

AS91171
Demonstrate understanding of mechanics
Level 2 Credits 6

This achievement standard involves demonstrating understanding of mechanics.

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of mechanics.	Demonstrate in-depth understanding of mechanics.	Demonstrate comprehensive understanding of mechanics.

Written statements include mathematical solutions and/or descriptions. Descriptions may include graphs or diagrams.

MOTION

- Displacement
- Initial velocity
- Final velocity
- Acceleration
- Time
- Equations of motion
- Displacement- time graphs
- Velocity- time graphs
- Change in velocity
- Velocity vector components
- Constant acceleration in a straight line
- Free fall under gravity including terminal velocity
- Projectile motion
- Circular motion (constant speed with one force only providing centripetal force).

FORCES

- Force components
- Drawing force diagrams
- Vector addition of forces
- Unbalanced force and acceleration
- Torque
- Equilibrium
 - balanced forces
 - clockwise and anticlockwise torques
- Centripetal force and acceleration
- Force and extension of a spring
 - the spring constant
 - drawing force-extension graphs

MOMENTUM AND ENERGY

- Momentum
- Change in momentum in one dimension
- Change in momentum in one dimension and impulse
- Impulse and force
- Conservation of momentum in one dimension
- Elastic and inelastic collisions
- Work
- Power
- Conservation of energy
- Elastic potential energy
- Gravitational potential energy
- Kinetic energy

SKILLS

- The appropriate use of significant figures
- The appropriate use of units
- Negative index (e.g. ms^{-2}) notation or slash notation (e.g. m/s^2)

Notes

RELATIONSHIPS:

Formulae listed in this achievement standard will be supplied.

$$v = \frac{\Delta d}{\Delta t} \quad a = \frac{\Delta v}{\Delta t}$$

$$v_f = v_i + at \quad d = v_i t + \frac{1}{2} at^2$$

$$d = \frac{v_i + v_f}{2} t \quad v_f^2 = v_i^2 + 2ad$$

$$a_c = \frac{v^2}{r}$$

$$p = mv \quad \Delta p = F\Delta t$$

$$E_p = \frac{1}{2} kx^2 \quad E_k = \frac{1}{2} mv^2 \quad \Delta E_p = mg\Delta h$$

$$W = Fd \quad P = \frac{W}{t}$$

$$F = ma \quad \tau = Fd$$

$$F = -kx \quad F_c = \frac{mv^2}{r}$$

Demonstrate understanding involves writing statements that show an awareness of how simple facets of phenomena, concepts or principles relate to a described situation.

Demonstrate in-depth understanding involves writing statements that give reasons why phenomena, concepts or principles relate to a described situation. For mathematical solutions, the information may not be directly usable or immediately obvious.

Demonstrate comprehensive understanding involves writing statements that demonstrate understanding of connections between concepts.

This achievement standard replaced AS90255 and unit standard 6379.