Chapter 9 Past Paper Questions - Answers

1. (i) weight greater than air resistance
[or (initially only) weight/gravity acting] **(1)**
hence resultant force downwards or <u>therefore</u> acceleration (2nd law) **(1)**
air resistance or upward force increases with speed **(1)**
until air resistance equals weight or resultant force is zero **(1)**
leaf moves at constant velocity (1st law)
[or 1st law applied correctly] **(1)**

(ii) air resistance depends on shape
[or other correct statement about air resistance] **(1)**
air resistance less significant **(1)**
air resistance less, therefore greater velocity
[or average velocity greater or accelerates for longer] **(1)** max 5
QWC 2

[5]

2. (a) (i) ($E_K = ½ mv^2$ =) $0.5 \times 68 \times 16^2$ **(1)** = **8700** or 8704(J) **(1)**

(ii) ($\Delta E_P = mg\Delta h$ =) $68 \times 9.8(1) \times 12$ **(1)** = **8000** or 8005 (J) **(1)**

(iii) any **three** from

gain of kinetic energy > loss of potential energy **(1)**

(because) cyclist does work **(1)** 7

energy is wasted (on the cyclist and cycle) due to air resistance or friction or transferred to thermal/heat **(1)**

KE = GPE + W – energy 'loss' **(1)** (owtte)

energy wasted (= 8000 + 2400 - 8700) = 1700(J) **(1)**

(b) (i) (u = 16 m s^{-1}, s = 160 m, v = 0, rearranging $s = ½ (u + v) t$ gives)

$160 = ½ \times 16 \times t$ or $t = \frac{2s}{(u+v)}$ or correct alternative

$\frac{2 \times 160}{16}$ (gets 2 marks) **(1)** = 20s **(1)**

(ii) acceleration $a = (\frac{v-u}{t} =) \frac{0-16}{20}$ ecf (b) (i) **(1)** = (–) **0.80** (m s^{-2})

resultant force $F = ma$ = 68 × (–) 0.80 **(1)** = (–) 54 (N) **(1)** or 54.4
or (work done by horizontal force = loss of kinetic energy
work done = force × distance gives)

force = $\frac{(\text{loss of kinetic})\text{energy}}{\text{distance}}$ **(1)** = $\frac{8700\text{ J}}{160\text{ m}}$ ecf (a) (i) **(1)** = 54 (N) **(1)** 6

[13]

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