	Assessment statement	Obj	Teacher's notes
2.3.8	Distinguish between elastic and inelastic collisions.	2	Students should be familiar with elastic and inelastic collisions and explosions. Knowledge of the coefficient of restitution is not required.
2.3.9	Define *power*.	1	
2.3.10	Define and apply the concept of *efficiency*.	2	
2.3.11	Solve problems involving momentum, work, energy and power.	3	

2.4 Uniform circular motion

2 hours

This topic links with sub-topics 6.3 and 9.4.

	Assessment statement	Obj	Teacher's notes
2.4.1	Draw a vector diagram to illustrate that the acceleration of a particle moving with constant speed in a circle is directed towards the centre of the circle.	1	
2.4.2	Apply the expression for centripetal acceleration.	2	
2.4.3	Identify the force producing circular motion in various situations.	2	Examples include gravitational force acting on the Moon and friction acting sideways on the tyres of a car turning a corner.
2.4.4	Solve problems involving circular motion.	3	Problems on banked motion (aircraft and vehicles going round banked tracks) will not be included.

Topic 3: Thermal physics (7 hours)

3.1 Thermal concepts

2 hours

	Assessment statement	Obj	Teacher's notes
3.1.1	State that temperature determines the direction of thermal energy transfer between two objects.	1	Students should be familiar with the concept of thermal equilibrium.
3.1.2	State the relation between the Kelvin and Celsius scales of temperature.	1	$T/\text{K} = t/°\text{C} + 273$ is sufficient.

	Assessment statement	Obj	Teacher's notes
3.1.3	State that the internal energy of a substance is the total potential energy and random kinetic energy of the molecules of the substance.	1	Students should know that the kinetic energy of the molecules arises from their random/translational/rotational motion and that the potential energy of the molecules arises from the forces between the molecules.
3.1.4	Explain and distinguish between the macroscopic concepts of temperature, internal energy and thermal energy (heat).	3	Students should understand that the term thermal energy refers to the non-mechanical transfer of energy between a system and its surroundings. In this respect it is just as incorrect to refer to the "thermal energy in a body" as it would be to refer to the "work in a body".
3.1.5	Define the *mole* and *molar mass*.	1	
3.1.6	Define the *Avogadro constant*.	1	

3.2 Thermal properties of matter

5 hours

	Assessment statement	Obj	Teacher's notes
Specific heat capacity, phase changes and latent heat			
3.2.1	Define *specific heat capacity* and *thermal capacity*.	1	
3.2.2	Solve problems involving specific heat capacities and thermal capacities.	3	
3.2.3	Explain the physical differences between the solid, liquid and gaseous phases in terms of molecular structure and particle motion.	3	Only a simple model is required.
3.2.4	Describe and explain the process of phase changes in terms of molecular behaviour.	3	Students should be familiar with the terms melting, freezing, evaporating, boiling and condensing, and should be able to describe each in terms of the changes in molecular potential and random kinetic energies of molecules.
3.2.5	Explain in terms of molecular behaviour why temperature does not change during a phase change.	3	
3.2.6	Distinguish between evaporation and boiling.	2	
3.2.7	Define *specific latent heat*.	1	
3.2.8	Solve problems involving specific latent heats.	3	Problems may include specific heat calculations.

	Assessment statement	Obj	Teacher's notes
Kinetic model of an ideal gas **Aim 7:** There are many computer simulations of the behaviour of gases. **TOK:** The use of modelling in science may be introduced here.			
3.2.9	Define *pressure*.	1	
3.2.10	State the assumptions of the kinetic model of an ideal gas.	1	
3.2.11	State that temperature is a measure of the average random kinetic energy of the molecules of an ideal gas.	1	
3.2.12	Explain the macroscopic behaviour of an ideal gas in terms of a molecular model.	3	Only qualitative explanations are required. Students should, for example, be able to explain how a change in volume results in a change in the frequency of particle collisions with the container and how this relates to a change in pressure and/or temperature.

Topic 4: Oscillations and waves (10 hours)

4.1 Kinematics of simple harmonic motion (SHM)

2 hours

Aim 7: Many computer simulations of SHM are available.

	Assessment statement	Obj	Teacher's notes
4.1.1	Describe examples of oscillations.	2	
4.1.2	Define the terms *displacement*, *amplitude*, *frequency*, *period* and *phase difference*.	1	The connection between frequency and period should be known.
4.1.3	Define *simple harmonic motion* (*SHM*) and state the defining equation as $a = -\omega^2 x$.	1	Students are expected to understand the significance of the negative sign in the equation and to recall the connection between ω and T.
4.1.4	Solve problems using the defining equation for SHM.	3	
4.1.5	Apply the equations $v = v_0 \sin \omega t$, $v = v_0 \cos \omega t$, $v = \pm\omega\sqrt{(x_0^2 - x^2)}$, $x = x_0 \cos \omega t$ and $x = x_0 \sin \omega t$ as solutions to the defining equation for SHM.	2	
4.1.6	Solve problems, both graphically and by calculation, for acceleration, velocity and displacement during SHM.	3	