Name of the Student:_____
Max. Marks : 23 Marks **Time : 23 Minutes**

Mark Schemes

Q1.

Question Number	Acceptable Answer	Additional Guidance	Mark
(a)	• use of $v^2 = u^2 + 2as$ **(1) OR** use of ½ mv^2 =mgh **(1)** • initial speed = 7.0 m s^{-1} **(1)**	Example of calculation: $v = 0$ $a = -9.81$ m s^{-1} $s = 2.5$ m $u^2 = -2as$ $u^2 = -(2 \times -9.81$ m $s^{-1} \times 2.5$ m) = 49 m^2 s^{-2} $u = 7.0$ m s^{-1} Alternative calculation: ½ v^2 = gh v = √(2gh) = √(2 x 9.81 x 2.5) = = 7.0 m s^{-1}	**2**
(b)	• use of trig function to find v vertical **(1)** • use of trig function to find v horizontal **(1)** • use of equation of motion to find time of flight **(1)** • use of equation of motion to find distance **(1)** • horizontal distance = 2.7 m **(1)**	Example of calculation vertical velocity = 6.5 m s^{-1} sin 20 = 2.22 m s^{-1} time of flight using $v = u + at$ -2.22 m s^{-1} = 2.22 m s^{-1} + (-9.81 m $s^{-1} \times t$) $t = 0.45$ s horizontal velocity = 6.5 m s^{-1} cos 20 = 6.11 m s^{-1} horizontal distance using $s = ut$ $s = 6.11$ m $s^{-1} \times 0.45$ s $s = 2.7$ m	**5**
(c)(i)	• use of $p=mv$ **(1)** • correctly applies conservation of momentum **(1)** • $v = 14.8$ m s^{-1} **(1)**	Example of calculation: momentum of lid = − momentum of canister 1.6 g × v = 4.3 g × 5.5 m s^{-1} $v = 14.8$ m s^{-1}	**3**
(c)(ii)	An explanation that makes reference to: • no unbalanced force on dry ice **(1)** • so no acceleration according to Newton's First Law **(1)**	MP2 is dependent on MP1 Allow suitable reference to Newton's Second Law for MP2	**2**

Q2.

Question Number	Acceptable Answers	Additional Guidance	Mark
(a)(i)	• measurements from page, 7 mm, 6.3 cm (1) • calculates area using 3 × 0.007 m × 0.063 m (1) • uses ± 1mm to calculate percentage uncertainties (1) • adds percentage uncertainties to calculate final uncertainty, 1.3×10^{-3} m^2 ± 0.2×10^{-3} m^2 (1)		**(4)**

Question Number	Acceptable Answers	Additional Guidance	Mark
(a)(ii)	• use of $I = P/A$ (1) • P= 1.61 W (1) • use of $P = IV$ (1) • use of efficiency = power output / power input (1) • efficiency = 0.096 or 9.6% (1) • comparison – this is about 10%, so correct (1)		**(5)**

Question Number	Acceptable Answers	Additional Guidance	Mark
(b)	• very small amount of energy (1) OR the hat is something we don't really need • so it isn't significant compared to the energy required to make it (1)		**(2)**