



EUNOIA JUNIOR COLLEGE JC2 MID-YEAR EXAMINATIONS 2022 General Certificate of Education Advanced Level Higher 1

H1 PHYSICS

PAPER 1 MARK SCHEME

Jul 2022

Question	Key	Question	Key	Question	Key
1	D	6	С	11	С
2	Α	7	Α	12	С
3	С	8	Α	13	Α
4	В	9	С	14	Α
5	Α	10	С	15	Α
16	D	21	D	26	В
17	В	22	В	27	D
18	В	23	С	28	D
19	В	24	Α	29	D
20	Α	25	D	30	D

1	Ans: D
	$\rho = \frac{m}{wlt} = \frac{51.6}{(100.0)(10.0)(0.02)} = 2.58 \text{ g cm}^{-3}$
	$\frac{\Delta\rho}{\rho} = \frac{\Delta m}{m} + \frac{\Delta w}{w} + \frac{\Delta l}{l} + \frac{\Delta t}{t}$ $\frac{\Delta\rho}{2.58} = \frac{0.1}{51.6} + \frac{0.1}{10.0} + \frac{0.1}{100.0} + \frac{0.01}{0.20}$ $\frac{\Delta\rho}{2.58} = 0.06293798$ $\Delta\rho = 0.16238 = 0.2 \text{ g cm}^{-3} \text{ (to 1 s.f.)}$ $\rho = 2.58 = 2.6 \text{ g cm}^{-3} \text{ (since } \Delta\rho \text{ is to 1 d.p.)}$
2	Ans: A
	$v = k \left(\frac{\Delta P}{\rho}\right)^n$
	LHS units: $[v] = m s^{-1}$
	RHS units: $[k\left(\frac{\Delta P}{\rho}\right)^n] = \left(\frac{kg m s^{-2} m^{-2}}{kg m^{-3}}\right)^n = (s^{-2} m^2)^n$
	Therefore n = 1/2

3	Ans: C
	Accuracy refers to the degree of agreement between values of measurements and the actual or accepted value.
	Precision refers to the degree of agreement among values of measurements themselves.
	The measurements of 891 mm and 892 mm differ by more than 1 mm from the true value of 895 mm. Hence the measurements are not accurate to within 1 mm.
	As the measurements of 891 mm and 892 mm differ by 1 mm among themselves, they are precise to within 1 mm.
4	Ans: B
5	Ans: A
9	Ans: C He decelerated in one direction and accelerated in the opposite direction at the same rate. Therefore the acceleration vector should be in the same direction before and after he made the U-turn.
7	Ans: A Horizontal component: $s_x = v_x t$ $900 = 450 cos(31.6^{\circ}) t$ t = 2.35 s Vertical component:
	$s_{y} = u_{y}t + \frac{1}{2}a_{y}t^{2}$ $s_{y} = 450\sin(31.6^{\circ})(2.35) + \frac{1}{2}(-9.81)(2.35)^{2}$
•	$s_y = 527 \text{ m}$
8	Ans: A Change in momentum = Area under F-t graph = $10 \times (4 + 6) / 2 = 50 \text{ N s}$
9	Ans: C Kinetic Energy = $p^2/2m$ Since both M and m have the same Kinetic Energy, $p^2 \alpha m$ $\therefore \frac{p_M^2}{p_m^2} = \frac{M}{m}$ $\frac{p_M}{p_m} = \sqrt{\frac{M}{m}}$
10	Ans: C Since the ball is momentarily stopped, the resultant force cannot be zero. The resultant force is upward since the ball is undergoing compression.

