1. Kinematics

Weeks 1–3

运动学

They should be able to

1. Describe a scalar or vector quantity using magnitude and direction, as appropriate.
2. Describe a change in an object's position.
3. Describe the average velocity and acceleration of an object.
4. Describe the instantaneous position, velocity, and acceleration of an object as a function of time.
5. Describe the position, velocity, and acceleration of an object using representations of that object's motion.
6. Describe the reference frame of a given observer.
7. Describe the motion of objects as measured by observers in different inertial reference frames.
8. Describe the motion of an object moving in two or three dimensions.

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 01 (10 questions, answers on sheet 2)	
Teach the new content	Handout 01 Slide deck 01 Vocabulary list 01	
Practice guided then independent	Exercise sheets 1.1, 1.2, 1.3, 1.4, 1.5 Past-paper sheets 1.2, 1.3, 1.5	
Check before they leave	Unit test 1 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

2. Force and Translational Dynamics

Weeks 4–12

力与平动动力学

They should be able to

1. Describe the properties and interactions of a system.
2. Describe the location of a system's center of mass with respect to the system's constituent parts.
3. Describe a force as an interaction between two objects or systems
4. Describe the forces exerted on an object or system using a free-body diagram.
5. Describe the interaction of two objects or systems using Newton's third law and a representation of paired forces exerted on each object or system.
6. Describe the conditions under which a system's velocity remains constant.
7. Describe the conditions under which a system's velocity changes.
8. Describe the gravitational interaction between two objects or systems with mass.
9. Describe situations in which the gravitational force can be considered constant.
10. Describe the conditions under which the magnitude of a system's apparent weight is different from the magnitude of the gravitational force exerted on that system.
11. Describe inertial and gravitational mass.
12. Describe the gravitational force exerted on an object by a uniform spherical distribution of mass.
13. Describe kinetic friction between two surfaces.
14. Describe static friction between two surfaces.
15. Describe the force exerted on an object by an ideal spring.
16. Describe the equivalent spring constant of a combination of springs exerting forces on an object.
17. Describe the motion of an object subject to a resistive force.
18. Describe the motion of an object traveling in a circular path.
19. Describe circular orbits using Kepler's third law.

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 02 (10 questions, answers on sheet 2)	
Teach the new content	Handout 02 Slide deck 02 Vocabulary list 02	
Practice guided then independent	Exercise sheets 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10 Past-paper sheets 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10	
Check before they leave	Unit test 2 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

3. Work, Energy, and Power

Weeks 13–17

功、能与功率

They should be able to

1. Describe the translational kinetic energy of an object in terms of the object's mass and velocity.
2. Describe the work done on an object or system by a given force or collection of forces.
3. Describe the potential energy of a system.
4. Describe the energies present in a system.
5. Describe the behavior of a system using conservation of mechanical energy principles.
6. Describe how the selection of a system determines whether the energy of that system changes.
7. Describe the transfer of energy into, out of, or within a system in terms of power.

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 03 (10 questions, answers on sheet 2)	
Teach the new content	Handout 03 Slide deck 03 Vocabulary list 03	
Practice guided then independent	Exercise sheets 3.1, 3.2, 3.3, 3.4, 3.5 Past-paper sheets 3.1, 3.2, 3.3, 3.4	
Check before they leave	Unit test 3 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

4. Linear Momentum

Weeks 18–20

线动量

They should be able to

1. Describe the linear momentum of an object or system.
2. Describe the impulse delivered to an object or system.
3. Describe the relationship between the impulse exerted on an object or system and the change in momentum of the object or system.
4. Describe the behavior of a system using conservation of linear momentum.
5. Describe how the selection of a system determines whether the momentum of that system changes.
6. Describe whether an interaction between objects is elastic or inelastic.

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 04 (10 questions, answers on sheet 2)	
Teach the new content	Handout 04 Slide deck 04 Vocabulary list 04	
Practice guided then independent	Exercise sheets 4.1, 4.2, 4.3, 4.4 Past-paper sheets 4.1, 4.2, 4.3, 4.4	
Check before they leave	Unit test 4 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

5. Torque and Rotational Dynamics

Weeks 21–24

力矩与转动动力学

They should be able to

1. Describe the rotation of a system with respect to time using angular displacement, angular velocity, and angular acceleration.
2. Describe the linear motion of a point on a rotating rigid system that corresponds to the rotational motion of that point, and vice versa.
3. Identify the torques exerted on a rigid system.
4. Describe the torques exerted on a rigid system.
5. Describe the rotational inertia of a rigid system relative to a given axis of rotation.
6. Describe the rotational inertia of a rigid system rotating about an axis that does not pass through the system's center of mass.
7. Describe the conditions under which a system's angular velocity remains constant.
8. Describe the conditions under which a system's angular velocity changes.

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 05 (10 questions, answers on sheet 2)	
Teach the new content	Handout 05 Slide deck 05 Vocabulary list 05	
Practice guided then independent	Exercise sheets 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Past-paper sheets 5.1, 5.2, 5.3, 5.4, 5.5, 5.6	
Check before they leave	Unit test 5 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

6. Energy and Momentum of Rotating Systems

Weeks 25–27

转动系统的能量与动量

They should be able to

1. Describe the rotational kinetic energy of a rigid system in terms of the rotational inertia and angular velocity of that rigid system.
2. Describe the work done on a rigid system by a given torque or collection of torques.
3. Describe the angular momentum of an object or rigid system.
4. Describe the angular impulse delivered to an object or rigid system by a torque.
5. Relate the change in angular momentum of an object or rigid system to the angular impulse given to that object or rigid system.
6. Describe the behavior of a system using conservation of angular momentum.
7. Describe how the selection of a system determines whether the angular momentum of that system changes.
8. Describe the kinetic energy of a system that has translational and rotational motion.
9. Describe the motion of a system that is rolling without slipping.
10. Describe the motion of a system that is rolling while slipping.
11. Describe the motions of a system consisting of two objects or systems interacting only via gravitational forces.

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 06 (10 questions, answers on sheet 2)	
Teach the new content	Handout 06 Slide deck 06 Vocabulary list 06	
Practice guided then independent	Exercise sheets 6.1, 6.2, 6.3, 6.4, 6.5, 6.6 Past-paper sheets 6.1, 6.2, 6.3, 6.4, 6.5	
Check before they leave	Unit test 6 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

7. Oscillations

Weeks 28–30

振动

They should be able to

1. Describe simple harmonic motion.
2. Describe the frequency and period of an object exhibiting SHM.
3. Describe the displacement, velocity, and acceleration of an object exhibiting SHM.
4. Describe the mechanical energy of a system exhibiting SHM.
5. Describe the properties of a physical pendulum.

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 07 (10 questions, answers on sheet 2)	
Teach the new content	Handout 07 Slide deck 07 Vocabulary list 07	
Practice guided then independent	Exercise sheets 7.1, 7.2, 7.3, 7.4, 7.5 Past-paper sheets 7.1, 7.2, 7.4, 7.5	
Check before they leave	Unit test 7 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	