

Y12 Lesson 1 Solutions

Motion in 1-D

1)

- a) $Velocity = 4t - 4 \text{ m/s}$; $Acceleration = 4 \text{ m/s}^2$
- b) $Displacement = 1680 \text{ m}$; $Velocity = 116 \text{ m/s}$; $Acceleration = 4 \text{ m/s}^2$
- c) $Displacement$ is 0 at $t = 0$ and $t = 2$; $Particle$ is stationary at $t = 1$

2)

- a) *Sketch, hailstone is small and light*
- b) $-gt$
- c) $3000 - gt^2/2$
- d) $t = 24.7 \text{ s}$; $v = 242 \text{ m/s}$
- e) $t = 17.5 \text{ s}$; $v = 171 \text{ m/s}$

Motion in 2-D

1)

- a) *Sketch*
- b) $Speed = 49.3 \text{ km/h}$; $Velocity = 42.5\mathbf{i} - 25\mathbf{j} \text{ km/h}$

2)

- a) $Displacement = 3t\mathbf{i} + 2t^2\mathbf{j} \text{ m}$; $Acceleration = 4\mathbf{j} \text{ m/s}^2$
- b) $t = 14.1 \text{ s}$; $x(14.1) = 42.4 \text{ km}$

Further Questions

1)

- a) $Acceleration = 6t\mathbf{i} + 4\mathbf{j} \text{ km/hr}^2$; $Displacement = t^3\mathbf{i} + 2t^2\mathbf{j} \text{ m}$
- b) $x^2 = 8y^3$
- c) *No*

2)

- a) $x = 2z^2$; *Parabola in the x-z plane*