Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic: Particle And Radiation

Merit Minds
www.merit-minds.com
Exam Preparation and Free Resources

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

Mark Schemes

Q1.

(a) $m = 16\ g = 0.016\ kg$ $r = 0.008\ m$

Use of $V = 4 / 3\ \pi\ r^3$ to give $V = 4 / 3\ \pi\ (0.008)^3$

$= 2.1 \times 10 - 6\ m^3$✓

The first mark is for calculating the volume

1

Use of density = m / V to give density = $0.016 / 2.1 \times 10^{-6}$✓

The second mark is for substituting into the density equation using the correct units

1

Density = $7.4 \times 10^3\ kg\ m^{-3}$ ✓

The final mark is for the answer.

1

(b) Use of $v^2 = u^2 + 2as$ to give $v^2 = 2\ (9.81)\ (1.27)$ ✓

(allow use of $mg\Delta h = ½\ mv^2$)

$v^2 = 25\ (24.9)$

The first mark is for using the equation

1

$v = 5.0\ (m\ s^{-1})$ ✓

The second for the final answer

1

(c) Use of $v2 = u2 + 2as$ to give $0 = u^2 + 2\ (-9.81)\ (0.85)$ ✓

The first mark is for using the equation

1

$u^2 = 17\ (16.7)$

$u = 4.1\ m\ s^{-1}$ ✓

The second for the final answer

1

(d) Change in momentum = $mv + mu = 0.016 \times 5 + 0.016 \times 4.1$✓

The first mark is for using the equation

1

= 0.15 (0.146) kg m s^{-1} ✓

The second for the final answer

1

(e) Use of Force = change in momentum / time taken

= 0.15 / 40 × 10^{-3} ✓

The first mark is for using the equation

1

= 3.6 N ✓

The second for the final answer

1

(f) Impact time can be increased if the plinth material is not stiff ✓

Alternative

A softer plinth would decrease the change in momentum of the ball (or reduce the height of rebound) ✓

1

Increased impact time would reduce the force of the impact. ✓

Smaller change in momentum would reduce the force of impact ✓

1

[13]

Q2.

(a) Peak power = 107 / 108 mW and load resistance = 290 / 310 Ω ✓

1

Use of power = I^2R with candidate values ✓

1

0.0186 – 0.0193 A ✓

1

(b) Area of cell = 36 x 10^{-4} m^2 and solar power arriving = 730 × (an area) ✓

1

$\frac{0.108}{2.63}$ seen ✓

1

0.041 (correct answer only; lose if ratio given unit) ✓

1

(c) energy of one photon = $\frac{hc}{\lambda}$ = 4.0 ×10^{-19} J ✓

1

Number of photons = $\frac{730 \times 36 \times 10^{-4}}{4.0 \times 10^{-19}}$ = 6.6 × 10^{18} s^{-1} ✓

1

(d) **Two** from

Intensity of the sun at the Earth's surface
Average position of the sun

Efficiency of the panel
Power output of 1 panel
Weather conditions at the installation=
✓✓

Allow other valid physics answers=

2

[10]