of π rad.
2014/P3/Q7e	Should it not have a complete path?
2013/P3/Q4bii	• The flux in core is in phase with current in the primary coil. • By Faraday's law, there will be an induced e.m.f. in secondary coil because it experiences a rate of change of magnetic flux linkage. • The flux and rate of change of flux are not in phase. Original answer is not wrong, but hopefully, this is neater.
2012/P1/Q4	D The body was initially at rest, then the three forces of 50 N, 40 N and 40 N acted on it. This produces a resultant force of 10 N in the direction of XG. Hence subsequently when a 10 N force is applied in the direction GX, the net force becomes zero and the body will just continue to move in the direction of XG with uniform velocity.
2012/P1/Q12	B There is a typo in the answer. Should be D instead of B

2012/P2/Q3ai	Solution seemed to imply that resistance is the inverse of the gradient of the I-V graph. This is WRONG, resistance is the ratio of the potential difference across the conductor to the current flowing through it.
2012/P2/Q5bi	The maximum induced e.m.f. can be determined using the gradient of the straight line portion of the graph of *B* - *t*. $E = \frac{NBA}{t} = 500(7.25 \times 10^{-4})\frac{2.4}{0.009} = 0.9667$V The maximum current in *R* is determined using the maximum induced e.m.f. divided by the effective resistance. $I = \frac{E}{R_{eff}} = \frac{0.9667}{(10+5)} = 0.0644$A
2012/P2/Q5bii	*graph did not take into consideration of the transitional time at 0.01 s.* *the graph at 0.03, 0.05 s is drawn wrongly* Note that the graph should not be a square wave. Since the induced current is proportional the induced emf which is in turn proportional to rate of change of magnetic flux linkage and hence magnetic flux density, the gradient is changing gently at the 0.01 s and 0.03 s mark.
2011/P1/Q13	*D*. Angle POQ = 60° or π/3. Since the disc is rotating clockwise, line OP will need to complete ⅚ of a complete revolution before reaching OQ. Thus the angular displacement of OQ relative to OP is 5π/3.
2011/P2/6bi	*Extracted from Examiner Report: Only a small minority drew the line of best-fit. In most cases candidates did not realise that –2.8, 5.32 was an anomalous point and should be ignored.* Please note the solution booklet included the anomalous point so the best fit line shown is wrong. Moral of the story: there could be an anomalous point in the given data which you are tasked to plot best fit line for.
2011/P3/Q7biii	The method shown in solution booklet is correct, just that the mass was incorrectly substituted, the mass should be 320 g and not 620 g so the final answer should be 1.75 × 10^{-3}J.
2010/P1/10	B

	In order for a gas to expand, it will have to do work against the forces on it. Hence when we calculate the work done by the expanding gas using the expression $W = p\Delta V$, the external pressure has to be constant. This is also why a gas expanding in vacuum does not do any work as it does not need to overcome any forces.
2009/P1/11	Answer should be B not D.
2008/P3/Q5ai	Electric field strength is defined as the <u>electric force per unit **positive** charge</u> acting on a <u>stationary small positive test charge</u> placed at that point.
2008/P3/Q5bi	$N = \frac{8.6 \times 10^{-3}}{1.60 \times 10^{-19}} = 5.38 \times 10^{16}$