Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic : 2 (Mechanics)

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Name of the Student:______________________________

Max. Marks : 24 Marks **Time : 24 Minutes**

Mark Schemes

Q1.

Question Number		Mark
(a)	Graph does not have a zero gradient **Or** Graph does not shows constant velocity **Or** the velocity is constantly changing **Or** Graph always shows an acceleration (or deceleration) **Or** Graph not horizontal/ flat **Or** Graph not parallel to the time/x-axis **(1)** (Accept 'line/gradient/tangent' in place of 'graph')	**1**
(b) (i)	Use of gradient of tangent **(1)** a = 6.5 to 7.4 (m s^{-2}) (conditional mark) **(1)** (Check graph to make sure that the values have been read accurately from the graph, misreading from the graph will only score 1 mark even if the answer falls in the above range) <u>Example of calculation</u> Acceleration = $\frac{8.0\text{ m} - 1.2\text{ m}}{1.0\text{ s}}$ Acceleration = 6.8 m s^{-2}	**2**
(b)(ii)	Use of $F = ma$ **(1)** F = 0.016 to 0.018(N) (ecf acceleration from (b)(i)) **(1)** <u>Example of calculation</u> F = 6.9 m s^{-2} × 0.0024 kg = 0.017 N	**2**

(b) (iii)	Use of W = mg Drag = 0.006 to 0.008(N) (ecf) <u>Example of calculation</u> $W = 0.0024\ \text{kg} \times 9.81\ \text{N kg}^{-1} = 0.0235\ \text{N}$ $0.017 = 0.0235 - \text{drag}$ $\text{Drag} = 0.0065\ \text{N}$	**(1)** **(1)**	**2**
(b) (iv)	Use of Stokes' law equation with velocity either $5.2\ \text{m s}^{-1}$ or $6.6\ \text{m s}^{-1}$ $F = 3.5 \times 10^{-5}$ (N) or 4.5×10^{-5} (N) (no unit error) <u>Example of calculation</u> $F = 6\pi\eta rv$ $= 6\pi \times 1.8 \times 10^{-5} \times 2 \times 10^{-2} \times 5.2\ \text{m s}^{-1}$ $= 3.5 \times 10^{-5}\ \text{N}$	**(1)** **(1)**	**2**
(c)(i)	Correctly identifies a region of laminar flow and region of turbulent flow	**(1)**	**1**
(c)(ii)	the idea that there is turbulent flow **Or** ball is moving fast **Or** this is a large sphere **Or** Statement about Stokes law force for laminar flow only **Or** Stoke's law assumes that the ball is moving slowly (which this is not) **Or** Stoke's law is for a small sphere (and the hollow ball is large) **Or** A large amount of eddies increases the drag	**(1)**	**1**
(d)	**Max 3** Falls with constant acceleration At about 0.8 s: the ball bounces **Or** the ball changes direction Speed of ball after the bounce is less than the speed before the bounce Max height reached at about 1.3 s. Accelerations are the same before and after the bounce	**(1)** **(1)** **(1)** **(1)** **(1)**	**3**
	Total for question		**14**

Q2.

Question Number	Answer		Mark
(a)	Same (downwards) acceleration **Or** acceleration = g (accept constant acceleration)	(1)	**1**
(b)(i)	The ball is in contact with the floor (accept the ball bounces)	(1)	**1**
(b) (ii)	Lower gradient **Or** the lines would be not be as steep	(1)	**1**
(c)	Use of equation(s) of motion to find s **Or** use of distance = area under the graph **Or** use of GPE = KE $s = 1.1\ \text{m} - 1.4\ \text{m}$ <u>Example of calculation</u> $(4.7\ \text{m s}^{-1})^2 = (0\ \text{m s}^{-1})^2 + (2 \times 9.81\ \text{m s}^{-2} \times s)$ $s = 1.13\ \text{m}$	(1) (1)	**2**
(d)(i)	Use of $KE = ½ mv^2$ KE = 1.1 – 1.3 (J) (no ue) <u>Example of calculation</u> $KE = ½ \times 0.40\ \text{kg} \times (2.4\ \text{m s}^{-1})^2$ $= 1.15\ \text{J}$	(1) (1)	**2**
(d)(ii)	Use of GPE = KE $h = 0.27\ \text{m} - 0.32\ \text{m}$ (ecf from 16(d)(i)) (If area under graph or an equation of motion is used e.g. $h = \frac{(u+v)t}{2}$ or $v^2 = u^2 + 2as$ only MP2 can be scored) <u>Example of calculation</u> $h = \frac{1.2\ \text{J}}{0.4\ \text{kg} \times 9.81\ \text{Nkg}^{-1}}$ $h = 0.31\ \text{m}$	(1) (1)	**2**
(e)	(Elastic potential) energy transferred to thermal energy **Or** energy dissipated as heat	(1)	**1**
	Total for question		**10**