ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Advanced Level

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MARKING SCHEME

JUNE 2012

PHYSICS **9188/2**

1 (a) Rate of change of displacement / speed in a specified direction B1
reject rate of change of displacement w time
ms^{-1} B1

(b) (i) (–) 2 mu B1

(ii) ~~collision is elastic~~ closed system, no external force, B1

(c) (i) $U - V = V_1 + V$ $u - v = v_1 + v$ B1

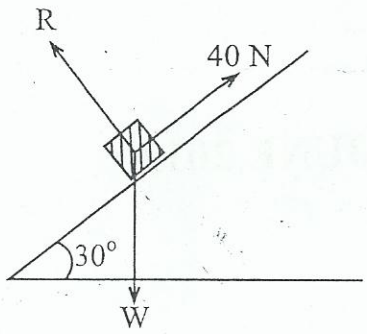
$V_1 = U - 2V$ B1

(ii) Final velocity is less than initial B1
gas has cooled / loses heat B1 [8]

2 (a) product of mass and acceleration / rate of change of momentum B1

The newton is a force which causes acceleration of 1 ms^{-2} on 1 kg mass. B1

(b) (i)



3 correct 2 marks
2 correct 1 mark,

~~– 1for for wrong force~~ B2

(ii) Resultant force = $40 \approx 4 \times 9.81 \times 0.5$ C1
$40 - 19.62$
= 20.4 N A1

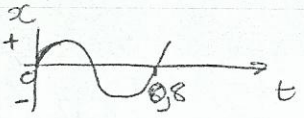
(iii) $a = \frac{F}{M} = \frac{20.4}{4} = 5.1 ms^{-2}$ A1

(c) Air resistance not negligible B1 (8)

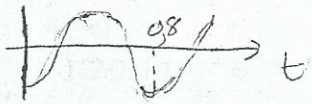
3 (a) (i) T = 0.8 s — A1

(ii) $f = \frac{1}{T} = \frac{1}{0.8}$ 1.3 s^{-1} — −1 — 1,25 S — B1 A1

(b) (i) correct starting point — B1
correct shape — B1



(ii) correct starting point — B1
correct shape — B1



(c) E_P maximum at maximum displacement, $E_k = 0$ — B1

E_P converted to E_k — B1

E_K maximum on passing equilibrium position, $E_P = 0$ — B1

E_K converted to E_P — B1

E_P maximum at maximum displacement $E_K = 0$ — B1

[max 4]

(d) (i) Oscillations where the amplitude becomes smaller and smaller with time — B1

(ii) Car suspension system, /moving coil meters/ — M1

critically damped — A1 [13]

4 (a) (i) Stress = $\frac{\text{force}}{\text{cross sectional area}}$ — If symbols are used explain the terms — B1

(ii) Strain = $\frac{\text{extension}}{\text{original length}}$ — B1

(iii) E = stress/ strain — B1

(b) (i) stress = $\frac{F}{A} = \frac{12 \times 9.81}{\Pi \times (10^{-3})^2} = 3.7 \times 10^7 \text{ p}_a$ — C1

$\frac{117,72}{3,141 \times 10^{-6}}$ — A1

(ii) Strain = $\frac{\text{stress}}{E} = \frac{3.7 \times 10^7}{7.0 \times 10^{10}}$ — C1

$= 5.4 \times 10^{-4}$ — A1

(iii) extension = L x strain = $2 \times 5.4 \times 10^{-4}$

= 1.1mm A1

1.1×10^{-3} m

(iv) energy = $\frac{1}{2} \times 12 \times 9.81\ 1.1 \times 10^{-3}$ C1

= 0.063J A1

0.065J

(c) Part of energy permanently deform the wire / energy lost as heat B1 c(ii)

5 (a) incompressible fluid / constant density B1

NO frictional force between layers / B1

(b) (i) $\Delta P = \frac{1}{2}\rho\left(V_2^2 - V_1^2\right) = \frac{1}{2} \times 1.29 \times \left(120^2 - 105^2\right)$ C1

= 2.18×10^3 Pa A1

(ii) F = $\Delta P \times A = 2.18 \times 10^3 \times 25$ C1

5.45×10^4 N

= 5.44×10^4 N A1

(c) so that air flows faster at top than at bottom creating pressure difference, B1

and ∴ lift force is generated B1 (8)

6 (a) minimum energy required to extract electrons from a metal surface B1

eqn terms defined.

(b) (i) E = hf

hf_o = 2.0 eV = $2.0 \times 1.6 \times 10^{-16}$ C1

$\therefore h\frac{c}{\lambda_o}$ = $2.0 \times 1.6 \times 10^{-16}$ C1

$\lambda_o = \frac{6.6 \times 10^{-34} \times 3 \times 10^8}{2.0 \times 1.6 \times 10^{-19}} = 6.2 \times 10^{-7}$ m A1

(ii) Maximum energy = $hf - \varphi$ B1

= $\frac{6.63 \times 10^{-34} \times 3 \times 10^8}{5.0 \times 10^{-7}} - 2 \times 1.6 \times 10^{-19}$ C1

= ~~7.6×10^{-20} J~~ 0.48eV A1

~~7.58×10^{-20} J~~

(iii) Stopping V

eV = maximum energy B1

$eV = 7.67 \times 10^{-20}$

$V = \dfrac{7.67 \times 10^{-20}}{1.6 \times 10^{-19}}$ C1

$= 0.479\ V$ A1

0,479V

(c) No emission of electrons A1

$\lambda > \lambda_o$ / equivalent statements in terms of frequency M1

(12)