11	Ans: C			
	For elastic collision,			
	Relative speed of approach = relative speed of separation			
	$V_2 - V_1 = U_1 - U_2$			
	(where the sign conventions of U_1 , U_2 , V_1 , V_2 are to the right)			
	Hence $W_{i} = (-W_{i}) \equiv V_{i} = (-W_{i})$			
	Hence $\mathbf{u}_{\mathbf{x}} = (-\mathbf{u}_{\mathbf{y}}) = \mathbf{v}_{\mathbf{y}} = (-\mathbf{v}_{\mathbf{x}})$ $\mathbf{u}_{\mathbf{x}} = \mathbf{u}_{\mathbf{x}} = \mathbf{v}_{\mathbf{x}} + \mathbf{v}_{\mathbf{x}}$			
	$a_x \cdot a_y \cdot v_x \cdot v_y$			
12	Ans: C			
13	Ans: A			
	$\Sigma \tau = 0$			
	Normal reaction from surface can be balanced by weight.			
	Hence $\Sigma F = 0$			
14	Ans: A			
	Taking moments about A:			
	$M \alpha \cos 30^{\circ} (1 0) = 4.0 \alpha (0.60)$			
	M = 2.8 kg			
	<u></u>			
15	Ans: A			
	The 3 forces acting on the rod is weight, F and the hinge force			
	For aquilibrium, all 3 forces must pass through a common point (concurrent) and			
	form a closed triangle			
	ionn a closed thangle.			
16	Ans: D			
	Work Done = Increase in GPE = <i>mgh</i>			
	= 200 (9.81)(15)			
	= 29 430 J			
	Power Output = $29430/60$ = 490.5 W			
	Efficiency = Power output/ Power input			
	0.03 - 490.37 Fowel input Power Input = 490.5 / 0.65 = 750 W/			
	1 ower input = 400.07 0.00 = 700 W			
17	Ans: B			
	Lorry is accelerated from rest to a speed of 100 km h ⁻¹ .			
	Work done by lorry's engine = increase in lorry's K.E.			
	Friction has to be ignored as minimum time is to be considered			
	$Dt = \frac{1}{2}mm^2$			
	$Pt = \frac{1}{2}mv$			
	$t = \frac{mv^2}{2P}$			
	where $v = 100 \text{ km} \text{ h}^{-1} = 27.78 \text{ m} \text{ s}^{-1}$			
	$\therefore t = \frac{(2000)27.78^2}{2\times 50000} = 15.4 \text{ s}$			
	2×50000			

18	Ans: B
	Efficiency of LED = $\frac{(8 \times 3600) - (3.4 \times 1055)}{(8 \times 3600) - (3.4 \times 1055)} \times 100\% = 87.5\%$
	(8×3600)
	Efficiency of CEL = $(15 \times 3600) - (30 \times 1055) + 1000/$ 41.40/
	Efficiency of CFL = (15×3600) $\times 100\% = 41.4\%$
	Difference = $87.5.\%$ $41.4.\% = 46\%$
	Difference $= 07.5 / 0 = 41.4 / 0 = 40 / 0$
19	Ans: B
	$F_{\text{not}} = \frac{mv^2}{m} \rightarrow mq - R = \frac{mv^2}{m}$
	$r \rightarrow mg r r$
	$R = mg - \frac{mv^2}{r}$
20	Ans: A
	The net force is perpendicular to the velocity at all times, and therefore the
	instantaneous displacement.
24	Ans: D
21	Alls. D
	$mR\omega^2 = \frac{OWIII}{D^2}$
	∇
	$mR(\frac{2\pi}{T})^2 = \frac{GWIII}{D^2}$
	$I = R^2$
	I ² ∝R ³
	The period of orbit of a satellite is independent of mass but dependent on
	the radius of orbit. As both satellites have the same period of orbit, they
	must have the same radius of orbit.
	However, just because a satellite has a 24 hour period does not mean it
	must be a geostationary satellite. The satellite need not be above the
	Earth's direction of rotation
22	Ans: B
	The solution can be obtained by calculating the resistance between the various junctions
	given in options A, B, C and D.
	For option B, the resistance between junctions Q and S is:
	$1/R_{Qs} = 1/(2+8) + 1/(4+6)$
	$1/R_{Qs} = 1/10 + 1/10$
	1/R _{Qs} = 2/10
	R_{Qs} = 5 Ω



26	Ans: B
	Use Fleming's LHR.
27	Ans: D
	According to Fleming's left hand rule, the particle experiences a magnetic force that is perpendicular to its velocity and the magnetic field that it experiences. With magnetic field directed into the paper and current directed downwards, the magnetic force acting on the electrons is rightwards.
28	Ans: D
	Using Fleming's left hand rule for force to be upwards, current must flow from Q to P and magnetic field must be in z direction.
	Magnetic force = weight , if tensions are to be zero.
	$BIL = \rho ALg$
	$I = \rho Ag/B$
29	Ans: D
30	Ans: D
	Majority of the α -particles managed to pass through the gold foil without being deflected since the atom consists of mostly empty space.