

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 (+ notes handout, 6-up) 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	

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 (+ notes handout, 6-up) Vocabulary list 02	
Practice guided then independent	Exercise sheets 2.1, 2.10, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9 Past-paper sheets 2.1, 2.10, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9	
Check before they leave	Unit test 2 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

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 (+ notes handout, 6-up) 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	

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 (+ notes handout, 6-up) 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	

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 (+ notes handout, 6-up) 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	

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 (+ notes handout, 6-up) 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	

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 (+ notes handout, 6-up) 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	